

## LUND UNIVERSITY

#### RQ20 - Lund University's research guality evaluation 2020

Benner, Mats; Bredenberg, Malin; Ståhlberg, Freddy

2021

Document Version: Publisher's PDF, also known as Version of record

Link to publication

Citation for published version (APA): Benner, M., Bredenberg, M., & Ståhlberg, F. (Eds.) (2021). RQ20 - Lund University's research quality evaluation 2020. Lund University.

Total number of authors: 3

#### **General rights**

Unless other specific re-use rights are stated the following general rights apply:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights. • Users may download and print one copy of any publication from the public portal for the purpose of private study

or research.

- · You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: https://creativecommons.org/licenses/

#### Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

**PO Box 117** 221 00 Lund +46 46-222 00 00

# **RQ20**

- LUND UNIVERSITY'S RESEARCH QUALITY EVALUATION 2020



RQ20 (Research Quality Evaluation 2020), the major research quality evaluation at Lund University, is part of a cycle of assessments done in the last two decades. RQ20 differs from the former evaluations in that it assesses the *preconditions* for research quality and the potential areas of *elevation* in all parts of the University, rather than being an evaluation of research quality. The many dimensions involved in RQ20 covers issues like how units are organised and governed, how research quality is assessed by the units themselves and their partners, how research is intertwined with education, the form and nature of societal networks, and funding strategies.

Such an approach is founded on interactivity, where those assessed take an active part by clarifying how they work in their own words, and where external experts provide advice on the basis of self-assessments and other documentation of the units' activities. Employing these methods, RQ20 also set out to examine how the university deals with five overarching issues: leadership, infrastructure, large and interdisciplinary research areas, recruitment and external engagement.

Importantly, this report is not the final statement on research at Lund University nor does it provide a "silver bullet" for enhanced quality. Quality work is a never-ending process, where RQ20 is only one part of a succession of activities.

If we want things to stay as they are, things will have to change (Tomasi di Lampedusa)





eds. Mats Benner, Malin Bredenberg and Freddy Ståhlberg



Photographers **COVER:** Johan Persson | **PART I:** Kennet Ruona 16 29 31 34 45 60 90, Malin Bredenberg 16 25 50 52 73, Louise Larsson 16, Mats Benner 16, Mikael Risedal 16 69, Brita Larsson 23, Charlotte Carlberg Bärg 39 90, Håkan Röjder 65 90, Leif Jansson 90 | **PART II:** Kennet Ruona 92 102 238 256 276 474 522 588 642 688 716, Mikael Risedal 92 256 276, Håkan Röjder 92 102 688, Charlotte Carlberg Bärg 102 238 588 716, Leif Johansson 238, Stefan Bengtson 256, Johan Persson 474 642 688, Inger Henrikson Ekström 474, Linnea Albertén 522, Johan Bävman 642, Perry Nordeng 716 | **PART III:** Kennet Ruona 732 747 752 778, Johan Bävman 760, Mikael Risedal 767 801, Gunnar Menander 817

© Lund University and the editors

Editors (Project group in alphabetical order): Mats Benner, Malin Bredenberg and Freddy Ståhlberg

Lund University https://www.lunduniversity.lu.se/

ISBN 978-91-7267-433-2 (Print) ISBN 978-91-7267-434-9 (PDF)

Layout by Gunilla Albertén, Media-Tryck, Lund University and Maria Wendel, Corporate Communication, Lund University



Printed by Elanders Sverige AB, 2021

## Vice-Chancellor's preface

Quality in research arises from the research process – when skilled researchers systematically and creatively succeed in investigating a field of study and drawing relevant conclusions.

The University's research does not rest on the vice-chancellor, the deans and the heads of department, but management structures and support systems can contribute to creating favourable conditions for high quality research – or not. Our systems for funding, recruitment and promotion, and our decision-making structure affect the conditions for research. Our support systems, our leadership and our work environment affect the everyday life of researchers and thereby the possibility of conducting high quality research.

How well does Lund University succeed in achieving its potential for the highest quality in research? RQ20 will provide a picture of this and highlight areas for potential development that will enable us to improve conditions for research.

I am impressed with the organisation's thorough work to produce the documentation on which RQ20 is based. Many hours of writing, reflection and discussion underpin the 161 self-evaluations from the organisation. I hope that the recommendations from the panels will provide good guidance for future work.

I would also like to extend warm thanks to the project management for RQ20 and the reference group that has worked purposefully and constructively.

Now, my hope is that all the levels of management will take the time to carefully study the recommendations that emerged from the evaluations and the project management and that they will continue this work through change implementation.

*Torbjörn von Schantz* Vice-Chancellor, 2015-2020

## Acknowledgements

The core RQ20 administration consisted of three people. If anything is certain, it is the fact that this report could not have been created by us alone. Numerous colleagues inside as well as outside our University have contributed to the long, sometimes elaborate but always rewarding process of creating this report. We would therefore like to extend our sincere gratitude for all the support along the way to:

*The leadership of Lund University*, for giving us this task, for giving us the freedom to execute it in a way that we saw fit, and for supporting us all the way;

The RQ20 Reference Group (listed below), with whom we met every second week for almost two years, for fruitful discussions, endurance and a spirit of collaboration and friendship which continuously has encouraged us;

Tim Djärf, Student Representative Ylva Hofvander Trulsson, Faculty of Fine and Performing Arts Almut Kelber, Faculty of Science (until 31 December 2019) Sven Mattisson, Faculty of Engineering (LTH) Titti Mattsson, Faculty of Law Anna Meeuwisse, Faculty of Social Sciences Per Persson, Faculty of Science (from 1 January 2020) Fredrik Sjöholm, School of Economics and Management Sven Strömqvist, Joint Faculties of Humanities and Theology Marjolein Thunnissen, MAX IV Gunilla Westergren-Thorsson, Faculty of Medicine

*The External Advisors in subject panels and transversal panels (Report Part II and Report Part III)* for lending us your expertise, for always answering e-mails on time and for delivery of 32 + 5 reports, creating the backbone of the RQ20 report;

The Faculty Coordinators (listed below) for their invaluable help with one of the most challenging tasks of RQ20: arranging the virtual subject panel meeting week in May 2020.

Lovisa Eriksson, Faculty of Social Sciences Tord Hjalt, Faculty of Engineering Gunnel Holm, Joint Faculties of Humanities and Theology Helena Josefsson, Faculty of Law Birgitta Larsson, Faculty of Medicine Catrin Malmström, Faculty of Science Emelie Niléhn, Faculty of Social Sciences Jesper Olsson, Faculty of Fine and Performing Arts Jeanette Ströberg, School of Economics and Management Marjolein Thunnissen, MAX IV

All Internal Subject Panel Coordinators, Units of Assessment Coordinators and Participants in Subject Panel and Transversal Panel meetings for your time and your efforts to write panel overviews, organise self-evaluations and for making the virtual meetings a success in spite of the pandemic; The Faculty Deans, Pro-deans, Heads of faculty offices and other colleagues at faculty management level for your efficient way of distributing RQ20 tasks among your coworkers, and for enduring the flow of RQ20 information to your mailboxes over 2 years;

LU Conferences, for helping us with the RQ20 support web pages and for excellent support when we were forced to convert all physical meetings during 2020 to digital meetings;

*Research Services at LU Administration* for continuous help with the administration of this large project, covering all aspects from the startup phase to the handling and administration of project finance;

*The University Librari*es and *The Strategic Development Office* at LU Administration for invaluable help with the publication base data and the financial base data;

And, last but not least:

All 4700+ researchers at Lund University for creating the self-evaluations – without these the external panel reports would not have seen daylight and the RQ20 project would not have been fulfilled.

THANK YOU!

*Freddy Ståhlberg* Project Leader

Mats Benner

Project Leader

Malin Bredenberg

Project Coordinator

## Report overview and summary

## Summary in English

RQ20 was incepted by the vice-chancellor in 2019 with the aim and ambition to assess the preconditions for research quality within the University as a whole and its constituent parts. RQ20 is part of a cycle of assessments done in the last two decades, with one round in 2008 and one in 2014. RQ20 differs from the other two evaluations in that it assesses the *preconditions* for research quality and the potential areas of *elevation* in all parts of the University, rather than being an *evaluation* of research quality. RQ20 is part of an evolving understanding of research quality, where a key element is to gauge the preconditions for quality, and provide advice on how they might be improved, rather than just awarding grades.

It has thereby taken a long-term future-oriented approach, where every unit and every activity is assessed in a multidimensional manner, with the aim to secure their future viability and, ultimately, Lund University's position in a global research system. The many dimensions involved in RQ20 covers issues like how units are organised and governed, how research quality is assessed by the units themselves and their partners, how research is intertwined with education, the form and nature of societal networks, funding strategies, and recruitment. The underlying assumption is that these issues in their totality form and shape the preconditions for quality in research.

Such an approach is founded on interactivity, where those assessed take an active part by clarifying how they work in their own words, and where external experts provide advice on the basis of self-assessments and other documentation of the units' activities.

162 units of assessments – units identified by the nine faculties – reported their activities, and 32 external panels (also formed by the faculties and with panelists identified in collaboration between the units and the RQ20 office) – read and interacted with the units on that basis.

Three themes for improvement stand out in the subject panel reports: recruitment, leadership and organisation. Firstly, panels highlight that a university which identifies as internationally leading must have an active stance towards recruitment, but recruitment and promotion practices vary within the University. A more concerted and systematic approach is called for. Such an approach will not be uniform for all parts of the University, but it should be attractive, transparent, predictable and reflect and enhance progress throughout a scientific career. Secondly, panels conclude that leadership within Lund University is highly decentralised, which gives a large degree of latitude to the units but leaves some critical issues open, especially regarding the strategic direction of the units' work, how they recruit, promote and replace their faculty and staff, and how they fund their activities. Thirdly, panels note that the organisational structure is not always adequate: they identified a large number of small and potentially isolated units, and a lack of strategic direction set at the faculty level. A complementary observation is that the University excels in initiating activities but is less adept at closing down.

In addition to the 32 subject panels, five transversal panels were asked to comment upon how the university deals with five critical issues: leadership, infrastructure, large and interdisciplinary research areas, recruitment and external engagement. The transversal panel reports largely confirm the patterns identified in the external panel reports. Firstly, despite ambitious attempts, recruitment remains unsystematic and overly dependent on internal labour markets. Secondly, Lund is an excellent hub for infrastructure in need of enhanced collaboration in and around them. Thirdly, collaboration is an underutilised source for renewal and quality enhancement in research and education. Fourthly, leadership lines are flexible but

unclear with vague strategies and goals. Finally, the numerous strong research areas of the University are an underutilised source of interaction, renewal, and visibility.

In sum, Lund is an eminent university which does not in all aspects act as one. There is room for improvement and if Lund wants to remain a leading international university it needs to raise the bar.

A final note on how to read this report: this is not the final statement on research at Lund University nor does it provide a "silver bullet" for enhanced quality. Given its interactive form, it is intended to be part of a process, of assessing and reassessing what Lund University is and what it does, in all its variety. It points at some critical issues today, issues that if unresolved will hamper Lund University's ambition to be an internationally leading university. But these issues will change over time, as will the recipes to deal with them. Quality work is a never-ending process, where RQ20 is only one part of a succession of activities.

## Svensk sammanfattning

RQ20 initierades av Lunds universitets rektor 2019, med syftet att undersöka förutsättningarna för forskningskvalitet vid universitetet och dess olika delar. RQ20 är del av en cykel av utvärderingar som genomförts de senaste decennierna: den första gjordes 2008 och en uppföljning genomfördes sex år senare. RQ20 skiljer sig från de två tidigare genom sin orientering mot *förutsättningar* för forskningskvalitet och mot att identifiera områden där universitetet kan *förbättra* sin verksamhet. Den är alltså inte en traditionell utvärdering av forskningskvalitet som sådan, utan är en del av en framväxande förståelse av forskningskvalitet som lägger tonvikten på att värdera förutsättningar och på basis av det ge råd – snarare än att bara dela ut betyg.

RQ20 har genomförts som en långsiktig och framåtsyftade analys, där varje enhet och varje aktivitet har värderats på ett flerdimensionellt sätt. Syftet är att de därmed ska säkra sin långsiktiga uthållighet och därmed också att Lunds universitet ska ytterligare förstärka sin ställning inom det globala forskningssystemet. Till dessa många dimensioner hör hur enheter är organiserade och leds, hur forskningskvalitet värderas av enheterna och deras partner, hur forskning samspelar med utbildning, utformningen av forskningens samhälleliga samspel, finansieringsstrategier samt rekrytering. Detta speglar antagandet bakom RQ20, nämligen att dessa områden sammantaget formar förutsättningarna för forskningskvalitet.

Denna ansats bygger på interaktion och samspel, där de som utvärderas spelar en aktiv roll genom att själva och med egna ord beskriva hur de arbetar, och där särskilt utpekade experter ger återkoppling baserat på dessa underlag och annan dokumentation.

162 utvärderingsenheter – som identifierats av universitetets nio fakulteter – skrev därefter sina rapporter, som lästes av 32 externa paneler (vars medlemmar föreslogs av enheterna i samråd med RQ20s kansli). Dessa paneler mötte sedan enheterna och gav dem återkoppling.

Tre förbättringsteman identifierades i dessa panelrapporter: rekrytering, ledarskap och organisation. För det första måste ett universitet med anspråk på att vara internationellt ledande ha en medveten rekryteringspolicy. Här finns det stora variationer som sannolikt är oundvikliga, men panelerna rekommenderar en samordnad ansats som är inriktad mot att vara attraktiv, öppen, förutsägbar och som speglar och belönar framsteg under en akademisk bana. För det andra är ledarskapet inom Lunds universitet mycket decentraliserat. Det ger stor handlingsfrihet för de olika enheterna men lämnar också många svåra frågor obesvarade. Dit hör den strategiska inriktningen på verksamheterna, hur de rekryterar, befordrar och ersätter sin personal samt hur de finansierar sin verksamhet. För det tredje noterar panelerna att organisationsstrukturen inte alltid är genomtänkt: det finns många små och isolerade verksamheter, och fakulteterna uttrycker sällan någon direkt strategisk inriktning för de olika enheterna. En ytterligare observation är att universitetet gärna startar nya verksamheter men har svårare att avsluta dem.

Utöver de 32 ämnespanelerna identifierades fem teman som gjordes till föremål för specifika panelrapporter: ledarskap, infrastrukturer, stora och tvärvetenskapliga områden, rekrytering samt samverkan. Dessa tvärgående panelrapporter bekräftade i stort mönstren från ämnespanelerna. För det första är rekrytering fortfarande osystematisk och uppbyggd kring interna processer, trots ambitiösa försök att bryta mönstren. För det andra är Lund ett centrum för infrastrukturer i behov av mer systematisk samverkan i och kring dessa. För det tredje är samverkan en underutnyttjad resurs för förnyelse och kvalitetsförstärkning i forskning och utbildning. För det fjärde är ledarskapets ansvarslinjer flexibla men oklara, präglade av oklara strategier och mål. Slutligen är de många stora och tvärvetenskapliga områdena också en resurs som kunde utnyttjas mer för samverkan, förnyelse och synlighet.

Slutsatsen är att Lunds universitet är ett framstående universitet som inte i alla avseenden agerar som ett sådant. Det finns ett utrymme för förbättringar och Lunds universitet måste höja sin ambitionsnivå om det ska förbli ett internationellt ledande universitet.

Slutligen en läsanvisning: detta är inte sista ordet om forskningen vid Lunds universitet. Inte heller levererar rapporten någon patentlösning för hur kvaliteten kan förstärkas. Eftersom den bygger på samspel är den en del av en rörlig process att värdera och omvärdera kvaliteten i forskningen i all sin variation. Den pekar på några kritiska punkter, punkter som om de lämnas obearbetade kommer att försvaga Lunds universitets framstående internationella anseende. Men vilka dessa punkter är förändras över tiden, liksom recepten för att hantera dem. Kvalitetsarbete tar aldrig slut, och RQ20 är bara en del i en lång kedja av aktiviteter.

## Content

Vice-Chancellor's preface	. 3
Acknowledgements	4
Report overview and summary	6
Summary in English	6
Svensk sammanfattning	. 7
List of acronyms	13

#### Part I

RQ20 Report	. 15
1. The structure of the RQ20 work	. 19
Who did what and how?	. 19
The RQ20 communication pathways	. 19
Reflections on work modes, choice of priorities and choice of	
base data: "qualitative versus quantitative" methodology	20
Constitution of Panels/UoAs	. 22
Identification of transversal themes	. 22
Recruitment of external advisors	23
Covid-19 consequences for RQ20	24
Strengths and liabilities of the chosen path	. 26
2. A synthesis of the RQ20 self-assessments	. 28
Is it worth it: the reception of RQ20	. 28
SWOT and all that: how units describe themselves	30
Who are you: identifying yardsticks and comparisons	35
Dig the new breed: how units recruit and promote	. 37
Primus inter pares: reflections on academic leadership	. 39
Life beyond the unit: how environments collaborate	41
3. RQ20 – a synthesis of panel reports	46
It was worth it: panels' views on RQ20	46
Short and sweet: how units summarise themselves	47
Who's who in the world: Lund's research standing	51
The generational contract: how units deal with renewal	54
Research and money: funding and research quality	56
Who governs: leadership and research quality	58
The centre holds: the relationship with	
large-scale areas and infrastructures	62
To the benefit of humankind:	
how Lund collaborates with the world beyond it	63
Self-Assessment vs. Panel Report statements	66
4. The transversal reports – a summary	68
5. The project group's conclusions	. 71
General conclusions	. 71
Reflections and conclusions on Lund University's	
central missions and tasks, in its different parts	. 72
Ten commandments for elevation	. 78

6. Enhanced quality work at Lund University – 95 theses	79
University politics:	79
On measurements of quality:	79
On governance:	80
On the integration of research and education:	80
On organisation:	81
On recruitment:	81
On funding:	82
On collaboration:	83
On infrastructure:	83
Appendix 1	84
Appendix 2	85

#### Part II

Subject Panel Reports	91
1. Foreword by the RQ20 project group	97
2. External advisors in subject panels	97
Faculty of Engineering (LTH)	97
Faculty of Fine and Performing Arts (K)	98
Faculty of Law (J)	98
Faculty of Medicine (M)	98
Faculty of Science (N)	99
Faculty of Science and Faculty of Engineering	
– Joint Panels (N+LTH)	100
Faculty of Social Sciences (S)	100
Joint Faculties of Humanities and Theology (HT)	101
School of Economics and Management (E)	101
MAX IV	101
3. Faculty of Engineering (LTH)	103
Panel and Unit of Assessment (UoA) overview	103
Foreword by the faculty leadership	103
External panel reports	104
4. Faculty of Fine and Performing Arts (K)	239
Panel and Unit of Assessment (UoA) overview	239
Foreword by the faculty leadership	239
External panel reports	239
5. Faculty of Law (J)	255
Panel and Unit of Assessment (UoA) overview	255
Foreword by the faculty leadership	255
External panel reports	255
6. Faculty of Medicine (M)	277
Panel and Unit of Assessment (UoA) overview	277
Foreword by the faculty leadership	278
External panel reports	278

7. Faculty of Science (N)	475
Panel and Unit of Assessment (UoA) overview	475
Foreword by the faculty leadership	475
External panel reports	476
8. Faculty of Science and Faculty of Engineering	
– Joint Panels (N+LTH)	521
Panel and Unit of Assessment (UoA) overview	521
Foreword by the faculty leadership	521
External panel reports	521
9. Faculty of Social Sciences (S)	587
Panel and Unit of Assessment (UoA) overview	587
Foreword by the faculty leadership	587
External panel reports	589
10. Joint Faculties of Humanities and Theology (HT)	641
Panel and Unit of Assessment (UoA) overview	641
Foreword by the faculty leadership	641
External panel reports	643
11. School of Economics and Management (E)	689
Panel and Unit of Assessment (UoA) overview	689
Foreword by the faculty leadership	689
External panel reports	689
12. MAX IV	717
Panel and Unit of Assessment (UoA) overview	717
External panel reports	717

#### Part III

Transversal Panel Reports	'31
1. Foreword by the RQ20 project group7	'39
2. External advisors in transversal panels7	'40
Management and Leadership7	'40
Infrastructure	'40
Large and Interdisciplinary Research Areas (LIRA)7	'40
Recruitment7	'40
External Engagement7	'40
3. External Panel Report: Management and Leadership7	'41
Preface	'41
Introduction7	'42
Lund University's Strengths7	'44
Lund University's potential weaknesses7	'46
The RQ20 Transversal Panel's conclusions on Management and Leader-	
ship 7	<b>'50</b>
Recommendations7	'53
Appendix: Planning Guide Management and Leadership Panel	'56

4. External Panel Report: Infrastructure	759
Introduction	759
Governance of infrastructures at university level	761
Data storage, library and computer facilities	763
Collaborations and career opportunities	765
Faculty-wise short reviews from self-assessments,	
subject evaluations and interviews/discussions	766
Summary and Recommendations	773
5. External Panel Report: The Relationship with	
Large and Interdisciplinary Research Areas (LIRA)	775
Background	775
Vision	775
Large and interdisciplinary research areas (LIRAs)	
at Lund University (LU)	776
Panel way of working and sources of evidence	776
Focus and structure of panelreport.	777
Summary of main findings and key recommendations	777
Strategic goal 1: Research of the highest quality and renewal	780
Strategic goal 2: Intertwining of research and education	781
Strategic goal 3: Impact on society.	783
Strategic goal 4: Visibility	784
Strategic goal 5: Leadership, gender equality and diversity	785
Strategic goal 6: Recruitment and retention of staff	786
Strengths	786
Concluding reflections	786
A nnevec	700
6 External Danal Paparti Paceruitment	700
Dreface	790
Fuccutive Summery	790
Background and introduction	790
The Liniversity's Dringinles and Strategy on	192
Description and Dremetion	706
The Examples and Leine Examples Deven extine	790
The Faculty and Joint Faculty Perspective	803
Annex	809
7. External Panel Report: External Engagement	811
	811
Managing external stakeholder engagement	811
Industrial collaboration	813
Lund University and innovation	816
Lund University and the region	819
Faculty and external engagement	820
Health care engagement	821
Showcase Helsingborg	821
Conclusions and recommendations	822
Appendix: Information about the	
Panel Assignment and Meeting Schedule	825

## List of acronyms

LTH	Faculty of Engineering
Κ	Faculty of Fine and Performing Arts
J	Faculty of Law
М	Faculty of Medicine
Ν	Faculty of Science
N+LTH	Faculty of Science and Faculty of Engineering – Joint Panels
S	Faculty of Social Sciences
HT	Joint Faculties of Humanities and Theology
E <sup>1</sup>	School of Economics and Management
HEI	Higher Education Institution
LIRA	Large and Interdisciplinary Research Areas
LU	Lund University
PI	Principal Investigator
RC	Research Council
RQ20	Research Quality Evaluation 2020
SFO/SRA	Strategiskt Forskningsområde / Strategic Research Area
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UoA	Unit of Assessment

<sup>1</sup> School of Economics and Management is occationally also refered to as EHL in the report texts.

# PART I RQ20 Report



## Content Part I

1. The structure of the RQ20 work Who did what and how?	19 19
The RQ20 communication pathways	19
Reflections on work modes, choice of priorities and choice of	
base data: "qualitative versus quantitative" methodology	20
Constitution of Panels/UoAs	22
Identification of transversal themes	22
Recruitment of external advisors	23
Covid-19 consequences for RQ20	24
Strengths and liabilities of the chosen path	26
2. A synthesis of the RQ20 self-assessments	28
Is it worth it: the reception of RQ20	28
SWOT and all that: how units describe themselves	30
Who are you: identifying yardsticks and comparisons	35
Dig the new breed: how units recruit and promote	37
Primus inter pares: reflections on academic leadership	39
Life beyond the unit: how environments collaborate	41
3. RQ20 – a synthesis of panel reports	46
It was worth it: panels' views on RQ20	46
Short and sweet: how units summarise themselves	47
Who's who in the world: Lund's research standing	51
The generational contract: how units deal with renewal	54
Research and money: funding and research quality	56
Who governs: leadership and research quality	58
The centre holds: the relationship with	
large-scale areas and infrastructures	62
To the benefit of humankind:	~~
how Lund collaborates with the world beyond it	63
Self-Assessment vs. Panel Report statements	66
And what the people respond	00
And what the panels respond	0/
4. The transversal reports – a summary	68

5. The project group's conclusions71
General conclusions
Reflections and conclusions on Lund University's
central missions and tasks, in its different parts72
Faculty of Engineering (LTH) – a university within a university
Faculty of Fine and Performing Arts – blending arts and research
Faculty of Law – a professional school in the world74
Faculty of Medicine – straddling scale and scope
Faculty of Science – in a dynamic steady state
Faculty of Social Sciences – disciplines and beyond 76
Joint Faculties of Humanities and Theology
<ul> <li>– squaring variety and edge</li></ul>
School of Economics and Management
– more than a business school77
MAX IV – shine a light
Ten commandments for elevation
6. Enhanced guality work at
Lund University – 95 theses
University politics:
On measurements of quality:
On governance:
On the integration of research and education:
On organisation:
On recruitment:
On funding:
On collaboration:
On infrastructure:
Appendix 1
Appendix 2

## 1. The structure of the RQ20 work

## Who did what and how?

The term RQ20 was first mentioned in a memorandum from Lund University's Research Council (RC) in September 2018. This memo stemmed from a task given to the RC by the vice-chancellor, which requested the creation of an initial structure for an upcoming quality evaluation of research at Lund University (LU). The RQ20 project was thereafter initiated during late autumn 2018 by the quest for and appointment of the project leaders.

Initially, only one project leader was envisioned but during discussions between the vice-chancellor and potential candidates it became obvious that the combined efforts of two part-time project leaders, with partially different academic backgrounds, would be better. As a result, Professor Freddy Ståhlberg (primarily representing the faculties of Medicine and Science) and Professor Mats Benner (for the faculty of Social Sciences and the School of Economics and Management) were appointed as project leaders from 1 February 2019 at 35% and 25% of full-time employment, respectively.

The appointments were made in a formal decision by the vice-chancellor (Reg. no STYR 2019/335), which furthermore stipulated two other functions of crucial importance for RQ20. First, the Division of Research Services at LU was given funding for a full-time administrative support person (from April 2019 held by project coordinator Malin Bredenberg). The project leaders and the project coordinator have throughout the RQ20 process constituted the RQ20 project group. Second, the RQ20 project was granted funding for a reference group composed of one senior researcher engaged at 10% from each faculty. Meeting frequencies for the project group were once per week with additional ad hoc meetings, and the reference group met every second week with the project group as chairpersons. This report was written by the project group with input from the reference group.

In addition to the abovementioned core officials that make up the RQ20 Office, the project group received support from several other LU functions. For instance, a team of experts specialising in scholarly communications at the University Library produced base data on the research environments in terms of publication patterns and bibliometrics. The financial base data was compiled with help from the Project Management Office. The event organiser LU Conferences helped organise the panel meetings and the travel agency Egencia managed most travel bookings by the panellists. Lastly, whilst organising the Subject Panel Meetings we received assistance from a group created for this sole purpose, named the faculty coordinators, who acted as an extension of the RQ20 project group at the faculty level.

### The RQ20 communication pathways

In the planning phase of RQ20, the project group spread the information about the upcoming evaluation as broadly as possible. Meetings with all deans (March-April 2019) were followed by meetings with heads of department and other interested parties that approached the project group. An open kick-off meeting with keen LU staff was held in early September 2019. On demand, the project group also presented the plan to the vice-chancellor's leadership group which included all deans, and to the University Board. The communication scheme with management officials at various levels of the University adopted a similar mode with frequent intervals as well as on demand throughout the project. A "time frozen snapshot" of the RQ20 process per early November 2019 is shown in Figure 1 below. Green boxes marked accomplished tasks, while pink boxes remained "to do" at that time.



#### **RQ20 – GENERAL SCHEDULE**

Fig. 1 Description of the RQ20 Project's initial timeline

The internal communication scheme – including for instance external advisors recruited at other Higher Education Institutions (HEIs) – was mostly conducted via email. In contrast to this "direct" form of communication, and perhaps from a less selective standpoint, it was also decided to launch an RQ20 Blog (https://rq20.blogg.lu.se/) that sought to address the public (e.g. external stakeholders who were invited to participate in the meetings) and the greater LU community, by frequently posting updates about the progress of the project.

## Reflections on work modes, choice of priorities and choice of base data: "qualitative versus quantitative" methodology

The first important task for the project group and the reference group was to create the RQ20 project plan in which the working procedures for RQ20 were defined. For further details on the project plan we refer to the formal documents in Appendix 1A-1D, specifically Appendix 1A. Some important aspects of this work and the subsequent administrative work to fulfil the initial phases of RQ20 are given in figure 2 and the list below:

- Number of subject panels. To decide the number of panels, comparisons with other Swedish universities that had recently conducted similar evaluations were made. Eventually, a total of 32 panels was decided, divided by faculty according to the approximate number of researchers in each faculty. One separate panel was given to the major infrastructure MAX IV, since the size of this organisation is similar to a faculty, and also with the argumentation that MAX IV should not overshadow other infrastructures at LU in the assessment of infrastructural needs.
- Identifying subject panels. To identify Units-of-Assessment, UoAs in each panel and staff persons in each UoA, this task was assigned to "where the expertise was", i.e. to the faculties, subsequent to a dialogue with each faculty leadership in April 2019. The faculties, in close collaboration with the University Library, were ready with this key task in early May 2019 for further description of the

»11 1.1.1.1 1.1 1

process, see the paragraph "Constitution of Panels/UoAs" below and, to decide upon the transversal themes – see the paragraph "Identification of transversal themes" below.

• Self-assessment instructions. For details, we refer to appendix 1B. In short, the self-assessment instructions assume a narrative perspective, focusing on three major themes: A) leadership, B) collegial culture and C) quality ecosystem. *The instructions made relatively limited use of quantitative measures such as those obtained by bibliometrics.* Some of the instructions for handling the base data (RQ20's only quantitative source material), illustrate the nature of our intention: "The background material is intended to serve as a backdrop to the research environments' discussions on research quality and development" and "When responding to the questions in the themes A-C, please refer to the background material (financial conditions, publication patterns, impact) when appropriate". The project group's ambition with RQ20, as frequently communicated to the researchers, was that RQ20 should provide "help for self-help", and not be an instrument for direct ranking nor financial redistribution of available internal funding. In this context, it should be noted that early on in the process it was decided that the self-evaluations but also in order to reduce the size of the final report.



Fig. 2 Organisational scheme RQ20

As stated above, the task of dividing researchers and research groups into (internal) subject panels, and in turn dividing each panel into Units of Assessment (UoAs), were given to the faculties. The prerequisite from the RQ20 office was the allotted number of panels per faculty, determined as described in the project plan which, after discussion with the reference group and the faculties, boiled down to the following final number of panels.

Faculty	Swedish Abbreviation	Number of Panels
Faculty of Engineering	LTH	6
Faculty of Fine and Performing Arts	К	1
Faculty of Law	J	1
Faculty of Medicine	M	9
Faculty of Science	N	3
Faculty of Science and Faculty of Engineering – joint panels	N+LTH	3
Faculty of Social Sciences	S	3
Joint Faculties of Humanities and Theology	HT	3
School of Economics and Management	E	2
MAX IV		1
SUM		32

Table 1. Overview of final number of panels per faculty.

In Appendix 2, the names of all subject panels and their UoAs are given.

## Identification of transversal themes

From start, the RC identified a number of overarching key areas of importance to the University as a whole. The investigation of these areas (or themes) was included in the remit of RQ20, in addition to the more research-oriented assessment. Five transversal themes, giving rise to five transversal panels, were ultimately adopted (see also appendix 1D):

Panel 1: Management and leadership

Panel 2: Infrastructure

Panel 3: The relationship with large and interdisciplinary research areas

Panel 4: Recruitment

Panel 5: External engagement

Themes 3-5 were identified as key areas already by the RC, while the first two themes were mentioned on a more tacit note. A sixth theme was discussed, namely the interaction between research and education, but this question was implicitly embedded in the instructions for the self-assessments rather than being treated as a separate theme.

In order to create the background material for the transversal panels, all UoAs were instructed to answer questions regarding the five transversal themes above in their self-assessments. Hence, the base data for these transversal panels primarily constitute self-assessment extractions, made by the project group. These extractions contained relevant information for each transversal theme. In addition to this information, the transversal panels were also provided with formal documents describing each theme from a general perspective, such as policy documents or information about collaboration partners (in the case of the external relations theme). After the arrival of the subject panel reports, the RQ20 office also added relevant extracts from these to the background material for each transversal panel. Finally, a dialogue was continuously kept with the transversal panellists, and they were given the opportunity to request additional information relevant to the work in the panel.

## Recruitment of external advisors

To assess the UoAs according to the peer review procedure, 32 external advisory subject panels were created, each corresponding to one of the internal subject panels (defined as the clusters of UoAs sharing similar research areas). During the summer/autumn of 2019, 202 advisors/panellists were recruited by recommendation primarily from the internal panels/UoAs and with invitations signed by vice-chancellor Torbjörn von Schantz. On average 4-6 external advisors per panel were appointed, though a few more extensive internal panels received dispensation to recruit up to 12 advisors. To this end, the project group was responsible for i) setting the criteria under which panellists were recruited and ii) the procedure for recruiting both panel chairs and fellow panel members.

The external panels were composed of experts spanning the UoA's subject areas, but also to enable assessments of areas other than the individual advisors' areas of expertise. Hence, the UoAs were encouraged to identify advisors who possessed a well-rounded and empirical understanding of procedures, conditions and prospects coupled with research both in the general and in the specific sense.

It was furthermore proposed that each panel's advisory group was led by a researcher that possessed an understanding of the organisational and financial conditions of HEIs within the Nordic countries.



Importantly, the external panel chair played a key role by overseeing and being responsible for the panel's collective report, and therefore marked our first priority in terms of recruitment. The merits on which the chairs were selected is summarised in the RQ20 Project Plan as their "experiences of managing and/ or evaluating large organisations (within universities, research councils, public authorities etc.)". Otherwise, an even recruitment of panellists was desired with a mix of Nordic, European and international representatives. Issues concerning conflict of interest, age and gender balance were also considered in the selection process. The panellist should for instance have no active ongoing collaborations with Lund University researchers.

## Covid-19 consequences for RQ20

In the spring of 2020, the pandemic known as Covid-19 brought international, and even domestic, travel to a halt. Since many of RQ20's external panellists were based outside Sweden and/or Lund, the project group had to forego its original plan of hosting *physical* subject panel meetings in Lund between 4-8 May (as shown in Fig. 1).

Rather than postponing the event, it was decided to conduct the Subject Panel Week online and thus preserve the original schedule running 4-8 May. This was a result of two key factors: one being the ambition to maintain the initial project deadline, since the owner and initiator of the project, i.e. Lund University Management, ended their term of office on January 1 2021. Second, RQ20 was dependent on materials – self-assessments – bound by their ephemeral nature and, to eliminate the risk of losing both diagnostic value and relevance, it was important not to stall the work of the external subject panels. Consequently, the new plan (as seen in fig.3) largely maintained the initial timing of things, but with a slightly altered format:



#### RQ 20 REVISED PLAN 2020 – UPDATE SEPTEMBER 24 2020

Fig. 3 - RQ20 revised plan as per September 2020 (comparable to Fig. 1 above)





As an alternative to hosting a physical site visit, 32 virtual meeting rooms were created based on temporarily generated IDs in the University's staff directory, LUCAT. Each subject panel was then allocated one virtual meeting room in which they remained throughout the week, whilst having the invited representatives from the UoAs and Faculty Managements enter the respective meeting room according to pre-set programmes. The employed event planner, LU Conferences, also assembled a team of technicians who oversaw the process and provided support whenever required and, most importantly, at short notice.

To complement the new digital format, it was furthermore decided to adopt a more dialogue-based framework, including for instance extended Q&As between the Subject Panels and UoAs (e.g. box C in fig. 3) and by prolonging the involvement of the Subject Panels into the follow-up phase using a written dialogue between chairpersons and UoA representatives (e.g. box F in figure 3). Here, the UoAs were asked to create a few "action points" for the future based on their panel report and the external panels were asked to comment on these suggestions. This dialogue, although in written form, was considered to be a part of the RQ20 follow-up procedure and is therefore not included in the RQ20 report. In parallel to the extension of the subject panel process, the transversal panel meetings were moved. Initially planned for spring 2020 (fig.1), these meetings were postponed to autumn 2020 in the hope that they could be conducted physically; however in August 2020 the decision to "go digital" was taken. All-in-all, the virtual meetings worked well, although participants from distant time zones had to work odd hours.

## Strengths and liabilities of the chosen path

Evaluations at university level are of a relatively recent date, and have been subjected to both critiques and appraisals.<sup>1</sup> Assessing a university in its entirety based on a singular methodology is indeed not without risks as any methodology will have its particularities (bibliometrics working best for areas with clearly defined research frontiers and communication channels, peer review favouring areas of well-established networks, and so on). In addition, if assessments are tied to rewards, issues on the comparability of grades and assessment criteria are likely to emerge – are the criteria neutral to differences in the set-up of tasks of units (for instance, the relationship between education and research, funding versus applied research, or the degree of external collaboration)? In short, the crux of university assessments is whether they really allow for comparable results within the university as well as between the university and the world; if not, their credibility will be limited.

These shortcomings have in their turn paved the way for a model of steering and assessments of research organisations that emphasise reflexivity and self-organisation. The ideal is based on the notion that a university or indeed any organisation cannot be fully controlled from the top. Therefore, each part of an organisation should be allowed to formulate its goals and conditions, to have them approved in an interactive manner with top-levels of the same organisation and vice versa, central management should have their goals assessed and audited from below to allow for genuine organisational development. A critical role in such exercises is played by external advisors that check for undue influences and information asymmetries.<sup>2</sup> The aim is to allow for comparability – where each unit is allowed to self-assess on its own terms – and the process of self-assessment is guided and aided by external advisors that ensure that assessments and remedies are valid.

<sup>1</sup> E.g. Van Raan, A. (2005) Fatal attraction: conceptual and methodological problems in the ranking of universities by bibliometric measures, Scientometrics, 62, 1, 133-143; Hazelkorn, E. (2015), Rankings and the reshaping of higher education, London: Palgrave.

<sup>2</sup> Outlined in Drucker, P.F. (1954), The Practice of Management, New York: Harper & Row. As has been observed in numerous articles and books, the original intentions of MBO have been skewed, and it is nowadays used as a managerial steering instrument and tied to incentives. The original formulation by Drucker, however, emphasised the interactive and learning elements and these are still valid.

Other challenges reside within the very institutionalisation of an undertaking like RQ20. When working in an academic environment, it is frequently the case for superimposed projects of this kind to become questioned and perhaps even criticized. However, the experience with antagonistic sentiments from within the Lund community towards the project and its tasks has been very sparse, virtually in the "noise regime". Hence, it appears that the significant efforts invested by the RQ20 office and the reference group have contributed to a common understanding and acceptance of the project and its purpose. Another reason for this optimistic observation may, in our opinion, be the relatively free disposition, integrated into the format of the self-assessment. Reports from several UoA coordinators testify that they have conducted fruitful seminars and workshops with their teams during the self-assessment process.

Naturally, criticism has of course also appeared, primarily regarding the distribution of researchers into panels and UoAs, and regarding the choice of style of the self-assessment. With respect to the distribution of researchers into subgroups, it is evident that the chosen approach (giving the faculties full freedom to divide within their allotted number of panels) has created a rather heterogeneous subdivision pattern when comparing different faculties. While some chose to follow the administrative division via for example the departmental organisation, other faculties chose to make divisions based more on research topics.

Furthermore, the non-quantitative nature of the self-assessment template and the presentation format of the publications as well as the economic base data have led to critical comments and perhaps also to some confusion. This criticism is not without reason; however the choice to conduct a more qualitative evaluation was stipulated already in the project plan and the base data format was partially governed by the resources and preconditions at hand within the support systems at, for example, the University Library, to produce such data with a very short timeline. In summary, it is the general perception of the project group that the launch as well as the execution of the RQ20 project was very well received by our colleagues at LU.

## 2. A synthesis of the RQ20 self-assessments

In this chapter, we highlight some of the issues raised in the RQ20 self-assessments. The self-assessments were intended primarily as a backdrop to the panel reports, and will not be published. The self-assessments themselves – comprising around 3000 pages of text – reflect a multitude of experiences and are of general interest in themselves. In this text, critical themes in them will be showcased, in a synthesis of their orientation. The synthesis aims to showcase the general reception of the endeavour, the implications for the University as a whole, some significant findings when it comes to the direction and organisation of the units, their articulation with the different organisational levels of the University, and the assignment of tasks and responsibilities within Lund University as a whole. In doing so, it aims to highlight how the units deal with self-representation and how they articulate their internal and external relations and working conditions. We are of course fully aware of the challenges of representing such a large and disparate material and present this as tendencies rather than an exhaustive summary.<sup>3</sup> To enable the reader to follow our reasoning, we have added quotations from the reports, to provide a sense of the thinking and style of the units' reflections.

## Is it worth it: the reception of RQ20

As a first observation, it can be noted that the task of conducting self-assessments has been received with what seems to be "cheerful compliance". The idea behind RQ20, to invite the units to gauge themselves and their current conditions and then offer suggestions as to where they are aiming, seems to have been well taken. Instructions have been interpreted and acted upon in a manner which reflects the intentions of RQ20. Only occasionally have the structure and form of RQ20 been subjected to comments, and then often to highlight that the assessment template triggered some initial consternation which however paved the way for a productive assessment of the unit's direction forward and its current capabilities:

Some of the subheadings were not sufficiently clear and gave rise to internal discussions on how to interpret them. However, these discussions improved to be interesting in themselves and gave rise to further self-evaluation (M)

Admittedly, a number of assessments critique what they see as unnecessarily vague instructions, or felt that the assessment was only an exercise in stating the obvious, without a clear connection to policy-making and resource allocation:

No one can possibly know how or if the RQ20-report will be used when the new (currently unknown) vice-chancellor steps into office. This leads to ambiguity, which we consider counter-productive (N)

The very fact that the assessment hinges upon the unit itself and its openness, with rather loose demarcations, nonetheless seems to have been understood as a virtue – for once, the objectives of the assessment could be influenced (at least to some extent) by the unit itself.

<sup>3</sup> Swedberg R. How to use Max Weber's ideal type in sociological analysis. Journal of Classical Sociology. 2018;18(3):181-196.

The self-assessments reflect not only the multitude of experiences within Lund University, but also different ways of framing these experiences. Some have taken the opportunity to explicate their evolution and future directions, while others have been more succinct. A few units have chosen not to engage with the assessment except in a rather truncated form, seeing it as a concern of others and not themselves:

I find it quite unacceptable to provide an evaluation of my own scientific achievements and those of scientists close to me, who are coauthors, colleagues or former PhD students (M)

Such responses, rare as they are, are not necessarily an effect of the composition of units. Also, units set up solely for the purpose of RQ20 generally responded diligently, also on issues where questions were difficult to respond to (for instance, they have no common strategy, no common financial control or other governance mechanisms available). The composition of units of assessment in RQ20 was done in close dialogue with the faculties, to ensure that the constitution of units of assessments would reflect the actual conditions of research, rather than formal structures, of course not neglecting that the two might coincide. This has in some cases led to considerable work to define and articulate relations within the unit of assessment, including commonalities and differences, as well as potential alignments:

We do have a lot in common, and the assessment has been a valuable exercise in showing us exactly that, but it is in reality not one research unit (HT)



Whether or not this work will also be followed up, at the level of the units but also in the faculties, is another issue, but it seems clear that the open-ended manner in which units have been identified has opened up for reconsiderations of boundaries and bridges between different parts of the University.

Altogether, the overall impression is that the ambition to reinforce the capacity and space for reflections on current conditions and future directions – including an understanding of impacting conditions that are external to the units – has been met. It seems to have been worth it:

The exercise has been rewarding much in the same way as writing grant applications helps focus ideas and make efficient plans (N)

## SWOT and all that: how units describe themselves

A critical element in any self-assessment is the almost obligatory summary in the form of a SWOT analysis. Despite the obvious limitations of the stylised SWOT format – such as the subjective choice of indicators, and the absence of reflections on strategic choice – a summary of the intrinsic strengths and weakness, as well as the constraints and opportunities that reside outside the unit, seems to function well as a starting-point for the self-assessments. This also enables a summary of the conditions for the units more broadly, moving into more detailed accounts later on for matters such as leadership, collaboration and recruitment.

To begin with, it should be noted that very few units reflect upon the specificities of the location in Lund, for instance when it comes to the relatively limited presence of political bodies, public agencies and industry headquarters (on the negative side) and the geographical proximity and low social barriers on the positive side. The relative strengths and weaknesses of the adjacent ecosystem are seldom addressed; nonetheless, they of course present the University with certain framework conditions.

In their responses, the units tend to highlight their ambitions and achievements as strengths. They position themselves as quite distinct within their respective fields, and quite a few found ample evidence for this, in rankings or evaluations or in other forms. If the self-assessments are to be believed, Lund does also comprise a sizeable number of units that resonate with, and in some exceptional cases actually expand, the frontier of their fields.<sup>4</sup> Thus, units often consider themselves to be among the leaders within their respective areas:

The division is not relating to any unit in particular for benchmarking: Instead, it is continuously receiving inspiration and ideas for its strategic developments and quality work through national and international networking, involving numerous groups and departments of high international standard (N)

When it comes to weaknesses, financial constraints are a recurrent theme. Virtually no unit exists without considerations of its financial underpinnings, and even though this might have been attributed as a strength, the dependence on external funding is repeatedly brought up as a weakness. With growing dependence on the funding "market" come various shortcomings in the form of externally-driven strate-

<sup>4</sup> This, incidentally, resonates with the bibliometric data available, where very few units are below the 10 per cent level (10 per cent of publications are at the ten per cent scientific impact level, an indication of globally average impact).



gies, insecure long-term planning, challenges when it comes to staffing and recruitment, responsibilities for funding infrastructure and other critical resources:

The major obstacle (...) is the lack of long-term, stable funding that can provide an infrastructure in terms of researchers, staff and resources for experiments and development (LTH)

And even when such support is actually attainable for the units, that in itself constitutes a risk, as longterm funding can seldom be taken for granted. When external funding becomes the major source of research revenue, university funding is not sufficient to drive change:

Direct government funding does unfortunately does not, in itself, allow for any direct strategic priorities (LTH)

However, units generally try to align both external and internal resources into a coherent whole, to ensure that variations in funding policies can be accommodated with common goals within the unit:

All PIs are well aware of the research environment's strong areas and plan their own research with this in mind (N)

Another resurfacing "weakness" resides in recruitment, which is seen as less than optimal. Recruitment is done, it would appear, based on financial conditions and opportunities here and now rather than considerations of the longevity of the unit. Funding opportunities again override strategic considerations (or, more correctly, funding opportunities, for research and for education, constitute the strategic considerations). Overall, recruitment and a balanced faculty is a recurrent issue for virtually all units:

The department could also benefit from more strategic planning in the area of research recruitment. Until now, new lecturers have mainly been recruited along educational needs. Limited resources notwithstanding, the department now also needs to consider possibilities to strategically recruit internationally leading scholars to maintain and enhance research excellence (S)

Among the opportunities and threats, funding and national research governance stand out. The significant expansion of research environments in the last decade – both in terms of the number of them and their size – brings with it hopes and concerns about the ramifications of research policy. Lund has been particularly successful in attracting funding for large-scale environments, and this has become an increasingly important source of funding throughout the University, with opportunities but also ensuing risks and uncertainties:

> Several large-scale research funding opportunities have been cancelled (e.g. Linnaeus grants). Based on the current grant levels, it is difficult to compete with leading international experts in similar fields. Additional funding, including coverage of salaries to permanent and non-permanent staff, will be necessary to reach the highest level of research (N)

The dependence on external funding shows not only in and around such large-scale funding initiatives, but more generally, for groups and individuals that rely on funding in smaller portions. Interestingly, they often welcome this as it decreases the dependence on local power and governance:

In general, the bottom-up driven research within (our unit) has benefited from the competitive, excellence-driven and project grant-driven funding system for research in Sweden, in which internal processes by universities influenced by political or strategic considerations play a lesser role (N)

Virtue sometimes turn into vice, and external funding remains a largely untapped or temporarily lost opportunity for many units. Indeed, sometimes the situation has taken a turn for the worse in recent years:

In the last five years, the department has decreased considerably in numbers, due to retirements. This fact, together with a heavy teaching load, creates a discontinuity in the research development and progress (HT)

The group is currently in a valley when it comes to major grants -a situation that must be remedied (N)

However, the rising importance of external funding seems generally to have empowered the units. They have incorporated external funding as a natural part of their activities and future planning. External support functions both as a goal and a means for the units, and is often incorporated in the process of recruitment and appraisal:

There are a number of funding schemes, including ERC and Wallenberg Academy Fellowships, that make it feasible to continue to encourage outstanding early career scientists to join our research environment and further its scientific excellence (LTH)

Part of this is also the increasingly prevalent practice of co-funding permanent positions with external funding. The practices vary widely here, sometimes also within one unit of assessment, but it is not uncommon for at least 30-40 per cent of professorial salaries to be paid via research grants, sometimes up to 70-80 per cent.

This way of making the funding of positions more flexible in turn means that the ties to formal organisational governance seem to have loosened. The classical departmental structure – of clearly divided demarcations between areas of specialisation and sections (or other formal units) formed on the basis of floor funding and fully funded positions – has decreased in importance. Instead, flexible matrices play an increasingly central role to research practice:

> Four out of six groups are physically located in close proximity, which allows daily interactions and many opportunities to exchange ideas and share equipment (LTH)

In quite a few cases, this has led to a fairly large degree of decentralisation, to ensure that research activities are in line with the developments of specific areas, albeit with a modicum of coordination:

> (The unit) comprises researchers with (specific profiles) but does not set the agenda of the research content nor goals for research. Instead, research strategies are driven by the individual PIs under full academic freedom, but they are of course influenced by local colleagues and external collaborators (M)

Others highlight that formal structures – departments, faculties and divisions, remain cohesive and strategic, constituting the foundation for planning, thinking and action:

The action plan also emphasises the importance of thematic areas, and the Faculty's readiness to make investments and recruitments in relation to new and topical strategic areas in research and education, as well as individual strategic recruitments when specific opportunities present themselves (J)

This view is more predominant among the units with a large educational remit, which they take into account when they recruit and plan their activities. While this creates a certain degree of predictability, it also creates some tensions in recruitment, which straddles educational and research needs that do not
always coincide. In general, the relationship between external and internal funding streams is one of complementarity, with various degrees of stability and forward-looking as a result. However, such complementarity cannot be taken for granted, as there is sometimes a tension in the relationship between formal levels of the University and units:

The whole responsibility for funding, work environment, research etc are placed on the group leaders that are working in a framework of myriad ever changing, complex rules and limited administrative support, guidance or resources from University (M)

This holds in particular for the parts of the university where external funding forms the backbone of most activities; the situation is as mentioned quite dissimilar in areas where external funding is of lesser relative importance. This also ties in with the general composition of units. For units that are the most exposed to the vagaries of the funding market, education is often of marginal importance, whereas for teaching-intensive units, increased external funding is deemed critical to their research vitality.

This would and could serve as a memento to the leadership of the University, as the financial framework and task load are largely beyond the control and influence of most units of assessment. Management at different levels has seemingly instigated a sense of urgency when it comes to funding, with a wide variety of measures to reinforce search behaviour in research funding. The next step seems to be to apply stabilising measures to set directions and organise accordingly. In quite a few instances, this has already been done, but then at the behest of the units themselves rather than as part of any overarching strategy from central University or faculty levels. Indeed, as the extensive quotation below indicates, some units have very elaborated models for identifying and managing their internal and external conditions, but this, judging from the self-assessments, is still not the dominant practice:



In order to understand and appreciate if the research strategy is efficient and successful we actively discuss and evaluate our performance. We have a long tradition of using internal assessments to evaluate our present standing, including variables such as publication rate, publication profile (where we publish, impact factors, etc.), demography, PhD and post doc recruitment and ability to attract external funding. The Senior Group regularly discusses research strategies and at workshops we have used SWOT-analyses to evaluate our present standing and identify longterm goals. These discussions and analyses have resulted in concrete action plans for long- and short-term goals that enable follow-up and evaluation of achievements. Examples of strategic goals identified are to decrease our vulnerability to changes in external funding by widening our grant portfolio and to increase our international network by increasing visibility at different venues (N)

#### Who are you: identifying yardsticks and comparisons

The units have been asked to identify internal governance models as well as external yardsticks, if relevant. The request for benchmarks has provoked different types of search behaviour. Only a fraction of the units seemed to draw on an existing understanding of their fields and relevant comparisons within them; RQ20 may therefore have been instrumental in identifying relevant measures of understanding one's owns practices:

The critical issues, as we see it, deal with the problem of obtaining an overview of a multilayered organization in which many activities are embedded in each other, and of perspectivizing a working culture that we are deeply familiar with, and therefore might be hard to pinpoint (S)

Such comparisons tend to be national – for reasons of similarity, possibly – or international, when the unit is exclusive or dominant in its field in its own view, or when there are few organisational units at other universities with a similar set-up. Besides aiding the search for descriptive equivalents and for critically monitoring one's own identity and practices, benchmarking has also shown strengths and shortcomings of the current work modes:

The Y Group is internationally exceptional in their way of working and attracting research funding from both governmental organisations and industry for both basic and applied research concerning Z. We could learn from the group how to better cooperate with industry and attract other financial sources than traditional (LTH)

The units have also been asked to outline their governance structure, that is how they are organised and led, and how they secure and distribute funding and how they distribute task responsibilities. In many instances, this has been relatively straightforward. When it comes to leadership structure, the responses tend to be formal, enumerating the various mechanisms, roles and positions available in the unit. The respective roles of heads of department, section leadership and leadership at the level of groups or similar appears to have been stabilised, with a division of labour that primarily reflects the significance of groups

and individuals in securing funding as we referred to above. Clearly, at Lund University, a culture of decentralisation permeates not only the university as a whole – see more below – but also the different units, below the level of department leadership. Task responsibilities are quite devolved, which often seems to create a sense of purpose, autonomy and self-control, but sometimes somewhat unclear directions and accountability:

> Project funding is primarily investigator driven, there are no department level targets for project funding although individual researchers and research groups may have such targets. The unit has no plans to create targets for project funding but we have discussed taking a more strategic approach to project research (E)

> From a certain perspective, the division has become something of a space where members of staff greet each other in the corridor in between fulfilling their own goals and ventures. Everybody has their own external network, it is not certain what these bring to the division as such (HT)

In addition, for units that have been significantly reshuffled over the years, or which have been assembled for the purposes of RQ20, formal leadership has been more difficult to pinpoint, and it seems as if governance and leadership for them are floating. Hence, the time seems to be ripe to at least consider the alignment between the formal and the informal, and how Lund University is governed, and how responsibilities are distributed.

Another question raised in the RQ20 exercise concerned developments since the latest (and first) large research evaluation exercise at Lund University, RQ08. While the 12-year timespan has prohibited such a comparison in some cases – the units simply did not exist at that time or the entire exercise had been forgotten (as one unit stated, "During the work with this evaluation, we could not find anyone who remembered reading the RQ08 evaluation") – many conclude that time has indeed made a difference. It is not uncommon that the size has doubled over time, with in most cases also considerable reorientations of the profiles of the units. While such reorientations are only to be expected in such a dynamic activity as research, they seem in many cases to have been driven also by opportunities rather than internal considerations, again a reflection of the pattern throughout RQ20, namely that the organisational "we" is increasingly a mirror of external steering and external considerations. However, it should also be noted that some have deliberately tried to steer away from the often rather compartmentalised organisational forms that still reigned supreme in 2008:

For the past 10 years, we have had an excellent departmental organization with units under administrative heads and no powerful divisions competing for resources. The principle of not giving the unit heads any strategic influence at department level has made the department delightfully free of internal fights for resources. All tenured academic staff belong to the department and not in any way to the units (N).

And for other units, the period after RQ08 has been marked by attempts to change the structure and orientation, in a more inclusive and outwardly direction:

The gender imbalance among the professors at department level was addressed after RQ08 by setting a long term action plan to encourage younger female scholars to attend different programs within the academia (LTH)

At the time for RQ08, the faculty and PhD students were almost exclusively from Sweden or the Nordic countries. Today, all faculty members collaborate internationally and there is a continuous flux of visitors from all over the world (S)

Thus, RQ20 could ideally be part of the reconstruction of an updated "we", where scientific ambitions are mirrored in flexible work modes, leadership forms and models of collegiality, and where different funding streams and tasks are aligned in a conscious and progressive manner. The units at least portray this as an opportunity, but also identify critical junctures on the way forward. One of the most critical issues concerns recruitment.

#### Dig the new breed: how units recruit and promote

The units have been offered the opportunity to describe and reflect upon how they ascertain renewal and mobility, as well as predictable and rewarding career paths. The open-ended questions were intended to invite reflections on the logic and direction of the units and how they are reflected in recruitment practices, rather than trying to answer in a "correct" or predictable way.

Recruitment itself is decomposed by the units into a series of critical stages: introduction, promotion and succession.

As to the introduction and selection of new faculty, a main issue is selection, how the units identify recruits. At the time of RQ08, this was largely a local issue, where the units were self-sufficient. The picture now is mixed, with everything from a basically unaltered structure of internal recruitments to open calls:

Recruitment of new PIs has so far mainly been based on "budding", i.e., previous group members have, after appropriate post-doc periods in other internationally leading research groups, established groups of their own (M)

In recruiting, we try to focus more on the person than on the field and always formulate calls that are as broad as possible (N)

A salient feature of recruitments, as a reflection of the altered funding structure, is that recruitments are sometimes tied to funding opportunities and success on the funding market. At times, this is done with a positive twist (a necessity to recruit those who can fund their own activities), at times with a negative, if and when external funding collides with other obligations:

> Our main aim is to attract already successful young researchers, e.g. those who have received VR funding for early-career researchers. Here we see that we could be even better at identifying strong international scholars and inviting them to apply for funding in Sweden through various programmes (LTH)

Remarkably few mention the category of associate senior lecturer and tenure track to promote faculty, and to serve as a measure to fill those voids and secure the long-term viability of the unit. Other considerations, more pressing and perhaps more opportunistic, seem to overshadow the virtues of an orderly tenure track model. The funding strategies deployed collide with the ambitions to have more orderly career planning:

We have a skewed age structure with older professors and lecturers and although we have several younger researchers ("forskare") they all are on soft money; we have no associate lecturers (BUL) (LTH)

Recruitment to the Division 2014–2018 has relied on external funding. No permanent position has been advertised since 2010 (HT).

...there is an obvious problem of matching the university's long-term fixed positions with the needs of external funded research projects (S).

When it comes to succession, quite a few units are critically dependent on senior scholars approaching retirement, and measures to fill that void are often described in some detail, as is the sometimes (not always) somewhat unfinished attempts at finding such replacements. This holds in particular for units that have hosted very visible and prominent faculty, which have retired:

Recruitment procedures are extremely slow, which has severe negative implications when recruiting externally since the most successful candidates will often have offers from several universities and may not be able to wait many months for a decision (M)

The threat for the environment is that the well-established research groups that have been running over a long period (+15 years) will eventually have PI's that will retire and there will not be so many to take over from these groups, if not a better network to support younger research groups will be established (N)

On a general note, it could be said that recruitment is high on everybody's agenda but also constrained. There is a reported lack of search process, search spaces (formal, informal) and the financial underpinnings seem to prohibit a degree of planning among the units. Recruitment is often seen as tied with enhanced visibility, in previously rather stable environments:

The department has been relatively successful in internationally recruiting highly qualified young PhDs for our tenure-track and postdoc positions. These young scholars have shown themselves capable of publishing in high-quality journals and have contributed substantially to our research output (E)

Gender composition – and diversity more generally – is frequently touched upon in the self-assessments, in particular in units with a highly skewed composition but also among those that are more complex in their set-up. It is fair to state that few, if any, of the units do not view their composition as critical to

long-term viability, and that many of the units have grown not only size-wise but also in their diversity. They link diversity to recruitment and to renewal in a flexible and pragmatic manner – it is viewed as an integral part of quality work.

While we are not actively working to increase diversity at our division by affirmative action or similar approaches, we are strongly devoted to the concept of equal opportunities. This is a central component to reach our general goal that each individual in our environment should be allowed to develop their full professional potential. We believe this makes us an attractive environment for any researcher independently of their gender or ethnical background (LTH)

#### Primus inter pares: reflections on academic leadership

The self-assessments have been done at the basic level of a university: at a division, a department or in a conglomerate of research groups.

Central management is seldom referred to; the occasional polite response mentions that the University is quite decentralised in its governance, with most of the opportunities and responsibilities residing at the lowest possible level: Lund comes across as a university marked by the principle of subsidiarity more than perhaps any other major Swedish university (whether by design or default). The units often infer



that management has its own set of laudable objectives on top of the widespread decision devolution, but that the communication line is slightly warped with central management pursuing an agenda that is somewhat detached from the everyday realities of the units.

#### The central University management is not a visible actor to us (S)

If anything can be inferred from this, it is that the current structure of responsibilities and decision-making ("linjen", the line) appears somewhat vacuous when it comes to the central management level. There is no clear-cut model for which issues should be managed by the units themselves, or their superior organisational levels, departments or faculties, or central leadership. Why some issues therefore end up as central initiatives is not always clear to the units. Quite a few have taken the opportunity to articulate consternation regarding the mandate and underpinnings of leadership at Lund University:

Considering the leadership that is actually conducted at LU central level, and to some lesser extent also at faculty level, decisions are made without really considering the consequences for the organisation at department level. It does not help to have very well-trained leaders if they are not making decisions with the perspective of core activities at the university – research and teaching (N)

As an organisation, Lund University seems from the perspective of the units to be dependent on the aforementioned "cheerful compliance" and heavy responsibilities taken at the level of units (or subunits), with a somewhat anarchic decision-making structure and an unclear mandate for the managerial levels. Sometimes, this has prompted units to ask for an audit of the top levels of the University:

The central university administration should aim to provide tools for handling the regulations such that research and teaching enjoys a minimum of restrictions and loss of resources. An internal audit, with this purpose, driven by the scientific staff would be unique and efficient solution (N)

The faculty, in a similar vein, is more often than not associated with occasional support, or directives, but there seems to be a need for a dialogical interaction, if judging by self-assessments; not all issues can be dealt with at their level.

The organization of the university is very hierarchical and communication between the research environments and the leadership at levels above the department is almost entirely through the head of the department. (...) On a day-to-day basis it is somewhat difficult to pinpoint how leadership at the faculty and university level supports our quality work. (LTH)

We have already pointed to issues and areas in which meaningful management might evolve, in association with shortcomings and challenges among the units. This pattern of decoupling might also be a reflection of several rather profound changes since RQ08. The degree of external funding has continuously increased, and as mentioned, when the units consider their strengths, weaknesses, opportunities and threats, funding is a top concern. What faculties (and other formal units) do is primarily to reinforce the awareness of funding. They also alleviate some of the ensuing tensions, but rarely if ever do they instigate much more than lubricating measures – or reminders of financial prudence – into the everyday activities of the units. This in itself may hamper initiatives to be more internationally visible, focusing instead on the management of currently more pressing issues:

Our governance structure may undermine our chances of successfully competing for top-notch senior staff in some research areas (E)

#### Life beyond the unit: how environments collaborate

The units were also asked to reflect on their articulation with some of the University's major external assets and resources, namely infrastructures, collaboration with wider society, and support in the form of long-term, large-scale programmes, and how these external opportunities might best be aligned with the direction of the units themselves.

Infrastructures have always been important to progress in research, and their significance increases in Lund and elsewhere. Quite a few of the self-assessments devote considerable space to enumerating their infrastructural foundations, and access to adequate facilities appears as important as the access to talented people.

> One of the strengths of () is the innovative philosophy about the value and design of infrastructures, which is based on a unanimous appreciation of the importance of investing in and developing cutting-edge technologies to remain at the scientific forefront. We have established a system for joint investments and maintenance of key infrastructures, including the technical personnel running them, to maximize their use, and to help all but especially early career scientists, to access otherwise expensive or difficult to establish infrastructures (M)

Also striking is the wide variety of infrastructures, ranging from libraries to international facilities. "Intermediary infrastructures", intermediary in size and complexity - with easy or even immediate access, seem particularly important, also in the light of Lund's major commitments to large-scale infrastructures:

These are specialized national/international infrastructures that we should try to take advantage of but they are relevant only to a fraction of the research in Lund university. Direct government funding for technical personnel to maintain our laboratories and support researchers and students is more critical to us (N)

Even though there are a few outstanding – in costs, visibility and impact beyond the unit – infrastructures in Lund, the intermediate ones are in as much need of care, governance and support as larger endeavours.

Infrastructures are also, in Lund more than elsewhere, assets that come with financial and organisational constraints. In quite a few instances, the housing, funding, governance and organisation of infrastructures come across as issues dealt with in a lenient but sometimes unorganised manner; given the complexity of Lund's combined infrastructural responsibilities, this would seem to be an issue that should be addressed coherently and transparently. Much credit is given, though, to the current balancing act of funding and supporting infrastructures of different size and complexity: In recent years, the faculty and central LU levels have developed a coordinated approach for supporting infrastructure needs at LU, which represents a significant improvement that enables funding of expensive equipment and holds the promise to maintain or even increase our competitiveness (LTH)

Lund is outstanding in a national context for its many large-scale areas and environments, in the form of the Linnaeus environments, which ended in 2016 and 2018 respectively, and the Strategic Research Areas (SFOs) that were commenced in 2010. If judging from the statistics, such areas permeate large parts of the University, and they indeed seem quite significant also judging from the self-assessments. For those heavily engaged in their SFOs, they comprise a very important asset:

(it) encourages us to engage in interdisciplinary research of the highest standards, as well as collaborations outside academia that increase the societal impact of both our excellent basic and applied research (N)

To some extent – which may surprise – SFOs can be regarded as yet another governance and lubricating level which adds more or less substantial amounts of funding and organisational context to the units, which adds to, but does not fundamentally alter, their activities:

Through SFO membership we have access to () facilities and we are part of a stimulating intellectual environment with ample possibilities for scientific discussions and collaboration (LTH)

And when the strategic areas are such forces, they are sometimes perceived as overly stale and impenetrable to those who operate outside of them:

Belonging to disciplines () that are not prioritized by the main SFO () in terms of permanent positions is particularly problematic (M)

It is important to vitalize the organization of the SFOs to avoid "a second department level" and to ensure that the SFOs can establish efforts in new areas. Also, areas at the borders between the SFOs need consideration (LTH)

It may be somewhat surprising that the Linnaeus grants – at the time of RQ08 viewed as a particularly important signifier of Lund University's research capacity – appear in a subdued form in the self-assessments, or simply just a note of funding opportunities of the past without any lasting effect on working methods:

Several large-scale research funding opportunities have been cancelled (e.g. Linnaeus grants) (N)

If judging from the self-assessments, SFOs have emerged as one of many steering devices in and around the University, just like the Linnaeus grants of yesteryear. Units move on between funding opportunities. Large-scale areas and environments like the SFOs appear more forcefully in a select number of self-assessments, this time as major undertakings with substantial impact and focus. This of course reflects the dual nature of such environments, as distributed *and* concentrated, with many stakeholders in complex networks, but also with coherent directions, leadership and centres. Working out this duality and striking the balance between two fundamentally different governance models will most likely constitute a major issue for the units and for the management of the University at different levels.

Hence, while Lund stands out through its many large-scale undertakings, many units report that they have no or only limited alignment with consortia in their fields. They struggle with size disadvantages and their relative location within their respective fields, with few or any mechanisms available to reduce the negative effects of marginalisation:

There is currently no clear strategy for the development and leadership of larger research consortia applying for larger grants. Instead, individual researchers are continuously relying on being invited to such consortia due to lack of basic time/ funding to establish such net- works. In the next years to come, it is a goal to take more overall initiatives in this regard and to take on the role as a joining force of research investments (M)

Hence, it comes across rather clearly that Lund, while excelling in this regard, still has some way to go to foster inclusive and broad environments, and to entice and support units to, when applicable and conducive to quality, to form and lead broader constellations. Lund is still very much the site of small-scale activities, with all the opportunities and constraints that ensue.

As to collaboration, this comes across as ubiquitous. All units do, in some manner, align with external forces and interests, but the forms of such alignments vary considerably. In some instances, the relationship is virtually mimetic and the boundaries between the unit and its environment are difficult to pinpoint; resources and activities flow between the two, and the University might even be secondary to the external partner (with resources and mandates springing from external relations overshadowing those of the University):

Most of the research at the department is applied, and the research approach taken is based on case studies and other forms of close collaboration with the realistic scale of challenges that come with applications. Therefore, a good collaboration network with industry and other external parties is essential for success (LTH)

In other units, considerable efforts have been made to actually strengthen boundaries, to ensure that the unit has the capacity to identify its own directions rather than serving as the auxiliary arm of strongly defined practical interests:

It has happened, for example, that a company did not want to be officially associated with a certain project due to conflicts with their management's communication strategies. A similar potential conflict of interest is that, in research programs where you are dependent on industrial funding, there is a tendency not to look at certain types of problems (M)

In yet other units, collaboration comes across as intermittent efforts to inform the general public and act as a supporting device in social affairs. Quite a few operate at considerable distance from the hurly burly of life outside academia, and such units seek discreet measures and arenas for interplay with practical knowledge interests:

External engagement is built into most projects since they are conducted on a public arena and often consist of performances that involve the audiences (K)

Our UoA supports external engagement and outreach cooperation, this within all levels in society. This activity is not formalized in documents, but instead with time has grown to be a guideline based on tradition, current opinion and attitudes among the leadership/board (N)

If there ever was an armchair, ivory tower stance among Lund's academics, that time has passed. However, the means and ends of collaboration vary, and the form and direction of partnerships are clearly something to which the units devote varying degrees of consideration. This is another potential area for increasing interaction between the units and the formal organisational leadership, as not all partnerships are productive for the long-term mission of the University. The governance mechanisms for collaboration appear far more professional than a decade ago when RQ08 was done, but still come across as somewhat erratic in light of the significance that collaboration actually plays in the everyday activities of the University.

Education is often mentioned as perhaps the most important avenue for impact. Virtually all units align with education in one form or another, virtually all see this as a productive relationship between activities. However, tasks are not equally distributed, and research opportunities tied to external funding in particular and teaching obligations tied to student demand sometimes cause imbalances, sometimes a productive tension:

Research is carried out in all core legal disciplines in order to guarantee research-based education within the professional law degree programme and supervision within the doctoral education programme. At the same time, strong research environments are being promoted and are flourishing and new strategic, often thematic, research areas are being developed and supported (J)

The balancing between research and teaching. A and B are unbalanced, relative to its low educational activities, i.e. limited relevant teaching. C and D on the other hand are too dominated by teaching, i.e. not enough research (LTH)

For many units, expansion in recent years has been tied primarily to research opportunities. As a result, planning and recruitment have primarily been tied to identifying suitable members of research projects and teams. This has created a cycle of reinforcing focus on research opportunities:

The Division has since its start had a strong focus on research. Unfortunately, our education activity has not grown as fast as we have hoped and still today, our education share is relatively smaller than for other Divisions (N)

While this is the pattern for quite a few units, others have retained or even reinforced an identity based on educational expertise. Quite a few identify strongly with their educational missions and see this as a signifier of their importance and standing:

46



*Teaching by the department is conducted professionally and is appreciated tremendously by the students (LTH)* 

All teachers in postgraduate education and all doctoral students are teaching or will be teaching within undergraduate education. This arguably makes our department quite unique (K)

While recognition for educational engagement represents a defining element for many units, it sometimes also leads to potential trade-offs, where a broad and large educational portfolio might be difficult to align with research ambitions. And vice versa, research strengths might be difficult to showcase in education:

The Department's current educational portfolio does not capture the main research strengths of our Unit of Assessment. This means few opportunities for students to capitalize on a strong and intellectually stimulating research environment (S)

All in all, education is a critical intersecting element for the units. It serves to align research with recruitments, to showcase strengths in research, and to find ways into the general public and organisational life outside academia. However, as well as for collaboration, this is a complicated balancing act with numerous pitfalls and challenges. The current focus on research opportunities may need to be balanced with other obligations to ensure that the different tasks and responsibilities reinforce one another – for individuals, units and the University as a whole.

## 3. RQ20 – a synthesis of panel reports

Having summarised the self-assessments, we now turn to the response of the external panels: how were the reports received? As for the self-assessments, this is based on a stylised account of all the panel reports, which are of course highly variegated; the aim has been to be clear yet nuanced in the presentation (and identification) of themes in the reports. Sometimes, panels provide contrary advice, for instance on the relationship between internal and external funding. For those who want to explore further how the assessments were structured, the reports can be read in full in Part II of this report, while this section aims to highlight the overarching themes and lessons for Lund University as a whole.

#### It was worth it: panels' views on RQ20

The first issue in the self-assessments concerned the rationale, format and content of RQ20. This was, perhaps unsurprisingly, a major concern of the units. To the panels, perhaps also unsurprisingly, this is less of an issue as they have by and large taken up the task at face value. Panels also generally (but not always) understood the entire RQ20 as an exercise in identifying the conditions for research quality enhancement (elevation) rather than an assessment of research quality as of today (evaluation). This does not mean that the panels have been lenient in gauging the units; indeed, as we shall see, they have been quite pertinent in their assessment of the units, and their past, current, and future conditions.

In this sense, the panels have willingly adopted a holistic approach to research quality. They view quality as a relational phenomenon rather than a fixed entity: relations between activities, between members of staff, and between different governance levels are the factors that in the end enable high quality research. They also generally praise the units for being transparent and open about their conditions and ambitions, thus paving the way for a fruitful dialogue between units and panels:

The self-assessment document is informative, detailed, honest, and extremely well structured. It is commendable that the department has utilised the RQ20 opportunity to conduct a thorough self-evaluation during 2019, now giving the department the opportunity to compare the comments of this RQ20 panel with the department's own findings (S)

In those cases where units have been formed as a response to the RQ20 exercise – and did not exist as such prior to the assessment – panels raised the issue of the future value of their reports. What might their conclusions regarding leadership, organisation, and other issues, matter if units were only constituted for the RQ20 process and will be immediately dissolved after the exercise? Hence, the identification of units of assessment has not always been fully understood by the panels.

In some cases panels identify a gap between formal and informal responsibilities, and a lack of information on the interplay between the two. This, the panels argue, should be taken into account in future exercises: units should not be composed solely and perhaps haphazardly for the purpose of an assessment, but rather as a reflection of future-oriented, careful elaboration of the organisational form of activities. This is even more pertinent as the format of RQ20 may actually foster a more transparent and trust-based dialogue between different levels of the University, where panels can function as trustworthy intermediaries: Several units also expressed a feeling of mistrust by the central administration. They consider various administrative routines not to serve the activities in the different units, but to monitor and control them. (...) it appears that RQ20 has the potential to allow Lund University to address these problems as they are experienced by the teachers and researchers in the UoAs, and provide national leadership in building trust in the central administration. (N+LTH)

Overall, the panels seemed to have understood and acted upon the premise of RQ20, to identify conditions for improvements within the units – as well as for departments, faculties and University leadership. In cases when units belonging to different departments, or with no prior interaction, have been subsumed under one unit of assessment, the panels sometimes identify a mismatch between their remit and the material submitted. A lesson for future exercises might therefore be to start early and consider how units might best be constituted and assessed, how formal and informal authority are exercised and how they align. Overall, the open format and flexibility built into the framework seem to have worked, and provided panels with the opportunities to assess and advise units in a manner sensitive to conditional variations within the University, in a rewarding manner.

> We salute a RQ20 evaluation process that builds on active organisational involvement and dialogues, and in its own ways, makes space for alternative approaches to the data produced. This was central to making this evaluation a fruitful enterprise (S)

#### Short and sweet: how units summarise themselves

A key issue for the units was to describe themselves succinctly in the form of an analysis of their constitutive strengths and weaknesses, as well as their extrinsic opportunities and threats.

The SWOTs indicate how the units view their standing and position, and they serve as a measure of the degree of self-understanding and capacity to read and act upon external conditions. The panels generally underline and compliment the units' reflexivity, corroborating their view of themselves as well-positioned within their respective fields in terms of productivity and impact, and in possession of adequate equipment and other enabling infrastructures. Not all operate at the very cutting-edge of their fields, but no activities are below the level expected at an international research-intensive university:

This (unit of assessment) shows an excellent, partly outstanding, scientific productivity (M)

Overall, (the UoA) has an excellent publication record, in terms of quality, originality, quantity and impact in the field (N)

Reaching the highest European level is a realistic goal, but several challenges remain to be tackled (J)

49

The ambitions expressed in the self-assessments are deemed to be high. The RQ20 process is seen as instrumental in gauging opportunities and pitfalls in this endeavour:

> It has a clear sense of its own identity - reflected both in the self-assessment report and the discussions. It is confident of its strengths and weaknesses (S)

> The Faculty has identified well its strengths, weaknesses, opportunities and threats. Our findings confirm the relevance of the factors pointed out in the self-evaluation (J)

Leadership, especially at the level of departments or sub-departments, appears to be lenient and pragmatic, and the units seem generally to function well with a spirit of collegiality and helpfulness, with more than adequate external connections. While this creates numerous opportunities and minimises the risk of unproductive feuding, it also creates its own potential shortcomings:

In general, we have an impression of an environment that is both very ambitious and collegial (E)

The Faculty seems to have all the characteristics of the Swedish way of working. The downside of this approach may be a culture of 'live and let live', where hard choices are ultimately being avoided (J)

Panel proposals are usually incremental rather than draconic: be bolder, take risks, be cohesive. When it comes to shortcomings and hampering factors, the panels also corroborate the units' capacity to identify those and point at possible remedies. Panels agree with the self-assessments that there seems to be an exorbitant focus on funding opportunities, a focus that seem to hamper activities in quite a few instances. They also point at the risks and perils that ensue in a volatile funding landscape, namely that units may be too small, myopic or otherwise hampered to ascertain a position of international visibility:

the Lund (environment is) to a large degree fragmented into a number of small research groups, each left to themselves, fighting for survival with rather limited mentoring of the young groups (M)

The panels also validate the self-assessments' perception of recruitment issues – as critical and not always fully attended to. Indeed, all panels point to recruitment as a critical function which partly resides with the units themselves, partly something to which the University should pay more attention:

Staff recruitment and retention appears to be over-complex from a procedural point of view (S)

Currently a professor position with no extra resources will clearly not attract qualified applicants from any place outside Lund, particularly if the salary is not included (M)

50

The panel reports suggest that a few factors have been omitted in the self-assessments, one being scale disadvantages, where too few scholars are devoted to too many subjects and where the capacity to emphasise and focus on a coherent set of objectives is underdeveloped. Another omission is the position of Lund within international research networks. A recurrent observation is that Lund could be bolder and more present in collaborative networks or in the development of fields more generally. Lund environments and scholars are well ahead in their respective field but they seldom drive or propel them:

Most of the UoAs we reviewed are solid but not always among the world's best (LTH)

While many groups participate in international networks and collaborations it is striking that researchers from the units rarely receive larger grants from international sources and there are only very few researchers who have a leading role in applications that receive international grants (M)

A third and related omission concerns the funding underpinnings and the perceived need to diversify: with notable exceptions, units are overly dependent on a small set of funding opportunities and should devote more attention to others, in particular non-Swedish.

Finally, the position of Lund University is – again not everywhere but within a significant number of fields – dependent on a small set of scholars of international repute:

The tradition of high-profiled individual researchers maintains the strong university brand and position, but can hinder academic renewal (E)

It is evident that the success of a UoA is primarily the result of one or several excellent PIs being an attractive hub for recruiting junior scientists and attracting external funding (M)

In addition to a certain degree of skewness in the collegiate, such a reliance also runs the risk of over-investments in certain areas, methods or techniques, to the detriment of renewal and plurality more widely:

There was no strategic planning of recruitment, essentially "bottom up", which has resulted in "more of the same" rather than a more balanced composition (M)

All of the above indicate that Lund is doing well, but that its future directions – including the intertwining of leadership, funding and activities – are in need of clarification and solidification.

This, the panels ruminate, is not necessarily an effect of the units' mode of operation but rather a side-effect of the governance of the University as a whole: adamantly decentralised, adamantly focused on capturing funding opportunities outside of the University. In addition, the combination of internal decentralisation and external resource dependency creates differences within the University: first between "haves" and "have nots", and second between "haves" with relatively long-term and large-scale external support and "haves" which rely on an amassment of smaller grants. While such variations may well be inevitable, they should nevertheless be articulated and perhaps even addressed as a problem rather than an

unfortunate consequence of policies enacted elsewhere. Thus, what appear to be virtues of the University also appear as liabilities, and panels urge the units – and their organisational settings – to deal with the dilemma of squaring devolution with directionality.

Panels thus conclude that the submitted SWOTs showcase a reflexive capacity among units that operate at a high international level and that understand the preconditions for such a position. Units are perceptive of their strengths and weaknesses, and act upon external conditions, generally understanding their dynamics and potential effects. This notwithstanding, panels point at some missed "known unknowns" and recommend units and formal organisational levels to act upon those as well:

> The SWOT analysis should be complemented by a GAP MAP analysis. What are the key gaps in terms of research, technologies, infrastructure and human resources (PIs and young scientists with perspective)? How could the Unit take appropriate actions to strategically fill these gaps? For example, how should an ideal recruitment look like to complement the research strengths of the Unit? (M)

To sum up, based on the largely transparent and useful SWOTs, Lund comes across as an internationally recognised university that operates in a lenient manner, but which is also constrained by external as well as internal factors, and with quite a few internal imbalances.



### Who's who in the world: Lund's research standing

A critical issue for a "national flagship university" like Lund, is to determine its position in the world – in Sweden of course, to assess whether its national status is valid, but also beyond, to ascertain that it is internationally recognised and visible in its constituent parts. One increasingly prevalent way to do so is through rankings, which may be made on an institutional level (where universities are compared) or at the level of broadly defined subjects (say, economics or astronomy). Ranking methodologies differ and invariably have to deal with intellectual constraints of various kinds, for instance regarding comparability or coverage. RQ20 did not engage in rankings but asked the units to reflect on their relative position within their fields, and to identify relevant comparisons in the world. The first question was based on the bibliometric information provided, whereas the second was framed as an invitation to identify benchmarks (yardsticks, comparable units) in Sweden or globally. The intention was again to invite units to think about themselves in relational terms and as part of broader knowledge areas and systems.

Panels showcased and sometimes discussed at some length the bibliometric patterns, especially for units which scored highly. In these instances, panels noted the significant presence of the groups in these fields and commended them for the visibility. Panels also raised some caveats when it comes to the validity of bibliometric scores, at least in areas marked by large numbers of co-authors and where Lund scholars were participants rather than drivers of the reported research. The bibliometrics were intended to serve as underpinnings of the self-assessment and not as evidence per se and have been treated accordingly. This notwithstanding, they confirm the general pattern of Lund research being at or above – sometimes significantly above – the world average for research universities in different areas.

When it comes to the benchmarks, units sometimes hesitated to identify them, for a variety of reasons already mentioned in the summative discussion of the self-assessments. Most of the units nevertheless took on the task and mentioned reasonable counterparts. The panels generally corroborate the choice of benchmarks, choices which seemingly indicate a degree of rational self-awareness among Lund's research environments: they know who they are and where they are located in the world. However, panels sometimes ask for bolder, more demanding, and more in-depth comparisons – in particular for those thematic units that are composed of a large number of research groups:

The panel recommend the University and University Hospital to benchmark how other universities with translational profiles have visualised clinical and preclinical researchers career pathways (M)

Comparisons can and should, the panels argue, be used as devices that enable the units to orient themselves more clearly towards "best practices" within their respective fields, especially when it comes to the matters that are central to RQ20: recruitment, infrastructures, collaborative engagements, and new vistas and avenues for research:

> Implementing regular benchmarking of research organization, strategy and activities is needed to strengthen the international position of the Centre (LTH)

The panels also observe that the units which are composed of groups which rely on external funding tend to use funding opportunities as their organisational yardsticks. Thus, funding agencies serve as perhaps the most significant signposts:

There appears to be no incentives at all, and little financial possibilities at the Department or Faculty level to initiate overarching research. This is instead entirely left to the external granting agencies (e.g. Swedish Research Council/ Scientific Council for Medicine and Health, Wallenberg foundation), who launch at times larger programs or "steer" by their individual funding policy (M)

While the panels acknowledge this as sensible and indeed necessary, and in some cases done exceptionally well with external funding used proactively, they also point at ensuing risks: myopic orientation, less than optimal deployment of resources, and a focus on national opportunities rather than international tendencies. Funding is a vehicle, not an instrument for comparison, but again, panels note that visions and ambitions seldom come from an assessment of where the respective fields are moving, and more on the basis of opportunities and existing work modes and directions.

Panels view Lund University's risk strategy as highly decentralised, where directionality is left to units themselves: they have the leeway but also largely the responsibility to navigate within their area. The occasional exceptions are centres and large-scale programmes which, however, are identified by government, funding agencies, foundations, and the like – a fact that in itself leads to some tensions between them and the University as a whole. A point to which we will return.



Some national references also appear in the self-assessments. Quite a few of them refer to benchmarks and comparable units at other Swedish universities, and some of the reports reflect on Lund's position within the national research system. These benchmarks indicate that a leading position in the country is a challenging goal in itself and that units compete fiercely with equivalents in others Swedish universities for resources and staff. While Lund is certainly esteemed – and some panels note, also proud to be old in its self-presentation as a higher education institution – panels sometimes fail to see how age and esteem actually play out in how the University is governed. To put it more bluntly, is Lund really an elite university? And in what way does it pursue this as a goal and a yardstick for its activities? For instance, is research excellence the predominant form of identification? Few or any articulations of Lund's self-representation are found, which left some panels somewhat consternated: are activities of small scale, or those dominated by their educational remit, really expressions of a world-class university?

> ... the elitist research culture of an old university is in some tension with the Swedish university system, which favours education over research. A frequent concern with our informants was too little time and money for research, particularly for young faculty (E)

> Several colleagues explicitly said that they did not have much time for research unless they acquired external funding. Within the context of traditional research universities, to which LU belongs, this is a remarkable, almost unique, situation (HT)

This also ties in with leadership and how university management acts in relation to external factors such as resource allocation, funding and regulation. A self-proclaimed elite university should act accordingly. The panels seek more coherent depictions of what Lund University is and aims for, not merely in its constituent parts but as an organisation – where different levels of the University operate in tandem and dialogue:

It's the panel's impression that collegial culture at the department is very healthy, and therefore, it could be counterproductive to let any of the issues to be decided by faculty or higher level of administration. This said, it is in the Faculty's interest to oversee that strong research environments do not dwindle just because the processes at the lower administrative levels do not progress in timely fashion or run into stalemate (N)

The panel noticed a lack of overarching research strategies and explicit performance goals. Explicit performance goals may be controversial but they strengthen research profiles, safe-guard research time and help staff to balance research/teaching engagements when the financial conditions for undergraduate teaching impact on research quality (HT)

Generally, Lund comes out as a university of international renown, with units that have a stable standing within their fields (corroborated also by the bibliometric data), an international reputation and visibility that form the foundation of the unit's self-assessments. However, not everything is of equally high standard and those variations need to be addressed. Faculties are an underutilised resource in this respect, the

panels argue. An issue of some importance is to sustain and perhaps even reinforce that position, and to do so in a way which acknowledges the conditions and constraints that shape universities in Sweden. This leads further to issues of recruitment, leadership, funding, and the relationship between different tasks.

#### The generational contract: how units deal with renewal

While panels identify Lund as a university that makes a significant imprint on research frontiers, and take responsibilities and obligations seriously, they point at some critical elements in need of a more concerted approach. Among those, recruitment is singled out in practically all panel reports. It is also evident that Lund comprises a bewildering variety of recruitment policies and practices. This comes as no surprise as the conditions for the units vary, both in terms of historical evolution, task set-up, funding profiles, and demographic profiles. This variation plays out strongly in recruitment practices, seemingly unmediated by strategic concerns at a higher level:

In order to counter the uncertainty associated with reliance on external funding, a more strategic approach in addition to collaboration and strategic alliances, would put in place safeguards and analyse risks associated with different funders and for different individuals (S)

To put it bluntly, panels identify a two-pronged, dualised, recruitment system: one "golden" through real positions attained in competitive progression with predefined tasks (normally associate senior lectureships), another informal and tied either to educational needs or to external funding opportunities with a myriad of career paths and constructions of positions. While the former is increasingly emphasised in the self-assessments, panels observe that even golden practices vary, with tenure track models containing elements of pragmatism and chance, and possibly also fuzzy criteria for promotion. Panels are generally not impressed with the attempts at streamlined recruitments, and advise even well-functioning units to better align recruitment practices and policies:

> A significant amount of "inbreeding" and hierarchical interdependence is evident in the PI recruitments within the UoA. The "budding" system, in which recruited junior PIs are former students or postdocs of more senior PIs, seems to be widespread and accepted as the norm, although it does not appear to represent a specific recruitment policy (M)

> Further support for early career researchers is necessary to develop shared understandings of what it takes to pursue an academic career [] or elsewhere, in particular in relation to teaching and research strategy, including criteria for quality scientific outlets (S)

The pragmatic model of recruiting still reigns supreme, with vacuous career paths, external funding also of permanent positions, and research space tied to successes on the research funding market. While most of this seems to be driven by contingency and happenstance, panels single out some environments as particularly adept at playing the "funding game", squaring their own direction with funding opportunities: The Centre has a clearly articulated strategy to recruit junior faculty with excellent potential. This means already demonstrated independency and ability to compete for external funding. They should also have complementary expertise to existing faculty, meaning that they can effectively contribute to the Centre competence profile and have the potential to actively engage in collaborations within the Centre (LTH)

Another general remark is that Lund – like other Swedish and Nordic universities – relies heavily on internal labour markets, on the promotion of students and PhDs of Lund origin. While this creates long-term stability and predictability, and has served Lund in the past and also in the present, it also carries with it risks of overinvestments in already established research lines, and missed opportunities of rejuve-nation. Some panels note that an internal recruitment strategy is sometimes pursued not by default but by design. In such instances, it is not seldom done with highly successful results, in terms of coherence and long-term stability in areas of specialisation and network formation. Such recruitment strategies may thus serve as an antidote to rapid evaporating trends. Hence, there is a need for an elaborated understanding of different conditions and different ambitions, panels argue, and no universal panacea might be available – but an active stance is called for:

While a plurality of views as to the nature of artistic research is to be celebrated, the necessary balance of unifying ethos on a general level is absent. This is reflected in uncoordinated – sometimes inconsistent, even riskily unstrategic – approaches to research and recruitment of both staff and doctoral students (K)

The strategy to fill positions to cover teaching is likely to produce singletons - i.e. small and isolated research groups lacking a critical mass – and may compromise scientific quality (N)

The third note is that of rejuvenation. Young PIs are often showcased as a group whose recruitment and promotion is critically tied either to funding opportunities or educational needs. However, if junior recruitments are to be made, they need to be integrated into coherent environments, neither overly teaching-oriented nor project-based. While there are many proficient examples of units and environments that pursue a dedicated and transparent stance here, there appears to be room for increased ambitions, or at least a transparent use of different types of positions: post-docs that are and should be time-limited and used accordingly for specific tasks, and associate senior lectureships that should be offered if ambitions are of a long-term nature. This is not merely a matter of fair recruitment policies but also, panels argue, a critical issue for the long-term impact of Lund's research:

> It is especially facing challenges of maintaining and renewing study areas, balancing teaching and research, ensuring recruitment and career development for young scholars, and addressing gender imbalance and diversity (S)

> As we understand it, the main decisions on hiring are being taken by the division but have to be confirmed at the department level. The decisions of the divisions are in turn based on proposals from research groups, but there is no formalized hiring committee. With such a system there is a risk of conservatism, while there is less concern for an overarching strategy (N)

Recruitment issues are central also for the senior levels. "Hiring before retiring" is a recurrent recommendation, as many units are heavily reliant on senior professors nearing retirement, but where constraints and/or inertia seem to hinder serious considerations of future directions of the units once senior members have left. This is particularly critical for units which rely heavily on research, where – apart from very senior and very junior positions, only a vacuum exists in between, and where happenstantial recruitment will not yield the expected results, panels argue:

"Hire before retire" is strongly recommended. Providing clarity about the hiring process, including its timing, is also important for the senior postdocs and researchers who do not have permanent positions (N)

It could be argued that limited basic funding hinders such a strategy; resources are simply tied up. However, the last decade has witnessed a rather dramatic concentration of resources to strongholds at Lund University – more so than at any other Swedish university (through Linnaeus grants and Strategic Research Areas in particular). The ultimate intention was that such centres should enhance recruitment, for instance by allowing for start-up packages and other forms of support (even if this was not explicated in detail in the calls). The relationship between such funding and recruitments patterns has not been entirely clear to the panels.

Matters of gender composition and diversity surface in many panel reports, where panels argue that the skewed composition of many units has to be addressed more forcefully if Lund wishes to maintain the opportunity to recruit talented people of both genders, and of different backgrounds. A reinforced focus on recruitment means, panels argue, a dedicated stance to identify recruitment opportunities beyond the trodden path, and to make units sensitive to candidates that may be outside its own search space:

However, we are unimpressed by the gender balance in the Department at all levels actually. There has been some improvements at the junior level, but it is far from a desired level. We are also not so convinced by the recruitment strategy to improve gender balance (E)

In sum, panels note and claim that Lund has a bewildering variety of recruitment practices, a variety that ties in with the devolved nature and ideals of the University. However, the panels stress that they can be made more transparent for individuals, and more elaborated and homogenised for units to avoid rushed and myopic recruitment processes. The large inflow of research resources has not yet had the intended effects on recruitment patterns, and a critical issue for the future seems to be to better monitor and support these, and empower them with resources and mandates.

#### Research and money: funding and research quality

Given the funding of Swedish research, research income is not merely a sign of ambition and perceived quality, but an absolute necessity, the panels acknowledge. This centrality in turn is reinforced by faculties and departments which base allocation and reward systems at least partly on the relative success of units on the funding "market", and which relegate the task of securing funding for permanent positions to the holder of these (at least to some extent). This, actually, seems to be the strongest steering mechanism of the faculties. This issue in itself raises questions as to the functional division between governance levels, and whether the primary role of faculties is to ensure financial prudence:

The Panel's impression is that the academic climate at LTH is not encouraging innovative risk-taking research endeavors due to the high pressure in securing funding to cover a substantial fraction of salaries for even senior faculty (LTH)

The complex funding situation for new positions risks creating an old fashioned hierarchy of positions, and does not appear to be a selling point in hiring (E)

Fair or not, such observations show that the rise and institutionalisation of a funding market for academic research in Sweden has been thoroughly internalised, and panels recognise the efforts put into funding strategies and practices and see them as generally both valid and productive. Nonetheless, pitfalls exist. Despite the ubiquitous search for funding, some funding opportunities remain untapped, panels argue. While many explore funding opportunities in a broad yet elaborated and conscious way, others seem to miss out on possibilities that are close to their own mode of operation, such as funding from industry in areas with commercial articulation, or European in areas which align with priorities set at that level. Here, as for many other aspects of quality work at Lund University, panels ask for a more elaborated stance to the units' future directions. Panels also note with some consternation that units are sometimes composed of sub-units with little or no interaction between them, which may lead to myopic outlooks and inhibited funding opportunities of greater magnitude:

> ... there appears to be no system for priority- or goal-setting by the unit or mechanisms for coordination, communication or interaction at the unit level. Any discussions are informal and undocumented and the report and interview suggested that serious discussions on research strategy had not been initiated and plans for expansion of funding sources for future research (i.e. ERC and unspecified applied research) are vague (N)

For other units, a pattern of rapid expansion causes numerous challenges that may not always have been articulated: the ratio between PhDs and researchers, how external resources tie in with recruitment more generally – and how funding aligns with goals and ambitions in issues like diversity, collaboration and interdisciplinarity:

It [the unit] is especially facing challenges of maintaining and renewing study areas, balancing teaching and research, ensuring recruitment and career development for young scholars, and addressing gender imbalance and diversity (S)

Size constitutes a challenge also at the other end, namely for units that have been highly successful in the funding system. Lund University has grown immensely in the last decade, with almost a doubling of research resources since 2008 (of which the predominant part has come in the form of external grants), and this shows in the conditions for many units. Here, issues of diversification and collaboration are pertinent, as well as how previously rather compact and integrated units may find ways to expand without losing coherence, and to follow trends and tendencies within (and beyond) their respective fields:

There is very much a sense of 'let 1000 flowers bloom' that is core to what the junior staff in particular expressed as critical to their enthusiasm for working in [...] Lund. Obviously, the limited opportunities for advancement at Lund itself is an issue of concern to them, especially because they find the working environment so collegial and conducive to their academic productivity (E)

The unit should take care to develop a research priority and a research funding strategy ensuring a sustainable portfolio of research projects including large and small, excellence and collaboration, fundamental and industrial, low risk and high risk (LTH)

This also ties in with the observation that several panels made, namely to pursue not only a funding strategy in general but rather to target sources which enable the units to compare themselves with leading environments elsewhere (for instance, the European Research Council). Units have generally been successful in expanding their financial underpinnings; however, they may now consider a more concerted approach to funding sources and how they may align with impactful research. This in turn, some panels conclude, would not only serve as a comparative baseline but also as a way to secure long-term funding stability:

> Improve chances of getting larger long-term funding from domestic sources, as well as from the EC, including ERC, by forming large enough, interdisciplinary group consortia (within [the unit] as well as supplementing with groups from the department and outside) that have a common research goal (N+LTH)

Altogether, Lund has been very successful in research funding, and this shows throughout the units, albeit with considerable variation between and within units. Panels highlight not only the cause for celebration but also some shortcomings, including fragmentation, lack of communal learning between units, and somewhat short-sighted planning horizons, where funding opportunities are not always explored very consciously. There is a very strong differentiation between units which know how to "play" the funding system and can use it to their advantage, and those which follow and adapt to it in a reactive manner. The quality ecosystem is therefore strongly developed in some aspects, but not always in a balanced manner. Funding is a necessary condition for any ambitious research undertaking in contemporary academia, panels argue, but it needs to be aligned with capabilities, opportunities and ambitions. The University should also aim for a stronger alignment with external funders to find ways and mechanisms to enable a general enhancement of research quality, for instance by engaging in dialogues with funders regarding the balance between internal and external funding, the role of faculty funding in relation to external support.

#### Who governs: leadership and research quality

A recurrent theme is that Lund University is a flat organisation, which may be seen as a virtue, but that the preconditions of that flatness have been less articulated. Generally, units view leadership more as a matter of collegial interaction than articulated organisational goals. This practice is viewed with sympathy by the panels, which strongly support the ideals and practices of this type of leadership. There are numerous examples of units that strike a balance between inclusion and direction, and that find ways of identifying and empowering leadership to enhance quality work within the units: Overall, this UoA has a very positive collegial culture, which can be observed at the highest level in their 3-year rotation system for the position of head of the Division, which allows for integration of all the "voices" of the PIs and precludes the dominance of any one subgroup of PIs (M)

All members of the panel were struck by the exceptionally positive attitude towards the Department [...] expressed by virtually all members of the UoAs that we interviewed. This appears to be a department with few conflicts and with a collegial and social culture that is working exceptionally well (N)

This shows a department capable of dealing with complex internal issues that are the product of organisational structures [...] and transformed the environment from tense to vibrant (S)

However, several panels identify shortcomings of the adopted approach and recommend units to form a balancing relationship between openness and directionality. Such pieces of advice are not given randomly but rather reflect critical choices and opportunities that call for both bottom-up and top-down approaches in parallel. Leadership sometimes operates without clear-cut goals or ambitions, which may also hamper possibilities to elevate quality and find a productive balance between formal management and localised activities:

> Some department level strategic planning with common goal setting along the research lines / divisions would lead to higher synergies and deeper collaboration between the groups. This does not of course mean that all activities should be aligned to common strategy but would increase synergies of different groups for making even a bigger impact in future (LTH)

> Making strategic decisions means that some actions have to be selected and others rejected. It is not clear that this is yet happening (S)

...the panel has the impression that the present organization by and large works and suits everybody. At the same time the task of this panel is to consider the longer-term future, and in such a perspective the present organization may not be optimal (N+LTH)

A recurrent issue therefore concerns the relationship between departments and research groups, and models of ascertaining autonomy but also directionality.

Another issue of some urgency concerns the relationship between centres or other cross-disciplinary undertakings and formal organisational levels. Lund's stated ambition, which on the one hand seeks to avoid the mushrooming of organisations beyond the faculties and on the other hand seeks to foster and nurture a large number of interdisciplinary centres, seems as yet unstable and in need of some clarification. Existing centres often pursue elaborated negotiations with departments as to their mandate, relationship with education, and similar issues:

61





A challenging factor for the leadership of this UoA is the complex governance structure in which multiple organisations need to be bridged. The process of setting overarching strategic goals and securing technical support and infrastructure was mentioned to the Panel as particularly challenging (N)

Panels also point at the need for more nimble and organic forms of interaction. An example is the following indicative prescription:

> Our long-term suggestion is that Lund University establishes an interdisciplinary and interfaculty strategic hub incorporating biomedicine, biotechnology and bioengineering [...] to strengthen research, education and innovation in an area where LU already has a good international position (LTH)

Faculties are ideally coherent and interactive sets of organised activities, where interaction and redeployment of resources can be done swiftly and flexibly. Realities are bound to deviate from those ideals, for many reasons: size, complexity, reorganisations, power distribution, among others, and panels realise this. Nevertheless, faculties should be both organisational umbrellas that leave considerable latitude to their constituent parts, as well as offering directionality, if we are to believe the panels:

The governance model of Lund [...] was not clear; it appeared that managers tend to coordinate day-to-day activities, while individuals do the strategic choices (E)

In their comments, panels primarily emphasise matters of potential improvements. Some environments rarely articulate with other units of the faculty and have an unclear relation to other constituent parts. The role of the faculty in relation to quality enhancement is in need of a sharper articulation and clearer practice. Succession plans are among those calling for immediate attention, as well as enhancing interaction between units. In addition, some units are governed by more than one faculty, an arrangement that seems to satisfy neither the units nor the panels, which view them as counterproductive to quality enhancement.

Central University management was seldom mentioned in the self-assessments, and accordingly appears only intermittently in the panel reports. However, judging from the instances in which central management is invoked, panels argue that there is clearly room for a more articulated role when it comes to framework conditions for the units for instance for recruitment procedures and tenure track slots:

The Lund University must make greater efforts to align the services of the central administration with the needs of the research units and to support the academic environment. The present lack of trust must be addressed and communication between administration and research units needs to be strengthened (N+LTH)

A more articulated political stance is also sometimes asked for, where University management elicits information and insights from the units and – after serious consideration – packages them and makes use of them in political debates on university governance. If, panels argue, Lund is to sustain and even reinforce its position as an internationally recognised university, some of the current University policy constraints need to be alleviated and the University needs to act in a more concerted manner.

A parallel issue that comes across clearly in a few panel reports regards the internal politics of Lund University, in particular the many and intricate matters that ensue from the large infrastructural undertakings in and around the University. While much attention has already been paid to these matters, quite a few unresolved issues are exposed in both self-assessments and panel reports, as with the relations between centres and departments discussed above. Panels call for ambitious and bold attempts to enable interaction and perhaps even integration between fields and areas. Cross-faculty learning and interaction cannot be devolved to specific high-profile units alone but should be a matter for central management as well:

Into the future, both the University and the Academy would profit from greater integration of the radical knowledge-producing potential of research in Fine Arts into the broader fabric and ethos of LU(K)

To sum up, Lund excels in lenient management and in an approach to build from below – and treat units as largely independent and in charge of their own direction. Panels point at some shortcomings of leniency, including matters left uncovered or too complex to be dealt with at the level of units, and an overly strong variation within the University, between and within faculties, and indeed also within units, in how resources are deployed and activities are planned and monitored.

# The centre holds: the relationship with large-scale areas and infrastructures

Centres and collective environments are one way to profile research in relation to large funding opportunities, but they appear underused and somewhat marginalised in the overall governance model; their deployment also varies – why they are set up, for what purposes, and on which outcomes they will be assessed.

They serve as nodal points for infrastructure access, and to alleviate recruitment. However, they do not always enable generational shifts as described before; even environments which can draw upon large research collectives cannot always capitalise on them for critical renewal.

There are several examples of areas in which a more active role for centres is indicated in the panel reports, for instance where there are growing funding opportunities for large-scale entities, or where the alignment between experimental and applied (basic and clinical) approaches is weak at the moment. The former is generally characterised by more scattered smaller groups, weaker funding and variable impact than the latter. Overall, even areas where Lund has an outstanding reputation nationally and worldwide, linkages between groups and activities are not always systemic or organised, and panels indicate that some synergistic potential is missed, even when collaborative structures such as Strategic Research Areas have been set up. One example is taken from a report on cancer research:

The Kamprad building works well as a translational environment but the panel see a risk that the fractionated workspaces at Medicon Village, Lund and Malmö Hospitals gradually increase the collaborative distance leading to a decrease in translational research. The panel suggest an increase in the support of LUCC as a virtual network for increased translational collaborations (M)

A more coherent organisation might also ensure that historical strengths are managed sensibly and that novel combinations are enabled, some panels muse. In some areas, the geographical distance between related activities is considerable, and for those a more coherent organisational structure might serve to alleviate the fragmentation of activities.

A related and often mentioned factor is interdisciplinarity. Lund often highlights its breadth and its interactive environment. While interdisciplinarity may take different forms, and can be pursued between units without any formal organisation to facilitate it, it is quite often mentioned in panel reports as an untapped opportunity: between areas, technologies, methodologies, and theories. It may, panels argue, suffer in an environment where the formal organisation is relatively lenient and where most activities are pursued in the form of smaller-scale and specialised groups. Even when interdisciplinary units exist as such, existing governance and organisational conditions are not always conducive to that, nor are the specific conditions that pertain to interdisciplinary environments always fully understood and acted upon. Such entities are generally more fluid and complex than disciplinary, and tend to align with and find support from external interests, and this in turn makes for some organisational challenges in governance, recruitment, promotion and so on.<sup>5</sup> There seems altogether to be room for improving and clarifying conditions for such activities, as challenges to date are sorted out and dealt with case-by-case rather than systematically.

Here, we could also add reflections on Lund as an infrastructure hub. Articulation with ESS and MAX IV – very important to a few units – is not always an explored opportunity, and with some inherent risks

<sup>5</sup> Wagner, CS et al (2011), Approaches to understanding and measuring interdisciplinary scientific research (IDR): A review of the literature, Journal of Infometrics, 5,1, 14-26.

as units are sometimes divided in their relation to such infrastructures, at least when it comes to co-loca-

tion. For some units, this is a matter of utmost urgency:

The storage ring MAX IV, mentioned in a majority of the self-evaluation reports, is an important asset which, finally, quite a few groups within the Units take advantage of in their research. The groups are encouraged to increase the use of this unique and powerful research infrastructure. The joint EC facility ESS has so far caught only weak interest by the researchers at the Units of assessment. Its scientific role seems to be distant and the University should be careful in becoming involved with costly operation of the infrastructure (N+LTH)

Other forms of infrastructural access are deemed more critical and units focus far more on them in their self-assessments. Panels agree on those priorities and identify Lund's units as generally well-endowed but also in need of long-term plans for the rejuvenation of infrastructures, including engagement from the University and from other funders. Clearly, access to up-to-date infrastructures is a core aspect of enhanced scientific visibility, and one of the effects of the funding system in Sweden is that infrastructures are shared between groups, but not always. Panels point at the many mechanisms that Lund has developed to ensure that infrastructures are properly funded and used:

In general, the willingness to stay flexible and to invest in new infrastructure is seen as an important prerequisite for scientific achievements. Nevertheless, one key resource is the technical lab, including people that develop new technology and software, and maintaining and perhaps extending support for this lab seems essential. The problem of a limited number of supporting technical personnel seems common to all UoAs (N)

In sum, Lund's decentralised mode shows also in the management of infrastructures and of organisational variation: there are notable examples of centralised ambitions and measures, but also a large degree of pragmatic management, sometimes to the extent that the forces of decentralisation and centralisation collide. It is challenging to be the host of a significant number of large centres and activities that represent national obligations while at the same time entertaining the idea that activities should be governed at lower levels.

#### To the benefit of humankind: how Lund collaborates with the world beyond it

Collaboration and interaction with other tasks do not figure prominently in the panel reports. Panels note, and sometimes make in-depth comments on forms and effects of societal interaction, but mostly they do it in passing, focusing instead on how patterns of scientific impact and networking align with how units are funded and organised. However, for some units, the considerable external linkages and impact on societal process (and vice versa) are acknowledged. Lund hosts a number of environments that play a central role in their respective areas, as evidenced in joint research centres with industry, centrality in global policy advice,

national policy mandates, and intensive formation of firms and spin-offs. Collaboration showcases a very high degree of variation in societal collaboration, variations that are nurtured by differences in orientation but also strategic considerations; generally, units seem to have a seasoned and elaborated understanding of partnerships, risks and pitfalls, as well as ethical considerations that need to be taken.

Collaboration sometimes becomes a core aspect of the strategic orientation of units. In such cases, units are embedded in national and sometimes transnational systems (social, political, industrial, etc.), which gives units access to – and impact upon – not merely collaborative partners but actually the opportunity to shape current and future directions in these systems:

Interaction with industry is very lively and active (LTH)

Several research groups have strong collaborations with non-governmental organisations, including commercial actors as well as entrepreneurship related to own research findings (M)

In doing so, collaboration also entices units to engage in transdisciplinary work. In such relatively rare instances, collaboration is genuinely redefining how work is done, in research but also in practices beyond academia. Panels suggest that such experiences, while unique, should be profiled even more and perhaps be given specific conditions and forms to acknowledge and profile Lund's contribution to change processes in society.

The panel reports note that collaboration mostly takes incremental forms, allowing units to share information with longstanding partners, access critical infrastructures and real-world problems, contribute to problem-solving, raise funding, and form the occasional new partnership. It is sometimes noted that collaboration is tied more to personal networks than organised interaction, despite the proliferation of collaborative programmes and initiatives in recent decades. While this observation ties in with the lenient practices pursued elsewhere, it also leaves the University exposed if and when individual members of staff leave, or simply being unaware of collaborative networks within their own organisation (at the risk of duplication, activities that may risk the integrity of work done elsewhere). The tradition of the "teacher's exemption" (or professor's privilege) lingers on, and the University at different levels has not always found a mechanism to stabilise and reproduce external interaction.

Education and alignment with other tasks within the University are a marked – yet rather uneven – aspect of how units interact with their surroundings. Teaching provides recruitment opportunities, aligns with research specialisations, and give units a foundation and an identity:

The department has been particularly proactive and innovative in seeking to combine research and teaching in both formal and less formal ways (S)

Aside from research, the department is a significant provider of high-quality teaching and is responsible for many courses. The department is justifiably proud of its efforts here (LTH)

notwithstanding a stoically cheerful acceptance of the heavy teaching loads it is clear that the required commitment to teaching creates a significant workload burden on many staff, and for some this creates challenges for their capacity to find adequate time to meet their own research goals (J) The very forms of that alignment vary considerably, however, and panels recurrently note imbalances: either too much or too little, and seldom a balance at the organisational and individual level:

It would appear that [] is ideally placed for collaborations with industry, however, these links were not highlighted or apparently encouraged (N)

Education manifests the backbone of activities, sometimes to the extent that other missions diminish in importance. Panels note that some units struggle to find a balance between the two or even to find a match between their often quite wide and broad educational remits and their limited research resources. Such units often pride themselves on their commitment to education – rightfully so the panels concur – but naturally also have limited impact within their respective fields. For other units, research activities form an uneven superstructure in relation to education and educational planning appears to be decoupled from research activities within the units. Even though panels seem generally well-informed about the specificities of university funding in Sweden, they nevertheless express their concern on morale and cohesion within the units, as well as divergent forces when it comes to recruitment and leadership, not to mention quality in education when it is seen as a task infringing on research.

Similar observations are made for faculty: panels express some consternation regarding the distribution of tasks within the units, in particular the large share of education held by certain members, and very limited teaching for others. Even though this is a reflection on a micro-level of funding arrangements, panels nevertheless express expectations on the meso-level (faculties and departments) to find ways to realign tasks and to ensure that all faculty is somehow engaged in research. This, again, would serve not only individual purposes but actually be highly strategic to the University as a whole:

In their mission and vision statement, the University highlights that research and teaching should be intertwined. In this context, the panel sees an urgent need for involving the UoA in department-wide strategic discussions to modernize the teaching (N)



Does Lund make proper use of, and engage with, activities and interests that reside outside of research? Judging from the panel reports, Lund is an interactive higher education institution, where research activities tie in with societal change processes as well as with education at different stages of people's lives. There is also ample evidence of a reflective and critical approach to collaboration to ensure integrity. Some of the variations in intensity and propensity are inevitable, given the breadth of activities, but some represent an unsystematic approach to how collaboration may actually enhance quality. Panels ask not for perfection but a systemic and traceable approach to these matters, rather than heroic efforts.

#### Self-Assessment vs. Panel Report statements

In this section, we make a brief summary of the communication between the units and the external panels: what did the units say in their reports and how did the panels respond?

#### What the self-assessments say...

- It may be of importance to do exercises in reflexivity, but units need to understand why and how they have been assembled in the form they have, how that assemblage ties in with the future organisation of Lund University, and what the University aims to do with RQ20.
- Feedback, in whatever form, is useful and RQ20 could be part of a more systematic interaction between units and the University as a whole.
- Units judge themselves to be in contact with, and sometimes at the frontier of, their respective fields. They can measure up with the best, but fields move rapidly, and interdisciplinarity, new methods, theories and research lines confront them with continuous needs to enhance and improve.
- Units self-organise around a core of activities, people, experiences and opportunities, and seek leadership models that conform with that.
- Faculties and University management need to recalibrate their leadership practices, to actually meet and perhaps even alleviate the shortcomings, challenges and opportunities that reside within the units rather than imposing agendas devised in relative isolation from units or simply engage in non-communication.
- Recruitment is sometimes painfully slow to conduct and with limited support and directions provided from higher levels. It is also done in a way which reflects the existing realities of institutional life, i.e. either large educational mandates or a reliance on external grants (seldom in balance) rather than long-term goals and ambitions.
- Funding is absolutely pivotal to the future of the units, but needs to be balanced with planning horizons, articulations of future directions, and perhaps organisational realignments; these are issues ideal for a dialogue with faculties and central University management.
- Lund hosts excellent infrastructures, governed in a largely transparent manner. This needs to be matched with technical support and opportunities for interaction and collaboration around these facilities.
- Interaction between different areas is recurrent but seldom facilitated or organised systematically.
- Collaboration is vibrant, but also highly variegated; that variation needs to be accepted but also cultivated, for instance through the sharing of experience between units, the provision of expertise, possibly a more elaborated strategy for the University as a whole.

#### And what the panels respond

- Lund University as a whole is a respected international university, with some eminent contributions and some environments that operate at the highest level. However, there is considerable room for further improvement.
- Lund should be far more proactive in comparing its conditions and visibility with counterparts elsewhere.
- Units should be commended for their realistic self-understanding; seek even more in-depth and challenging benchmarks.
- Leadership is indeed lenient and should continue to be so; balance that with the articulation of collective goals and expectations. Leadership should support and sustain units that function well and find ways to enhance those who are constrained.
- While units are generally quite good at self-organising, the University must aim for a productive balance between ambitions at central management, faculties, departments and research groups/ individual faculty. The current leadership model is unclear.
- Be far more proactive in recruitment and provide newcomers with reasonable conditions possibly in tandem with external funding opportunities.
- Units should be congratulated on their capacity to raise funding. Now attention needs to be directed to funding opportunities and how they align with the ambition to strengthen quality not every funding opportunity should be explored, and not every funding opportunity should be explored in small-scale.
- Develop a more elaborated strategy and policy for infrastructures and link it to the ambition to foster interdisciplinarity and collaboration.
- Lund needs to rally around interdisciplinary themes to a far larger extent.
- Collaboration is often a useful and quality-enhancing activity, embedded and ingrained in activities, but the engagement varies. This is perhaps inevitable, but variations should reflect conscious choices and not omissions or ignorance.

## 4. The transversal reports – a summary

Five transversal panels were, as mentioned, identified to gauge the University's standing, strategies and practices in five critical areas. The panels drew on the self-evaluations and the subject panel reports, but also material that was specifically commissioned for their work. The reports will here be briefly summarised; they are in themselves condensed overviews and syntheses of different functions within the University, and this section is therefore briefer than the summary of the far more variegated subject panel reports.

The reports portray a university in possession of several unique assets, giving it the preconditions to continue to be – and even elevate its position as – an internationally leading university. Lund's historical position as a national flagship university is one of them, as is its geographical location at the intersection of many countries and regions of Northwestern Europe. The palette of world-leading infrastructures and the wide-ranging large-scale environments are others. The University is also carrier of the collegial tradition and excels in granting individual faculty, many of whom are leading in their fields, considerable leeway; a light-touch management style is overall adopted which creates few obstacles and many opportunities.

While acknowledging these virtues and assets, the panels identify a series of elevation areas if the University is to sustain and even improve its international standing. For leadership, it is suggested to incept a more concerted approach to empowering and monitoring different leadership levels, with a more stringent model of identifying leaders. Strategy processes should be more concerted, comprehensive and profound, based on the monitoring of trends and tendencies, subjected to wide consultation, and be communicated with clearly defined goals and targets. The leadership of the University should more actively elicit external advice, and clarify mandates and expectations on different leadership levels. And the University should set itself ambitious and bold goals, otherwise it risks seeing its position slide in the future:

...we would argue that the core fundamental question for LU to address anno 2021 is the extent to which its much praised collegiality leads to an inherent conservative bias and an emphasis on reputation acquired in the past (Panel report on Management and Leadership)

Recruitment patterns still reflect a tradition of in-breeding, it is argued, and should be subjected to far more transparent expectations both when it comes to employment conditions and promotion criteria. The University should ideally propose a dual recruitment strategy, where most recruitments are done in transparent and predictable bottom-up approaches (beginning with associate senior lectureships with tenure track, accompanied with rigorous evaluation of promotion), where central management and faculties may also instigate in a top-down yet transparent manner the opening of positions in critical areas. In addition to that duality, a career pattern for staff scientists should be incepted, as well as for faculty that are not part of a tenure track model. Overall, the need to keep standards high in recruitment is stressed:

Leaning too much on internal candidates may lower the bars for promotion and as a consequence result in the said academic cronyism (Panel Report on Recruitment)

Lund University is an infrastructural hub of international renown, and is complimented for its elaborated and transparent model of setting priorities and allocating resources for infrastructures "... unanimously truly impressed by the quality, organization and structure of most aspects relating to research infrastructures at Lund University" (Panel report on infrastructure). Nevertheless, some shortcomings and



remedies were identified, including the need to set end-dates for infrastructures, for setting criteria for different types of infrastructures and to align support and governance models for the different types. It is also advised to far more engage the faculties outside the science, technology and medicine fields, and to highlight the productive importance of infrastructures also in those areas.

Lund is the host of a wide range of large and interdisciplinary research areas, and the University is commended for this success in competitive funding of large research undertakings. It is however noted that the University could better profile these areas internally and externally, and that it should ensure a productive relationship between them and the formal vertical line of command. Furthermore, it should strive to align the environments with education and research more widely within the University. The large and interdisciplinary areas thus comprise an underutilised resource within the University, and it is advised to move out of the current status of being "quietly brilliant" into a more proactive stance. Overall, it is recommended to make better use of the fact that Lund has strong faculties and strong research areas at the same time:

> Formalize, strengthen and embed the emerging multi-dimensional matrix between the vertical faculty line organization with the horizontal SRAs (various axes – faculty vs SRAs, research vs teaching, etc.) (Panel Report on Large and Interdisciplinary Research Areas)
For collaboration, it is noted that a viable organisational structure has evolved over time, but the University should explore much more thoroughly the opportunities to engage intimately with societal partners in both education and research; the current situation is one of several missed opportunities. This would give Lund scholars opportunities to engage with real-world problems, and to mobilise external competence and expertise:

> LU should be able to deal with such complex questions originating from industry. This means that LU members from different disciplines have to sit together to listen to industry and to compose multidisciplinary research groups to be able to respond. (Panel Report on External Engagement)

Overall, the assessments and advice provided align with those of the subject panels, and reinforce, in a detailed and focused manner, their conclusions: Lund University is an eminent university which does not always operate as one. It has multiple opportunities to elevate its work modes and processes. If it does, and most of the recommendations can actually be realised by the University itself, it will continue to be counted among the leading universities of the world.

72

# 5. The project group's conclusions

If we want things to stay as they are, things will have to change. (Tomasi di Lampedusa)

### General conclusions

Already from its inception, Lund University was part of the international exchange of people and ideas. As an example, the legal scholar Samuel von Pufendorf, one of Lund's first professors, transformed international law and the understanding of the relationship between the individual and the state. Pufendorf was a polymath, straddling law, history and economics and moved between universities and public assignments in Sweden and on the continent. Pufendorf's multiple legacies live on within Lund University – international, versatile, intellectual yet firmly anchored in its setting. Research at Lund University continues to have several tasks, forecasting and confronting changing knowledge interests in society, and responding to pressing problems and opportunities. The wide variety of expectations shape Lund Univversity today and into the future.

But does Lund University live up to Pufendorf's legacy? From time to time every renowned university needs to consider its standing in the world: How good is it, really? The question is perhaps more easily answered now than any time before in history. Comparisons are readily available through rankings and other means. They tell a lot – and are widely observed and read, also among universities of august reputation.<sup>[1]</sup> For students, rankings matter particularly much. Of course, rankings primarily say something about past performance and not so much about the future, and their validity should also be taken with caution. Nevertheless, a university which is self-proclaimed to be one of the leading global universities ("a world top 100 university") should be prepared to explore what it does and how it operates to maintain its position as a "leading" higher education institution.

Rankings indicate that Lund indeed measures up to global standards, but has seen its position slowly decline. If anything can be inferred from rankings, it is that a position among the most influential universities in the world cannot be taken for granted anymore. There is a constant dynamic among the leading universities of the world: universities in Asia are on the rise and are increasingly visible to the world, and many European countries, such as France, Germany and Austria, have made concerted efforts to boost the visibility of their "flagship" universities. At the same time, the leading universities of the United States and the United Kingdom have retained their international repute. Such movements call for some consideration and stress that the time seems ripe to gauge one's own operations, who are we in the world, how do we improve, how might we improve? The outcome of such exercises, if coupled with internal dialogue, could lay the basis for institutional elevation, improvements in all activities. The assumption and motivation behind RQ20 is that universities can improve through a combination of internal and external auditing, where self-assessments are critically reflected upon and advice elicited.

RQ20 thereby intended to move beyond rankings and other reporting exercises to gauge the ambition of Lund University to play a leading role in global research, in its different constituent parts and as a whole. What was the result?

From the RQ20 material, it can be inferred that Lund is a respected global participant in all the fields in which it engages. In quite a few fields, panels indicate that individuals and groups are at the very forefront

of development, and in most, they are known and recognised. These observations are corroborated by the bibliometric survey done for RQ20, where Lund scholars in virtually all areas are visible in high-impact outlets. The panel reports note this, but also identify and highlight a wide range of remedies that Lund could and should consider if it wants to elevate its position and strengthen research quality. This refers not only to scientific visibility but more generally to processes and procedures that are conducive to high quality in research. Procedures that are in need of constant monitoring and refinement if Lund University is to be recognised as a leading international university that engages with wider society, and in research-based teaching.

Put briefly, the panels recommend that such procedures incorporate and embody a clear-cut division of responsibilities among and between units, departments, faculties and central leadership. Expectations and mandates should, they argue, be clearly defined, and adapted to the task at hand. A more balanced funding profile and allocation of tasks are necessary to release creative energy and to foster breakthrough activities: loosely coupled activities and singleton projects should be avoided. Directionality and strategic goals – codified and possible to debate, monitor, and follow up – are necessary if Lund University is to stay ahead; the University should encourage and empower ambition, panels stress. Recruitment processes must be more transparent and demanding; panels advise the University to know what it does when it recruits and promotes. The access to colleagues, environments, infrastructures, and thematic interaction, within and beyond the boundaries of units, are critical to research quality: the University is advised to ensure that no activities are carried out in a vacuum. When relevant, units should entertain strong linkages with external actors for access to resources, real-world problems and networks.

Panels represent the University in its complex totality, and the exact form of such arrangements will inevitably vary within the University's innumerable research environments. Nevertheless, environments should all develop in a coherent manner to ensure that resources are used wisely, mandates are clear, yet flexible, external networks deployed and nurtured, relevant and demanding funding opportunities identified and explored, and organisational forms enacted to enable and cultivate concentration and interaction. Leadership should be exercised with caution and in dialogue with units. To varying degrees, these quality-enhancing preconditions already exist, but not in a cohesive manner – not all, not everywhere, not all the time. In short, Lund University needs to develop systematic mechanisms for setting goals, realising ambitions and enabling and developing a quality culture, if we are to believe the panels. Lund needs to develop a distinctive approach to research quality. The mechanisms of such an approach should develop in dialogue between units, formal leadership and external advisors.

This is well in line with RQ20's ambition – to move beyond evaluation towards elevation. Evaluations state that Lund is respected; elevation aims to move beyond that, to ensure that the current position is strengthened and reinforced.

# Reflections and conclusions on Lund University's central missions and tasks, in its different parts

How well is Lund prepared to elevate? This can be inferred not only at the general, university-wide, level, but also, in different forms, for the constituent faculties. Below we summarise the reflections of the RQ20 panel reports for each faculty.

### Faculty of Engineering (LTH) – a university within a university

LTH operates with a very wide mandate, many of its units are teaching intensive, but LTH also hosts quite a few units that are research heavy. Some are both. Some operate at the interstices of different fields – such as with biomedicine or with economics – while others are part of an engineering core. LTH is therefore somewhat of a university within the University: comprehensive, complex, assorted, located in Lund and in Helsingborg. In addition, it comprises a multitude of activities that span faculty borders, and LTH shares the responsibility of three major areas of Lund University with the Faculty of Science (chemistry, physics, and mathematics), and also connects with several other faculties. While this creates numerous opportunities, it also fosters vulnerabilities, and panels point at the risk of shared governance. In the reports, LTH comes across as a blend of cultures: within it reside areas that primarily orient themselves towards the international research frontier, while others operate in close dialogue with societal partners. Some are defined by their educational remit, or societal counterparts; others by methods or theories. The organisational format of research varies: some are tightly integrated, large-scale operations, while others are relatively small. Publishing culture varies also, sometimes within the same unit depending on people and opportunities. The main common characteristic of all operations is the dependence on external funding. While the organisation seems to have adapted well to the circumstances, and career opportunities are less problematic than elsewhere, it risks fostering risk averseness and a propensity to organise around funding opportunities to the detriment of innovation, and transformative and strategic efforts.

Areas of elevation: develop a systemic understanding of quality within units and align funding with that. Work systematically to avoid small-scale operations, and formulate coherent strategies at the levels of faculty and departments. Allow for demanding activities even though they may not be externally supported; allow for seed money and experimental support of such ventures. Gauge opportunities and risks associated with the shared governance of units. Consider reorganisations in the light of new infrastructural opportunities.



### Faculty of Fine and Performing Arts – blending arts and research

For this diverse and relatively young (research-wise) faculty, located in the city of Malmö, a mixture of opportunities and constraints emerge in the research disciplines of arts and education. On the one hand, the relative novelty of research activities creates opportunities. There are few deep-seated trajectories and lock-ins, and rather ample opportunities to explore and exploit new areas of advancement. On the other hand, as research traditions are relatively novel and to some extent vulnerable, research activities tend to be tied to individual projects rather than coherent environments driven by a concerted research agenda. It is also noted by the RQ20 panel that the interaction between the research done within the faculty and the University as a whole is underexploited, as well as interaction between the different constituent parts of the faculty. Overall, a general strategic orientation – with goals and means identified – is missing, as well as mechanisms to bridge individual projects and create environments. At the same time, the faculty is advised by the panel to engage with faculty more widely, to ensure that research activities are acknowledged, documented (in their wide variety, not merely traditional publications), and conjoined in themes and areas that span individual contributions. In doing so, the faculty has the potential to become an international beacon of artistic research – it has facilities and recruitment patterns to match such ambitions.

Areas of elevation: systemic relations within the faculty, to ensure learning and the dissemination of good examples and rewarding environments. Create and maintain a collegial culture where as many as possible are mobilised in setting directions for research. Avoid individualisation and dependence on too small numbers of researchers. Develop the documentation of research efforts.

### Faculty of Law – a professional school in the world

The Faculty of Law is unique within the University – it is composed of one department with one educational programme at its centre. It forms a tightly knit community founded on professional training and expertise in a field largely defined by national boundaries. However, law also has universal aspects, and the faculty has straddled comprehensive coverage of law (often met through individual professorships in specialised fields) and research niches that are global and topical. The faculty is recognised for its attempts to cross the boundaries between these two aspirations, but there seem to be opportunities to further refine the boundary-spanning. This would entail a clearer definition of the format and remit of research groups, as well as a strategy that is more operational and possible to monitor. In addition, the faculty is recognised for its ambition to align recruitment with research opportunities, even though it is still – as other education-intensive faculties – dependent on extensive efforts in teaching. The faculty is commended for its growing international presence but is encouraged to further the comparisons with units abroad – it should set high and realistic goals as yardsticks and as foundations of operations; without such, there is a risk of sliding back to the educational and societal tasks as the sole identifier.

Areas of elevation: clarify the role of faculty leadership in setting ambitions. Clarify the role of research themes and environments, and what constitutes a theme and not. Continue to identify global themes and interactions within research, while retaining the commitment to local and national issues. Intensify the search for external funding.

#### Faculty of Medicine – straddling scale and scope

The Faculty of Medicine is immense. It covers a myriad of research conducted in clinical settings as well as large preclinical undertakings, in an overwhelming number of units and research groups. It is aligned with one university hospital with two sites, and two large preclinical settings, in Lund and in Malmö. It is noteworthy that many conditions are similar for all units in the faculty – the dependence on infrastruc-

tures, the need to form research groups to enable a division of labour and specialisation, the articulation with international research frontiers, and the very high dependence on external funding. However, the faculty is also marked by large variations – in some areas, individual scholars or smaller groups form the basis, in others, highly focused large-scale entities function as the basis of operations. Some rest on historical legacies that still loom over activities, while others are recently formed. Some recruit mostly from Lund whereas others are global operations. For the medical faculty more than any other, recruitment is listed as a critical part for elevation. In most environments, there is no clear-cut or transparent model of recruitment and promotion, but rather an array of opportunities that is arranged into more or less stable positions. In addition, the very large number of research groups is not matched, panels argue, with a strategic layer in-between the faculty and the units: departments do not play that role and the distance to the faculty is too great. While this creates leeway for individual groups to develop according to their own logic and plans, it means that there are risks of duplication, subcritical activities, and myopic planning horizons. Arguably, the faculty is host to several integrated research environments, but they have their specific foci and remits, and cannot compensate for the lack of integrative mechanisms.

Areas of elevation: accept variation but mitigate subcritical activities; avoid a publishing cornucopia and incentivise demanding publications; continue creating integrative mechanisms in broad and complex fields, instigate a modicum of career planning and foresight also when funding horizons and task assignments are unclear.

### Faculty of Science - in a dynamic steady state

The faculty of science is highly research-intensive and excels in many of its activities. It covers the classical natural science fields in their entirety within distinctly defined areas, but also interdisciplinary combinations. Its profile is research-heavy whereas educational engagements are more limited. While the faculty has largely retained a departmental structure, it is quite decentralised with large responsibilities for direction and funding residing at the level of groups and/or divisions. It is also a complex faculty, which shares responsibilities with other faculties, in particular with engineering but also with medicine, and to some extent the social sciences and economics and management. The shared governance of large subjects with LTH has already been mentioned, and the variegated conditions between the two constitute both opportunities and constraints. The transformation of Lund University, with the expansion at Brunnshög, offers opportunities for elevation, by relocating adjacent activities, enabling proximity to world-leading facilities and flexible workspace at the intersection of different research areas. For the faculty in its entirety, there are critical issues that call for attention: the interaction between groups, recruitment (in particular impending retirements), the dependence on external funding and the relatively limited educational remits – but the faculty environments generally come forward as resilient. Several units have also developed dense collaborative networks with external parties.

Areas of elevation – avoid that the faculty evolves into a research institute with only limited connection to teaching, ensure that research profiles (subject-wise and for individual faculty) are matched with educational opportunities. Ensure that there is continuity in areas of specialisation and that prolonged hiring procedures are streamlined. Ensure that internal and external auditing of activities are done systematically; the faculty has developed an organisation where departments often ensure continuity and renewal, a role that should be maintained.

#### Faculty of Social Sciences – disciplines and beyond

The social sciences faculty forms a teaching-intensive faculty, one of the most popular among Lund's students and with several large professional programmes. It is also a large and heterogeneous faculty, encompassing over a dozen subjects in its wide range of departments and locations, including a large presence in Helsingborg. The social sciences have relatively fluid boundaries between themselves, but cross-disciplinary collaboration – and outright interdisciplinary entities – seem to be the exception.

The departments – most of them disciplinary in denomination – thus form the starting-point for research, and that connection seems generally to be working well, as all departments have clear-cut research profiles and strongholds – theoretical, methodological, and topical. The departmental tasks articulate with disciplinary fields, with a stable identity both for undergraduate and graduate education. However, there seems to be a perpetual need to establish and maintain linkages between broad educational commitments and research profiles, and to ensure that very wide educational engagements are matched with focused research efforts of international repute. Similarly, the expansion of the social sciences into area-specific and/or interdisciplinary fields has created some tensions between the remits, as such units tend to be based on external grants within large constellations, with limited educational articulation. The governance of such units tends also to differ from that of "traditional" departments, with a stronger emphasis on transient groups and themes.

Areas of elevation: allow for experimentation and interdisciplinarity, while retaining the firm commitment to, and identification with, disciplinary domains in education and research (and dense collaborative networks in society). Set high and ambitious goals for international visibility to spur research efforts in teaching-intensive environments.

#### Joint Faculties of Humanities and Theology – squaring variety and edge

The humanities and theology as a collective area cover very wide fields and responsibilities and serve as an important part of the University's historical and contemporary identity, in languages, culture, history, and communication. While this scope of activities gives the humanities and theology a key role in any university with aspirations to understand, explain and improve the world and the human condition, it is not an easy task to square with the realities of contemporary university politics. The faculties are confronted with the risk that such wide remits foster individualisation and fragmentation of research efforts, and uneven articulation with education (and vice versa). While acknowledging the manifold efforts and impact of Lund research, the panels recommend a concerted approach to the different subjects – accompanied by an elaborated strategy with discernable and even measurable goals. Panels advise the different levels of the faculty to set goals that go beyond the virtues of academic independence, to ensure that research in Lund is appreciated and visible in surrounding society and in the world. Panels also stress untapped opportunities for external grants and for larger constellations – they urge the faculties to combine and create larger entities, and in so doing, find novel ways of configuring the humanities' tradition of concentration and emphasis with ways of interacting. This calls for an interactive leadership, where the faculties set goals, directions and frameworks, while the units are free to elaborate on the more specific content, as well as sensible combinations of breadth and depth. The panels thus highlighted continued bottom-up perspectives on management.

Areas of elevation: develop themes, find common ground, respect the heritage but find new combinations within and beyond the faculty, ensure that education and research can grow conjointly and in environments rather than as singletons.

#### School of Economics and Management – more than a business school

The School of Economics and Management is also a teaching-intensive entity, organised primarily in quite large and comprehensive departments. What sets the School apart is the well-defined axis of business administration and economics at its historical core, with adjacent supportive fields defined mostly by their educational remit. Schools like the one in Lund tend to operate in relatively well-defined fields, with international fields to match and with established lists of academic journals and outlets, and models of interaction. The opportunities for yardsticks and comparisons are therefore more ample here than perhaps anywhere else within the University. Given the relative uniformity and the comparative opportunities, the panels note a leeway for a more ambitious approach, which also entails a more demanding role of the faculty vis-à-vis the departments to ensure that education is matched with ambitious research profiles. The Lund School of Economics and Management, like any business and management school, needs to balance vocationalism with research profiles, and a space remains to expand research ambitions therein, to propel international visibility and focus on unique strongholds in highly competitive fields. The faculty also has a balance problem, as some of the units are quite small and identified primarily as supportive in relation to the dominant axis; the faculty is obliged to address the disparities and find suitable roles also for such units. As to the larger units of the faculty, the recommendations from the panels are adamant: make sure that they have a strong and consistent orientation to international visibility and impact.

Areas of elevation: ensure that the faculty functions as a proactive force of renewal. Deal with the unevenness of the faculty, when it comes to tasks, funding and size. Ensure that junior scholars have predictable and congenial working conditions. Recruitment and diversity should be reinforced concerns.

#### MAX IV – shine a light

MAX IV is in many ways a unique asset to Lund University – with world-leading opportunities to pursue breakthrough research with no equivalent in the world so far. It comes with several opportunities but also some constraints. One obvious one is financial, namely that the facility is underfunded and resources too limited for the facility to realise its full potential. The complexity of the entire operation calls for an elaborate yet nimble project office, and an advanced research programme of MAX IV's own – not merely for the users. The governance of MAX IV is therefore a critical issue for the future of the facility, as has been highlighted not only in RQ20 but also in numerous other evaluations. In addition, MAX IV should be better used as a facility for both collaboration and education; it is an underexplored asset and every effort should be made to enhance its external articulation.

Areas of elevation – ensure that the technical excellence of the facility and its staff is matched with research opportunities. Strengthen the governance of the facility and ensure that its unicity is widely known and explored within Lund University.

### Ten commandments for elevation

In this section, we provide ten core prescriptions for quality elevation, based on a synthesis of the panel reports.

- Speak truth to power: be a driving force in national policy and enhance the conditions for and expectations on research-intensive universities
- Be truthful yourself: ensure that a research strategy is demanding and legitimate, widely known and acted upon, and possible to monitor the outcomes of. Distribute funding in accordance with strategic aspirations
- Counter complacency: make use of external advisors at all levels they can help identifying future directions and opportunities
- Be credible: appoint active researchers as formal leaders and empower them accordingly
- Listen to the organisation: orchestrate internal debate, auditing and discussions. Let all units get annual feedback on their activities
- Make excellence visible and accessible: large constellations and infrastructures should be profiled, well-defined and function as university-wide resources and platforms
- Create constant improvements: improve recruitment policy university-wide and ensure that all research environments have plans for rejuvenation
- Create open environments: ensure that units are well-defined and have a conscious approach to their composition when they recruit and promote
- Lead the research frontier: lead more international constellations, incentivise demanding publications and other outstanding contributions, ascertain that experiments and novel approaches are nurtured also when they counter received wisdom
- Collaborate with distinction: ensure that external collaborations are integrated parts of long-term ambitions, and ensure that research and education accompany one another

# 6. Enhanced quality work at Lund University – 95 theses

On the basis of the panel reports, we offer the following observations and suggestions on what constitutes an excellent and elevating university. They apply to different levels of the University, and should be read as a list of normative observations to consider in the future work with the elevation of Lund University.

### University politics:

- Internationally oriented, research-intensive universities must be funded and governed accordingly – both generously and demandingly, setting ambitious targets without underspecified and/or overdetailed regulation.
- All universities are not equal allow for a division of labour between different types of universities
- A university must find its effective profile in a national and international context
- Research-intensive universities lack a say and influence over Swedish research and education policies – Lund University should take the lead in this pursuit, ideally in collaboration with other leading institutions
- Comprehensive universities are uniquely prepared to contribute to the development of breadth and depth in research ensure that the breadth is maintained and cultivate governance and funding measures that stimulate breadth

### On measurements of quality:

- Universities can learn from others: successful universities share characteristics that can be emulated and acted upon
- With all their shortcomings, rankings say something on where a university stands
- Rankings should be complemented with more fine-grained analyses of where a university and its constituent parts stand
- Universities should actively contribute to the development of a plurality of comparative measures, not only rankings
- One way of assessing a university's strengths and liabilities is combined internal assessments and external audits, another is to identify a set of similar universities as benchmarks of ambition and elevation
- Leading universities should assess and make an overview of their aggregate academic output and make use of this in strategic decisions
- It is possible to propel one's renown identify a demanding comparison with one top university of the world
- Form strategic partnerships with a few leading universities, for the purposes of benchmarking and learning from others

### On governance:

- Central leadership should have the serenity to know when not to act, the courage to act when it must, and know the difference between the two be proactive, not reactive
- University management should make use of external inputs and networks; university boards and advisory bodies can be ideal forums for this. Engage such external forums in critical discussions of research directions, work modes, and national and international networks
- Ensure a large group of students are engaged in the strategic direction of the University and that their opinion is considered in decision-making on all levels
- Central leadership has a critical function in setting overall directions and ambitions ensure that these are possible to monitor over time
- Central leadership should also be experimental and instigate new initiatives of its own accord
- Faculty leadership should oversee activities in departments to ensure dynamism and renewal, but not control them
- Reserve strategic funding at the central and faculty levels, set in strategic and collegial processes
- Make identification of areas for recruitment and active identification of top-candidates primary targets for collaboration between dean and department head. In selective and critical cases, also engage central management in such matters
- Develop attractive academic leadership packages that enable leaders in line management to maintain top-level research during their time in office
- Departments ideally function as umbrellas of interrelated activities, and as transmitters of common identity and learning
- Departments can and should be complemented by centres or other similar entities for more focused and dedicated efforts, and the definition of a centre must therefore be clear and unambiguous
- Recruiting active researchers as academic leaders it is an important signal of ambition
- Ensure that externally recruited scholars are considered for leadership positions: their experiences revitalise the University
- A further ambition should be to recruit more systematically for positions of academic leadership internationally
- Invest in strategic interdisciplinary research centres and break down the barriers between so-called "wet" and "dry" sciences
- Further facilitate interdisciplinary research and education across faculties and departments through active leadership and by removing administrative impediments
- Central leadership should take a special responsibility for facilitating interdisciplinary cooperations which transcend faculty borders

# On the integration of research and education:

- Education is the University's first and foremost task research should reflect the commitment to education
- On the other hand, education should also reflect the dynamic nature of research and be in constant flux novel combinations must be produced regularly (and existing ones re-assessed)
- All teachers should be part of a vivid research environment and concomitantly, all researchers should engage in teaching

- Students are often the most important transmitter of knowledge into society, and should be mobilised as such a resource as early as possible
- Students serve as an integrative point between education and research; expose them to the research frontier as soon as possible and engage them in research activities as soon as possible

## On organisation:

- Organisational matrixes can, ideally, release rather than constrain intellectual efforts if they are sufficiently flexible and durable
- Reorganisations can sometimes be useful, if guided by intellectual ambitions
- Formalise and streamline the coupling between the vertical faculty organisational line with the horizontal strategic research areas (and other centres, large or small) to strengthen and integrate research, recruitment and educational strategies
- Collaboration between research areas often fosters innovative and groundhbreaking research encourage novel combinations and idea generation between them
- Centres and research areas need a voice in the University consider establishing a transversal dean to serve their interests
- Universities should take advantage of the full range of subjects and competencies in the development of centres and research areas
- Strategies from the top should allow for experiments at the unit levels avoid disconnect between ambitions and practices

# On recruitment:

- External mobility is no panacea for research quality, but universities stagnate without it. Vibrant research environments are diverse
- Shorten the recruitment process time to ensure the interesting candidates are secured
- Use search committees, ensure that strong candidates inside and outside the University are available
- Active recruitment needs to be tied to promotion and performance criteria
- Operate with a transparent recruitment process ensure that working and employment conditions are known beforehand
- Abstain from recruiting second-best applicants: identify only a small number of top candidates
- Stricter termination of the recruitment process when candidates are too few or lacking
- In a world increasingly geared towards external funding, recruitment may be tied to funding opportunities but associated risks must be clarified
- Allow more flexibility in the early career, with prolonged time for qualification as post-doc and associate senior lecturer
- Junior faculty can only break new ground if allowed independence ensure that recruited young faculty have salaries and working conditions that allow for this (such as starting packages and flexible organisational affiliation)
- Pursue, from time to time, international recruitments even if they may be daunting they signal commitment and ambition

- In the context of international recruitment, "soft" values, e.g. support when entering Swedish society for researchers as well as spouses should be catered for in a "one stop shop" manner
- National mobility should be pursued as a complement to international search processes
- The academic labour market is increasingly built from the bottom-up adapt to that by primarily announcing tenure track positions
- If tenure track is tied to funding opportunities, clarify this and allow for differentiated paths within (and outside) the University
- Permanent positions as non-faculty (staff scientists) should be used more systemically and transparently.
- Allow for flexible internal labour markets, between infrastructures and departments, between departments, between faculties

# On funding:

- In general, avoid dependence on external funding for faculty salaries or, at least, develop a clear plan for transition from external funding over time
- External funding is necessary to maintain research activities, but external opportunities should be aligned with long-term plans for areas, and for recruitment
- Always aim primarily for high-quality funding and abstain from funding that collides with strategic interests
- Learn from success: Lund University's achievements in getting SRA funding should be exploited to raise its international standing and position in international networks
- Leading international consortia is demanding but also a token of intellectual excellence
- Special means should be taken to provide high-end administrative support to research groups involved in particularly demanding funding and cooperation frameworks
- Centres and large-scale constellations make for division of labour, common identities and strong linkages in and outside the academic system
- Such large-scale entities often respond to external calls, but any university of repute must also develop such strongholds themselves do not let external funders set the University's strategy
- Leverage from success: Use SRAs and other strong environments to facilitate proactive recruitment internationally
- Common research themes often serve as an integrative mechanism, also between research units
- Allow also for concentration around unique competencies and profiles search for exceptional individuals, groups, and ideas
- Universities should profile their strengths visibly to the outside world
- Develop a transparent and effective framework for assessing the progress and success of the research strongholds with a prime focus to keep them dynamic, active and attractive and to allow for the disbanding of centres

# On collaboration:

- Collaboration can be a means of learning from real-world problems
- Engagement with societal partners can also give unique access to competence and knowledge
- External collaboration is risky almost by definition and calls for both openness and diligence
- Discern which collaborations enhance quality; not all forms do
- Identify strategic partnerships with societal partners in all areas of the University and create flexible structures for interaction between partners and research environments
- Improve communication with key companies in the field
- Develop strong and durable relations with alumni for networks, competence and resources
- Develop a broader perspective for future incentive programmes, which takes different impact areas (intellectual impact, impact on the labour market, the regional ecosystem, societal impact etc.) into account. This should go hand in hand with an inclusive external engagement and impact monitoring system
- Encourage external engagement performance as an important part of the appraisal of young talented researchers
- Widen the perspective Foster international external engagement

## On infrastructure:

- Commitments to internationally visible and unique facilities constitute a major asset for any university of repute
- The University should develop and implement generally accepted criteria for different categories of infrastructure
- Ensure that the University and the faculties have transparent processes to initiate, maintain and terminate infrastructures of all categories
- Infrastructures are becoming increasingly critical to scientific advance: plans for their development should characterise all areas of the University
- Infrastructures are expansive and expensive, costly to maintain and difficult to close down. As with centres, a clear definition is required and demands of user support and openness should be clear and university-wide
- Create suitable career- and competence-development plans for infrastructure/core facility employees
- Ensure that strategies and funding models are tailored to the interests of infrastructures from all areas of the University
- Infrastructures are critical in interdisciplinary interaction: they should be profiled as strategic resources for this purpose
- Infrastructure governance and funding are therefore becoming some of the most critical issues for leading universities work together with other universities to share costs and risks (and opportunities)
- Optimise the cross-faculty coordination of infrastructures to broaden utilisation and enhance project applications
- Develop a university-wide policy and implementation plan for the management of large data-sets
- Take a firm grip on the organisation of e-infrastructures
- Create fora for discussion among infrastructure managers and coordinators

# Appendix 1

### Formal documents and instructions

Documents also available from malin.bredenberg@fs.lu.se 1A: RQ20 Project Plan, May 2019 https://rq20.blogg.lu.se/files/2019/05/190508-RQ20-PROJEKTPLAN-FINAL-ENGLISH.pdf

1B: RQ20 Appendix 1, August 2019 https://rq20.blogg.lu.se/files/2019/08/RQ20-Appendix-1.pdf

1C: RQ20 Subject Panel Guideline, May 2020 https://rq20.blogg.lu.se/files/2020/05/200512-Subject-Panel-Guideline\_Final.pdf

1D: RQ20 Transversal Themes, October 2019 https://rq20.blogg.lu.se/files/2019/10/RQ20-Transversal-Themes.pdf

# Appendix 2

Overview of all subject panels and their UoAs

Faculty of Engineering (LTH)		
TOTAL NO PANELS: 6	TOTAL NO UoAs: 24	
SUBJECT PANEL NAME	UoA NAME	
Industrial Engineering	Mechanical Engineering I	
	Solid Mechanics	
	Industrial Management and Logistics	
	Mechanical Engineering II	
Energy Science	Energy Science and Engineering	
	Heat Transfer and Fluid Mechanics	
	Environmental and Energy Systems Studies	
	Industrial Electrical Engineering and Automation	
Information and Communication Technology	Electrical and Information Technology	
	Computer Science	
	Automatic Control	
Biomedical Technology	Biomedical Engineering	
	Immunotechnology	
Building and Construction Technology	Construction	
	Water resources and Risk Management	
	Mechanics, Acoustics and Geotech	
	Engineering Geology	
	Aeronautical Sciences	
Built Environment	Architecture and Built Environment	
	Working Environment and Rehabilitation Engineering	
	Innovation and Design	
	Packaging Logistics	
	Transport and Real Estate Science	
	Industrial Environmental Economics	
Faculty of Fine and Performing Arts (K)		
TOTAL NO PANELS: 1	TOTAL NO UoAs: 4	
SUBJECT PANEL NAME	UoA NAME	
Art	Music Education	
	Fine Art	
	Music	
	Theatre	
Faculty of Law (J)		
TOTAL NO PANELS: 1	TOTAL NO UoAs: 1	
SUBJECT PANEL NAME	UoA NAME	
Faculty of Law	Faculty of Law	

Faculty of Medicine (M)		
TOTAL NO PANELS: 9	TOTAL NO UoAs: 53	
SUBJECT PANEL NAME	UoA NAME	
Neuroscience	Neurobiology and Cell Therapy	
	Neurophysiology and Neuronanomedicine	
	Basal Ganglia Disease Models	
	Neurodegeneration, Epilepsy, Experimental Therapeutics	
	Dementia Research	
	Neurology and Clinical Neurogenetics	
Cancer, Basic	Clinical Genetics	
	Hematology and Transfusion Medicine	
	Translational Cancer Research I	
	Translational Cancer Research II	
Cancer, Clinical	Cancer Research - Clinical, basic	
	Cancer Research - Experimental	
	Tumour Pathology	
	Cancer Research - Abdominal Urological	
Regenerative Medicine	Molecular Medicine and Gene Therapy	
	Molecular Haematology	
Blood and Infectious Diseases and Immunology	Clinical/Molecular Infection Medicine	
blood, and micelieus biseases and minimanology		
	Transfusion and Haemostasis	
	Clinical and Experimental Autoimmunity	
	Clinical Chemistry	
	Virology	
	Clinical and Experimental Microbiology	
	Protein Chemistry	
Metabolic and Cardiovascular Besearch	Diabetes and Insulin Action	
	Cardiovascular Besearch	
	Diabetes and Defect Islet Function	
	Diabetes Genetics and Enidemiology	
	Type 1 Diabetes	
Sustainable Health	Occupational and Environmental Medicine	
	Global Health	
	Older People Ageing and Health	
	EniHealth Registers Enidemiology	
	Community Medicine	
	Rehabilitation Medicine Physiotherapy Sports Science Health Promotion	
	Activity Participation Mental Health	
	Emergency and High-technological Environments	
Tissue, Cell and Molecular Biology and Medical Techniques		
hissue, cell and Molecular blology and Medicar lechniques	Vascular Physiology	
	Pharmacology and Structure Piology	
Highly Specialized Clinical Science	Certraintectinal Research	
	Hoart Lung Posparch	
	Orthopodics and Hand Surgery	
	Audiology Speech Janguage Pathology Phoniatrics ENT	
	Revebiate Modical Ethics, Modical History	
	Julyery Madical Imaging, Dhysiology and Padiation, Dhysics	
	Pediatrics Penroduction Gunaacology and Obstatrics	
	Feulatrics, Reproduction, Gynaecology and Obstetrics	
	Eye and Edi-hose-thiodic Research	
	Dermatology and Venereology	
	Ivieucal Kadiation Physics	

Faculty of Science (N)		
TOTAL NO PANELS: 3	TOTAL NO UoAs: 16	
SUBJECT PANEL NAME	UoA NAME	
Geology, Physical Geography and Ecosystem Science	Biogeological Evolution	
	Ecosystem Modelling and Climate Impacts	
	Earth Observation-Geographical Information Science	
	Lithospheric Science	
	Quaternary Science	
	Terrestrial, Aquatic, and Atmospheric Processes in the Climate System	
Biology I	Molecular Biology	
	Evolutionary Ecology 1	
	Evolutionary Ecology 2	
	Molecular Ecology and Evolution	
	Functional Zoology 1	
	Functional Zoology 2	
Environmental Science and Biology II	Biodiversity and Ecosystem Services	
	Soil Microbial Ecology	
	Aquatic Ecology	
	Systematics and Plant Ecology	
Faculty of Science and Faculty of Engineering – Joint Panels (N+	LTH)	
TOTAL NO PANELS: 3	TOTAL NO UoAs: 22	
SUBJECT PANEL NAME	UoA NAME	
Physics	Atomic Physics	
	Astrophysics	
	Computational Biology and Biological Physics	
	Combustion Physics	
	Solid State Physics	
	Nuclear Physics N	
	Nuclear Physics T	
	Mathematical Physics	
	Particle Physics	
	Physics Education and Physics Library	
	Synchrotron Radiation Research	
	Theoretical Particle Physics	
Chemistry	Applied Life Science	
	Analysis and Synthesis	
	Molecular Protein Science	
	Chemical Physics, Physical Chemistry and Theoretical Chemistry	
	Chemical Engineering	
	Food Technology	
Mathematics	Applied Mathematics	
	Mathematical Imaging Group	
	Mathematical Statistics	
	Pure Mathematics	

Faculty of Social Sciences (S)		
TOTAL NO PANELS: 3	TOTAL NO UoAs: 12	
SUBJECT PANEL NAME	UoA NAME	
Service Management and Service Studies, Psychology, and Social	Service Management and Service Studies	
Work	Psychology	
	School of Social Work	
Gender Studies, Strategic Communication, Communication and	Gender Studies	
Media, Sociology of Law, and Sociology	Strategic Communication	
	Media and Communication Studies	
	Sociology of Law	
	Sociology (incl. Social Anthropology)	
Middle Eastern Studies, Human Geography, Sustainability Studies,	Middle Eastern Studies (incl. Swedish South Asian Studies Network)	
and Political Science	Human Geography (incl. Human Ecology)	
	Sustainability Studies	
	Political Science	
Joint Faculties of Humanities and Theology (HT)		
TOTAL NO PANELS: 3	TOTAL NO UoAs: 20	
SUBJECT PANEL NAME	UoA NAME	
Archaeology and Ancient History, History, Cultural & Educational	Archaeology	
Sciences, and Languages & Literature	History	
	Intellectual History, Book history and Media History	
	History of Art, Musicology, Fashion Studies, Intermediality	
	Ethnology, ABM and Digital Cultures, Studies of Book Market	
	Educational Sciences	
	Educational Sciences; Higher Education Development	
	Literary Studies, Film Studies, Theatre Studies, Creative Writing	
Languages & Literature, and Philosophy	Linguistics and Phonetics	
	Nordic Languages and Rhethoric	
	Studies of English, German and French	
	English Literature, German Literature, Studies of Spanish, Italian and Romanian	
	Arabic, Latin, Ancient Greek, Modern Greek, Russian, Japanese, Yiddish	
	Chinese Language, East and Central European Studies	
	Practical and Theoretical Philosophy	
	Cognitive Science, Cognitive Semiotics	
Theology and Religious Studies	Studies in Faith and World Views	
	History of Religions	
	Biblical Studies	
	Church and Mission Studies	

School of Economics and Management (E)		
TOTAL NO PANELS: 2	TOTAL NO UoAs: 6	
SUBJECT PANEL NAME	UoA NAME	
Business Administration, Business Law and Informatics	Business Administration	
	Informatics	
	Business Law	
Economic History, Economics and Statistics	Economics	
	Economic History	
	Statistics	
MAXIV		
TOTAL NO PANELS: 1	TOTAL NO UoAs: 4	
SUBJECT PANEL NAME	UoA NAME	
Accelerator-, Life-, Physical- and Infrastructure Enabling Science	Accelerator Science	
	Life and Environmental Sciences	
	Physical Science	
	Infrastructure Enabling Research	
GRAND TOTAL NO PANELS: 32	GRAND TOTAL NO UoAs: 1626	

<sup>6 162</sup> UoAs generated 161 self-assessments, since two of the UoAs decided to write together.



# PART II Subject Panel Reports



# Content Part II

1. Foreword by the RQ20 project group
2. External advisors in subject panels
Faculty of Engineering (LTH)
Faculty of Fine and Performing Arts (K)
Faculty of Law (J)
Faculty of Medicine (M)
Faculty of Science (N)
Faculty of Science and Faculty of Engineering
– Joint Panels (N+LTH) 100
Faculty of Social Sciences (S) 100
Joint Faculties of Humanities and Theology (HT) 101
School of Economics and Management (E) 101
MAX IV 101
3. Faculty of Engineering (LTH) 103
Panel and Unit of Assessment (UoA) overview 103
Foreword by the faculty leadership 103
External panel reports 104
Industrial Engineering 104
Panel overview 104
External panel report 105
Energy Science 120
Panel overview 120
External panel report 121
Information and Communication Technology 153
Panel overview 153
External panel report 154
Biomedical Technology 167
Panel overview
External panel report 167
Building and Construction Technology 183
Panel overview
External panel report 183
Built Environment 201
Panel overview
External panel report 202

4. Faculty of Fine and Performing Arts (K) 2	39
Panel and Unit of Assessment (UoA) overview 2	39
Foreword by the faculty leadership2	39
External panel reports	39
Art	39
Panel overview2	39
External panel report2	40
5. Faculty of Law (J)	55
Panel and Unit of Assessment (UoA) overview	55
Foreword by the faculty leadership 2	55
External panel reports	55
Faculty of Law	55
Panel overview	55
External panel report2	57
6 Faculty of Medicine (M)	77
Panel and Unit of Assessment (UoA) overview 2	77
Foreword by the faculty leadership	78
External panel reports	78
Neuroscience 2	78
Panel overview 2	78
Fyternal panel report	79
Cancer Basic	96
Panel overview 2	96
Fyternal panel report	97
Cancer Clinical	20
Panel overview	20
Fyternal panel report	20
Regenerative Medicine	20
Panel overview 3	38
Fyternal panel report	30
Blood Infectious Diseases and Immunology	251
Panel overview	51
Fyternal panel report	53
Metabolic and Cardiovascular Research	66
Panel overview	66
Fyternal panel report	68
Sustainable Health	277
Panel overview	277
Future al panel report	72
Tissue Cell and Molecular Biology and Medical Techniques	200
Panel operation	282
Fysternal banel report	20
Highly Specialised Clinical Science	01
Panel operation	01
Fyternal banel report	01
Line nui panei report	U I

7. Faculty of Science (N)	75
Panel and Unit of Assessment (UoA) overview	75
Foreword by the faculty leadership	75
External panel reports	76
Geology, Physical Geography and Ecosystem Science	76
Panel overview	76
External panel report	77
Biology I	89
Panel overview	89
External panel report 4	91
Environmental Science and Biology II5	06
Panel overview	06
External panel report 5	07
8. Faculty of Science and Faculty of Engineering	
– Joint Panels (N+LTH)	21
Panel and Unit of Assessment (UoA) overview	21
Foreword by the faculty leadership	21
External panel reports	21
Physics	21
Panel overview	21
External panel report	25
Chemistry	47
Panel overview	47
External panel report5	48
Mathematics	73
Panel overview	73
External panel report5	74
9. Faculty of Social Sciences (S)	87
Panel and Unit of Assessment (UoA) overview	87
Foreword by the faculty leadership	87
External panel reports	89
Service Management and Service Studies,	
Psychology, and Social Work5	89
Panel overview	89
External panel report5	89
Gender Studies, Strategic Communication,	
Communication and Media, Sociology of Law, and Sociology 6	07
Panel overview	07
External panel report6	07
Middle Eastern Studies, Human Geography,	
Sustainability Studies, and Political Science	24
Panel overview	24
External panel report6	25

10. Joint Faculties of Humanities and Theology (HT)
Panel and Unit of Assessment (UoA) overview
Foreword by the faculty leadership641
External panel reports
Archaeology and Ancient History, History,
Cultural & Educational Sciences, and Languages & Literature
Panel overview
External panel report
Languages & Literature, and Philosophy
Panel overview
External panel report
Theology and Religious Studies 672
Panel overview
External panel report
11. School of Economics and Management (E)
Panel and Unit of Assessment (UoA) overview
Foreword by the faculty leadership
External panel reports
Business Administration, Business Law and Informatics
Panel Overview
External panel report
Economic History, Economics and Statistics
Panel overview
External panel report
12. MAX IV
Panel and Unit of Assessment (UoA) overview
External panel reports
Accelerator-, Life-, Physical- and Infrastructure Enabling Science
External panel report
· ·

# 1. Foreword by the RQ20 project group

Lund University is critically dependent on the success of its constituent parts – faculties, departments, divisions, research environments and research teams. In turn, and without exception, they are also part of international research communities. A key issue for RQ20 is to identify where researchers at Lund University are located within those communities, and how they might sustain and enhance their positions. This has been done by external advisors, which have assessed and advised the research environments in each of the 32 *internal subject panels* with regard to their standing and future direction (For a more detailed description of the structure of the RQ20 work, please see chapter 4 in Part I).

In chapter 2 below, the external advisors in each panel are specified. In chapter 3, all external panel reports are given faculty by faculty, for each faculty preceded by (i) an overview of subject panel and UoA names and (ii) a short foreword explaining the strategy for division into subject panels and UoAs, written by the leadership of the faculty. For each panel, a short panel description written by the internal panel coordinator is also provided.

# 2. External advisors in subject panels

For a complete overview of all subject panels and Units of Assessment (UoAs), please see Appendix 2 in Part 1. Below, the names of the external advisors in each of the subject panels are given per faculty (faculty abbreviation in Swedish given in parenthesis). Advisors in each panel are listed starting with the chair and then in alphabetical order.

# Faculty of Engineering (LTH)

Industrial Engineering		
Viggo Tvergaard, Chair Giuliano Bissacco Samuel Forest	Ton de Kok	
	Lena Magnusson Åberg	
	Moyra McDill	
Energy Science		
Peter Lund, Chair	Sture Eriksson	
Erik Dahlquist	Alex Taylor	
César Dopazo	Wim Turkenburg	
Information and Communication Technology		
Ivica Crnkovic, Chair	Heike Riel	
Matti Latva-Aho	Sigurd Skogestad	
Simin Nadjm-Tehrani	Diomidis Spinellis	
Biomedical Technology		
Ingemar Lundström, Chair	Inger Sandlie	
Sergio Cerutti	Kristina Takkinen	
Susan Gibbs	Sabeth Verpoorte	

Targo Kalamees	Anne Steen-Hansen	
Built Environment		
Erik Arnold, Chair	Marjan Hagenzieker	
Abdellah Abarkan	Kathryn Janda	
Michael Bourlakis	Magnus Svartengren	
Faculty of Fine and Perform	ming Arts (K)	
Art	5	
Ingrid Elam, Chair	Deniz Peters	
Jonathan Impett	Ville Sandqvist	
Gary McPherson	Lucy Steeds	
Faculty of Law (J)		
Faculty of Law		
Kimmo Nuotio, Chair	Vanessa Mak	
Monica Claes	Joellen Riley Munton	
Helle Krunke	Jan Wouters	
Faculty of Medicine (M)		
Neuroscience		
Sten Grillner, Chair	Etienne Hirsch	
Sten-Magnus Aquilonius	Rosario Moratalla	
Veerle Baekelandt	Jon Stoessl	
Cancer, Basic		
Atanasio Pandiella, Chair	Oriol Casanovas	
Cord Brakebusch	Taina Pihlajaniemi	
Frank Böhmer	Jonathan Sleeman	
Cancer, Clinical		
Beatrice Melin, Chair	Peter Naredi	
Anne-Lise Børresen-Dale		
Regenerative Medicine		

Martin Bergö, Chair Ana Cumano Axel Schambach Claudia Waskow

Lauri Koskela

Johan Silfwerbrand

Building and Construction Technology

Lars Damkilde, Chair

Berit Balfors

<b>Blood, Infectious Diseases and Immunology</b> Olle Stendahl, Chair Magnus Grenegård Bo Nilsson	Lennart Svensson Thor Theander
Metabolic and Cardiovascular Research	
Tommy Olsson, Chair	Karolina Kublickiene
Torben Hansen Mikael Knip	Mikael Welsh
Sustainable Health	
Birgitta Bernspång, Chair	Lena von Koch
Carina Berterö	Kjell Torén
Tissue, Cell and Molecular Biology and Medical Tec	hniques
Pieter Hiemstra, Chair	Lena Palmberg
John Couchman	Ulf Simonsen
Werner Müller-Esterl	
Highly Specialised Clinical Science	
Henning Grønbæk, Chair	Jes Lauritzen
Nils Erik Gilhus	Karl Lemström
Iiris Hovatta	Lars-Gunnar Månsson
Rolf Hultcrantz	Malin Sund
Faculty of Science (N)	
Geology, Physical Geography and Ecosystem Science	2
Lars Holmer, Chair	Victoria Pease
Martin Forsius	Petri Pellikka
Alan C. Mix	Anne Ojala
Biology I	
Göran Nilsson, Chair	Craig Primmer
Bart Kempenaers	Heather Wallace
Juha Merilä	Robbie Waugh
Environmental Science and Biology II	
Kerstin Johannesson, Chair	Jim Prosser
Thomas Elmqvist	Susanne Renner
Anna-Liisa Laine	Katherine Richardson

# Faculty of Science and Faculty of Engineering – Joint Panels (N+LTH)

DI	•
Phy	ISICS
	0100

Mats Larsson, Chair	Hans Kjeldsen
Marianne Achiam	Willy Maenhaut
Paul Ewart	Chris Palmstrøm
Gunnar von Heijne	Amina Taleb
Gunnar Ingelman	Christina Trautmann
Henrik Johannesson	Barbro Åsman

#### Chemistry

Christina Moberg, Chair Jonas Bergquist Jan Delcour Vincenzo Fogliano Karsten Haupt Hanna Knuutila

#### Mathematics

Bo Berndtsson, Chair
Peter Guttorp
Helge Holden
Gunilla Kreiss

Jouko Korppi-Tommola Ove Nilsson Bengt Nordén Annalisa Pastore John Woodley

Ari Laptev Rasmus Larsen Olle Nerman Otmar Scherzer

### Faculty of Social Sciences (S)

#### Service Management and Service Studies, Psychology, and Social Work

Jørgen Ole Bærenholdt Johanna Moisand	der
Klaus Fiedler Rudi Roose	

#### Gender Studies, Strategic Communication, Communication and Media,

Sociology of Law, and Sociology

Anne Ryen, Chair Mathieu Deflem Winnie Johansen David Nelken Ann Phoenix Terje Rasmussen

#### Middle Eastern Studies, Human Geography, Sustainability Studies, and Political Science Katrina Brown, Chair Kristian Stokke

Katrina Brown, Chair Sune Haugbølle Peter Munk Christiansen Lise Rakner Richard Shearmur

## Joint Faculties of Humanities and Theology (HT)

#### Archaeology and Ancient History, History, Cultural and Educational Sciences,

#### and Languages & Literature

Bodil Axelsson, Chair Jørgen Bruhn Hans Dam Christensen Solveig Jülich Steve Murdoch Elisabet Nihlfors Anne Nissen

Languages & Literature, and Philosophy	
Jan Retsö, Chair	Pieter Muysken
Björn Melander	Andreas Olsson
Kevin Mulligan	Jobst Welge

#### Theology and Religious Studies

Terje Stordalen, Chair Eila Helander Jan-Olav Henriksen Ruth Illman

## School of Economics and Management (E)

#### Business Administration, Business Law and Informatics

Jan Mouritsen, Chair Bendik Bygstad Ulrike Mayrhofer Siri Terjesen Thomas Wilhelmsson

#### Economic History, Economics and Statistics

Kjell Gunnar Salvanes, Chair David Greenaway Anne McCants Carolyn Moehling Qiwei Yao

### MAX IV

#### Accelerator-, Life-, Physical- and Infrastructure Enabling Science Søren Pape Møller, Chair Anke-Susanne Mueller Bob Fischetti Janet Smith Simo Huotari



# 3. Faculty of Engineering (LTH)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 6	TOTAL NO UoAs: 24
SUBJECT PANEL NAME	UoA NAME
Industrial Engineering	Mechanical Engineering I
	Solid Mechanics
	Industrial Management and Logistics
	Mechanical Engineering II
Energy Science	Energy Science and Engineering
	Heat Transfer and Fluid Mechanics
	Environmental and Energy Systems Studies
	Industrial Electrical Engineering and Automation
Information and Communication Technology	Electrical and Information Technology
	Computer Science
	Automatic Control
Biomedical Technology	Biomedical Engineering
	Immunotechnology
Building and Construction Technology	Construction
	Water resources and Risk Management
	Mechanics, Acoustics and Geotech
	Engineering Geology
	Aeronautical Sciences
Built Environment	Architecture and Built Environment
	Working Environment and Rehabilitation Engineering
	Innovation and Design
	Packaging Logistics
	Transport and Real Estate Science
	Industrial Environmental Economics

### Foreword by the faculty leadership

At LTH, the establishment of Panels and UoAs was a process that lasted roughly half a year (first half 2019), and involved a dialogue between the LTH Management (Deans), the 19 Head of Departments and the LTH Research Board. The RQ20 Office, and in particular the LTH representative Sven Mattisson, served as a sounding board throughout the selection process.

In short, the process at LTH for constituting the RQ20 panels and UoAs started early 2019 by asking the 19 Head of Departments at LTH for their opinion on defining UoAs and how these would fit into panels. This included also a request for the names of suitable evaluators and chairpersons. The suggestions were then compiled by the LTH management and a distribution across panels was presented and discussed at length with Department Heads during a dedicated meeting in April 2019.

Since LTH shares three Departments with the Science Faculty, discussions were carried out regularly with that Faculty and the final decision was taken in unison. LTH also discussed with the Medical Faculty in order to find the best solution for the LTH Departments and research groups that conduct research in biomedical engineering and immune technology. Also in this case, the decision was taken in unison. The final suggestion for Panels and UoAs for the cross-faculty cases was fully satisfactory for all three Faculties (LTH, N, M) without any remaining unresolved disputes or forced compromises.

The construction of the LTH panels were initially focused on subject areas but also came to involve a strong ingredient of wishes to keep departments together in a single UoA and panel. The discussions that arose were mainly due to the seemingly illogical structure of LTH departments from a subject area point of view. The most obvious example is maybe the Department of Biomedical Engineering, where its three divisions (Biomedical Engineering, Industrial Electrical Engineering and Automation and Engineering Geology) formed part of three different UoAs and thus were split into different panels. We also have examples of were divisions with similar subjects areas hosted in different departments ended up in different UoAs. One example is that the division of Logistics in the Department of Industrial Management and Logistics is in a different UoA than the division of Packaging Logistics in the Department of Design Sciences. We believe that it would have been good that the department structure and those considerations had been forwarded to the panels to avoid confusion.

After consultation with the Science and Medical Faculties, LTH then settled the UoAs and panels and reported to the RQ20 Office on 24 May 2019. Additional requested clarifications were added on 13 June 2019 and were then accepted as final.

### External panel reports

#### Industrial Engineering

#### Panel overview

The Panel consists of research groups from 3 different organizational units; Industrial Management and Logistics (IML), Mechanical Engineering (ME) and Solid Mechanics (SM).

The three units are all organized in the form of Divisions and belong to a Department led by a Headof Department. Within the Divisions there are one or several research groups. These groups can vary significantly in size in terms of the number of members. In some cases, an individual may be active in several research groups, both within and outside the evaluation unit. These types of collaborations are encouraged and often scientifically successful. All evaluation units have key role activities tied to the Mechanical Engineering programme, as well as are significant parts of many of the education programmes at the Engineering Faculty.

There is a synergy and dependence in between the evaluation units regarding research and undergraduate education. There is a strong scientific similarity between Mechanics/ME and Solid Mechanics, based on the same research paradigm. Similar relation exists between certain activities at Production Engineering/ME and IML, regarding the connection between technology and economy. A link between the evaluation units is the field of Materials. These are described from different perspectives; basic structure, mechanical properties and performance, manufactured components assembled to products which are distributed, used and recycled. In this chain of life of the materials, the members of the evaluation unit have significant activities in research and teaching as well as in industrial collaborations.

The research is conducted at several different scales. Materials are studied with using advanced technologies down to the atomic level in order to simulate and draw conclusions about the behaviour of materials at macro scale under given conditions. Research is also conducted at several different stages of technology maturity, known as TRL-levels (Technology Readiness Level). Some of the research groups conduct fundamental research down to TRL 1-3, whereas others are significantly closer to industrial research and end users (TRL 6-7). Further, research is also conducted to integrate fundamental research and industrial implementations (TRL 4-5).

#### External panel report

#### **Executive Summary**

The Industrial Engineering Panel was responsible for the evaluation of three Units of Assessment (UoAs), namely: Mechanical Engineering I+II, Solid Mechanics (in the Department of Construction Sciences) and Industrial Management and Logistics.

All three UoAs considered by the Panel show good research activity. The Mechanical Engineering Department is now organized in two acting divisions, MMM (Mechanics, Machine Elements and Materials Science) and PME (Production and Materials Engineering). MMM has traditionally focused on publication in international journals, while PME had focused more on proceeding papers. In 2007 PME decided to change in the direction of journal publications. Now both Divisions have good publication activity. Solid Mechanics has a long tradition for good quality publications in international journals and the Panel, through its check Web of Science, found that Solid Mechanics has a very good level in terms of the number of articles per person and in terms of the number of citations per person. In Industrial Management and Logistics, the focus is on high quality publications as shown by a high fraction of such publications. However, this focus is at the expense of national and international visibility which would come with a more balanced publication strategy, also emphasizing the quantity of publication output.

Comments and recommendations to the individual UoAs are presented in the Panel's report. Here some issues of a general nature and common to all UoAs are summarized.

- All UoAs seem to struggle to attract younger scientists and high-quality PhD candidates. As the main recruitment source for younger staff is expected to be from the students attending the master programs, the Panel suggests adhering to the Bologna agreement thus changing the 5-year programs into the 3+2 arrangement. This will attract international students for the master program with a potentially high interest in an academic career.
- The Panel's impression is that the academic climate at LTH is not encouraging innovative risk-taking research endeavors due to the high pressure in securing funding to cover a substantial fraction of salaries for even senior faculty.
- The combination of the above may lead to a brain drain of the brightest young scholars seeking an academic climate where they can thrive.
- The Panel notes that there is limited collaboration between the UoAs while there are synergies that could be exploited. The Panel encourages LTH to provide incentives for collaboration among the various Divisions in the Faculty.

#### Introduction

The Industrial Engineering Panel was responsible for evaluating the following Units of Assessment (UoAs): Mechanical Engineering I+II, Solid Mechanics, and Industrial Management and Logistics.

#### **Panel Members**

The Panel of six included one member from Swedish industry, two members from a Nordic country and three international participants. The Panel had one-third female representation.
- Prof. Em. <u>Viggo</u> Tvergaard, Department of Mechanical Engineering (Solid Mechanics), Technical University of Denmark, Denmark (Panel Chair)
- Assoc. Prof. <u>Giuliano</u> Bissacco, Department of Mechanical Engineering (Manufacturing), Technical University of Denmark, Denmark
- Prof. Ton de Kok, School of Industrial Engineering, Eindhoven University of Technology, Netherlands
- Prof. Samuel Forest, Mines ParisTech, PSL University, CNRS, France
- Prof. Em., <u>Moyra</u> McDill<sup>11</sup>, Department of Mechanical and Aerospace Engineering, Carleton University, Canada
- Dr. <u>Lena</u> Magnusson Åberg, Manager, Material Processes and Specialists, Volvo Group Trucks Operations, Skövde, Sweden

# **Interviews for Industrial Engineering**

The interviews were carried out using Zoom during the week of May 4<sup>th</sup>. Specifically, Mechanical I+II and Solid Mechanics were interviewed on Tuesday, May 5<sup>th</sup>. Industrial Management and Logistics was interviewed on Wednesday, May 6<sup>th</sup>. Each interview was three-hours long and began with a brief welcome by the Panel Chair followed by roughly 30 minutes in which the respective UoA presented its activities. During the remaining time, the Panel members asked questions based on their own experience and specialisation. There was time for general discussion. The Panel also asked for specific information such as a list of courses.

# Meetings with the Faculty Leaders and Department Heads

On Thursday, May 7<sup>th</sup> members from all the Panels attended a meeting with the Faculty Leaders in the morning and then with the relevant Department Heads in the afternoon. At the outset, the purpose of the meeting with the Faculty Leaders was unclear and, for example, there was uncertainty about who was chairing the session. Moreover, the Panel would have appreciated a general presentation of the Faculty by the Dean. However, the meeting developed and, in the end, was informative and included a wide range of discussion topics. The afternoon meeting with the Department Heads was also unstructured but provided a good opportunity to discuss some of the issues the Panel had identified in its work as well as request more information on teaching loads.

# Panel Approach

Each Panel member read the self-evaluation reports prior to the week of May 4<sup>th</sup> and had prepared questions for each of the interviews. The Panel met by Zoom on the morning of May 4<sup>th</sup> to introduce themselves and to discuss how to carry out the interviews and to develop a strategy for writing the Panel's report. The Panel met throughout the week, typically after each interview but more significantly, for report writing and discussions, on the afternoons of Wednesday, May 6<sup>th</sup> and Friday, May 8<sup>th</sup>. During the week, the Panel members took turns developing and correcting draft documents. Commentary and modifications were exchanged by email. By the end of Friday, May 8<sup>th</sup> the Panel had successfully completed a first draft of its report. After receiving additional information from the three UoAs being assessed, the Panel completed its report through an exchange of email and two Zoom meetings during May and June. The report itself was assembled as a page-numbered (header) binder with separately numbered (footer) sections for each of the Executive Summary, Introduction, Mechanical Engineering I+II, Solid Mechanics, and Industrial Management and Logistics.

<sup>1</sup> Also, Doctoral students' ombudsman (part-time), Chalmers University Technology, Sweden.

The Panel was not given an introduction to the available research infrastructure at the University of Lund and could therefore only express a partial judgement on this aspect in its report.

The Panel's report was submitted to the Project Coordinator, for fact checking, on June 26<sup>th</sup>. Mechanical I+II and Industrial Management and Logistics had replied by July 10<sup>th</sup>. During July and early August, using email, the Panel assessed each of the comments made by the UoAs and modified the Panel's report in response.

# Mechanical Engineering I+II

The Department of Mechanical Engineering has a staff of 20 senior researchers and a total staff of 40, corresponding to 35 FYE. It consists of two acting<sup>21</sup> divisions: Mechanics, Machine Elements and Materials Science (MMM) and Production and Materials Engineering (PME), with a nearly equal split in personnel.

## Leadership:

## Priority setting, including goals for external research funding

The Department places an overall equal importance on education and research. While being active in seeking external funding, efforts have been carried out to renew the educational offering, with a new master program in Production and Materials Engineering

In the evaluated period, external funding has been steadily increasing and the Department has reached a sustainable economy. Currently, intake from external grants is generating a surplus that will allow repaying previously accumulated debts.

Furthermore, the Department has increased its participation in larger research applications at national and European levels. This effort has been successful, yielding two majorgrants supporting the implementation of the strategy of the Department.

The Department possesses strong and valuable experience in machining processes, wear and material processing, which can continuously attract research funding from industry. It is remarkable that, at the same time, advanced multiscale simulation and experimental methods have been developed in nanomechanics as a prospective research subject.

## Recruitment, promotion and succession

Within the coming 10 years, 8 faculty members will have retired. The Department's strategy is to hire postdocs to give these individuals time to develop and eventually be eligible to fill these positions. The Department Head delegates tasks such as writing applications for research grants and projects, arranging symposiums etc. to all levels, giving the younger persons the opportunity to develop skills in securing funding and developing networks. Furthermore, the Department has an active program in advertising, to college students, with junior staff dedicated to this task.

The Department head finds gender balance a priority since it gives a better working environment and increased use of capabilities as well as contributing to higher quality and performance. Today the balance is limited by the percentage of female students applying for engineering studies. Significant efforts have been made to attract young researchers and improve the gender balance. Here the Department could leverage the PME contacts with industry to have industry partners create an attractive research environment and advertise Mechanical educational programs to students looking for university programs.

<sup>2</sup> The Panel understands that a 2018 evaluation of doctoral education resulted in a reorganization that has been gradually implemented, with a formal decision expected within the next year.

As indicated, the need to implement staff renewal because of the retirement of the senior faculty members within the next 10 years has been addressed. The Department is currently recruiting personnel to address this issue and has plans for further recruiting.

It seems that topics such as machining, material processing and production are not attractive enough for master and PhD students at Lund University. Students are more sensitive to trendy topics such as additive manufacturing and the application of artificial intelligence in manufacturing. It could be possible to attract them by incorporating these recent approaches in the courses and by comparing their merits to standard techniques.

## Publication patterns

The Panel appreciates that the Department included in the report a table with a list of the senior staff, including name, age, gender, number of publications, and h-index of each individual and concludes that the Department has an overall good publication rate.

Analyzing the publication pattern of the two divisions, a considerable and consistent increase in the number of publications is observed starting from 2011 within PME. The motivations have been explained by the Head of Department. This has led to a good publication rate and number of citations in the context of the scientific area. Notably, the "cost per publication" has decreased over the years to a level of 0.6 MSek, indicating a high publication yield. Despite the low cost per publication, a considerable fraction of publications is among the 10% top cited (21.4% in 2015) for that year/period and within the particular research field.

A lower publication yield is shown within MMM. This is mostly related to the high teaching load, which is in average more than 60% of the workload for the faculty members. The self-evaluation report suggested that PME had to develop a publication culture, but that has already been accomplished. Collaboration between MMM and PME has the potential to generate scientific knowledge that can be published in journals outside the currently targeted set.

# The balance between activities in research, education and external engagement

The Department aims for a 50–50 balance in teaching and research for each of the permanent faculty staff. At the moment, this balance has not been reached, with MMM taking a larger fraction of the teaching load. The Department of Mechanical Engineering has an average teaching load over the evaluation period of 14800<sup>3</sup> ECTS with 9700 ECTS taught by MMM and 5100 taught by PME. The Department educates in total 2100<sup>4</sup> students per year. The very high teaching load of MMM likely has a direct impact on the publication yield.

While the distribution of teaching load is currently unbalanced between the two Divisions, the Department expects that the implementation of the new master program in Production and Materials Engineering will result in a more even distribution of the teaching load. In this respect, it is remarkable that, despite the general tendency within the Faculty to limit the efforts in innovating and updating courses, the Department has produced an entirely new study program.

In commenting on administrative burden, the Department remarked that while there is more administrative load than in the past, there are also better digital tools to manage the load.

It may be more effective and efficient to identify some researchers that have a strong capability in developing and maintaining industrial relationships. While these researchers spend the majority of their time on industrial engagement (project supervision, funding), they are supported in their tasks by resources that ensure high quality research.

<sup>3</sup> ECTS are calculated by multiplying the ECT of each course by the number of students attending the course.

<sup>4</sup> Sum of the students enrolled in each of the courses.

### The overarching research strategy

The research leaders (Head and Deputy-Head of Department) have positioned their activities in the context of the 17 UN Sustainable Development Goals (SDGs) and identified their role in contributing to these. Consistently, critical global challenges have been identified and research activities defined to provide solutions. In particular, the issue of the near-monopoly of critical raw materials for the production of cutting tools is being addressed at the Department by developing alternative materials, providing comparable performance. Such effort requires multidisciplinary competence related to Material Science/ Engineering and Manufacturing Engineering. In doing so, the Department is exploiting the competence spectrum available within the two Divisions. Additional areas of activity are related to sustainable production by machining, e.g. material recycling in machining processes and reduction of cutting fluids usage. In the dialogue with the Panel, the Department's leaders demonstrated that they have a clear focus and a clear perception of their scientific strengths and exploitable internal synergies.

The overarching research strategy could be described as combining the strengths of MMM and PME from nanoscale material modelling to industrial implementation of material processing and sustainable production, covering a wide range of TRLs and up to direct application to Swedish industry. The strategy was developed as a result of an analysis of the strengths and synergies within the Department.

Apart from the demographic challenge, the Department has a feasible strategy, that bridges fundamental research and industrial application. Implementing the strategy implies addressing the main issue: attracting younger high-quality faculty.

## **Collegial culture:**

### Opportunities for early-career researchers to develop their originality and independence

The Department explicitly advocates freedom for young faculty and a coaching role of senior faculty. This culture is already practised and has created a research atmosphere that fosters creativity and collaboration. Core values are trust and delegation of responsibilities to the "shopfloor".

Introduction and promotion of younger scientists within the relevant international societies should be encouraged to provide increased international visibility, communicate to larger audiences the highly valuable research results, and consolidate the position of the PME division internationally.

### Sustainability and renewal of research strengths

In order for the Swedish society to remain competitive, substantial restructuring of research funding should be considered. As the demographic composition of Mechanical Engineering is such that many will retire within a decade, this is even more important. Faculty having to earn their own salary, while it is not competitive in the global scientific arena, makes it difficult to attract and retain Swedish talent, and even more so this holds for talent from outside Sweden. Top research requires stability of income and the possibility for deep investments in time and effort, not diverted by yet another research proposal on a topic decided by others, derived from current types.

### Academic networks and collaborations outside the unit

The Department has a strong research network in Sweden and abroad. Furthermore, the Department (or specific person) is among the founders of the SPA (Swedish Production Academy) which regularly arranges the SPS<sup>54</sup> (Swedish Production Symposium). The SPA and SPS bring together industry and academia dealing with production engineering in Sweden and the Nordics. While this has grown to be a powerful group nationally, participation and affiliation to selected international societies is recommended, particularly for not yet established researchers.

<sup>5</sup> The SPS has occurred every 18 months since 2007.

## Diversity, integrity and ethics

The Department includes researchers with a blend of multidisciplinary expertise, beyond classical Mechanical Engineering.

The Panel has noted the 50–50 gender split at the professor level and acknowledges the challenge, in the long-term, of maintaining gender balance.

Given all the efforts put into creating gender balance and the fact that the number of female students in relevant MSc programs is low, it should be considered to put effort in attracting research talent regardless of gender.

## Quality in applications and publications

The Department places a large effort in preparing applications for research funding at national and European levels. The success rate is fairly good and larger grants have been secured during the evaluated period.

The Department was asked if it has any applications for the prestigious ERC grants. One consolidator grant application has been submitted, there has not yet been an invitation for interview and the final decision will come in late summer. The Department is currently involved in another Horizon2020 application.

Recent research in the field of replacement of critical raw materials for cutting tools has led to 2 patent applications and several additional applications are expected in the short term. However, patenting conflicts with the need to publish research results. Spin-off companies have been established in the field of induction heating and cutting tool materials.

For PME, the average quality of publications is good, with selected points of excellence. As described above, a considerable fraction of publications is among the 10% top cited (21.4% in 2015) for that year/ period and within the particular research field.

## Quality ecosystem:

## Research strengths and how these are reflected in the educational portfolio

The Panel requested a list of courses that are being taught by the Department in order to better answer this question. The Panel notes there are 9 courses in Materials, 14 courses in Mechanics, 6 courses in Machine Elements and 19 courses in Production and Materials Engineering. This is a significant teaching portfolio.

Research is largely carried out in collaboration with industry and results are implemented in industrial production. Cutting tools manufacturing companies have a long-standing collaboration with the Department and exchange of staff with such companies occurs frequently. Research results are introduced in the teaching portfolio at the graduate level as well as in courses delivered to industry. Prof. Ståhl's books are also used as textbooks outside LTH.

## How external research collaborations influence the quality of research

External collaborations are important for establishing the Department's high-quality profile. Most research at the Department is carried out in close collaboration with strong industrial and academic partners. The effect is entirely positive giving the possibility to access complementary facilities and competences. The Panel has not been made aware of any issues restraining independence of research as a consequence of industrial involvement.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere The Department seems aware of relevant research infrastructure at the University. Indeed the systematic use of microscopic observations (SEM and TEM) and large facilities (X-ray or neutron diffraction) of machined and worn materials is an original approach to machining and cutting processes that is not followed by most manufacturing labs in the world.

# If the unit is aligned with any of the University's strategic research areas (SFOs) how opportunities from such connections are utilised

The connections to the SFOs in Nanoscience and in Sustainable Production are clear. The activity within the SFO Sustainable Production Initiative (SPI) is analogous to the activities conducted at PME. Cooperation with Nanoscience (Nano Lund) occurs regularly. MMM plays an important role in this cooperation in the area of multiscale simulations. The possibilities and potential of strengthened cooperation with the SFO in Nanoscience and related areas within KC (Chemistry Center) have been indicated.

The Department has clearly articulated the relevance of its work with respect to the UN Sustainable Development Goals (SDGs) Approach 2030.

#### **Recommendations:**

In addition to the comments and proposals presented above, the Panel offers the following points for consideration.

A high quality of research is observed in selected areas matched by the international reputation of the involved researchers, the number and quality of publications as well as the ability to secure substantial external funding. The praxis within the two Divisions has been different, with PME having a stronger research focus and delivering a higher publication output and MMM having higher involvement in teaching activities. Overall, the Department has shown a continuous performance improvement in the evaluated period with respect to both the number of publications and external funding. Furthermore, the research is mainly carried out in close collaboration with strong industrial and academic partners indicating both the high industrial relevance of the research and a good level of international collaboration. Thus, the main weaknesses highlighted by the previous research evaluation RQ08 have been successfully addressed.

The panel has observed that there is synergy that could be exploited between Mechanical Engineering (MMM, PME) and Solid Mechanics. Frequent interaction between the Divisions is encouraged, for instance through yearly seminars for sharing recent research results, co- supervision of master projects, preparation of joint research applications and joint supervision of PhD students.

A well-known issue is the difficulty in securing funding for equipment such as standard modern machine tools without advanced measurement equipment, to enable experimental activities. Such equipment is not considered unique and therefore universities seldom recognize the value of such investments when distributing financial resources to the departments. However, such equipment is a basic enabler for testing and validation of models, materials and methods in production and materials engineering as well as for experimental activities in education. A recommendation to LTH from the Panel is to support or contribute to providing such means to the Department, perhaps exploiting co-financing by establishing strategic partnerships with industry.

It seems deficits and surpluses are due to expiry of grants and acquisition of grants, respectively. If acquiring grants is some kind of lottery, the budgetary systems should consider surpluses and deficits at a higher level than departments, e.g. at the faculty level. The Department of Mechanical Engineering will take 10 years to repay the deficit accumulated in 2016, while reputed faculty are expected to retire during these 10 years. The Panel suggests LTH forgive the debt.

## Solid Mechanics

The Division of Solid Mechanics is part of the Department for Construction Sciences at LTH. Solid Mechanics, in its presentation, indicated that it has 2 Professors Emeriti, 3 Professors (including an adjunct), 4 Associate Professors and 1 Researcher corresponding, in total, to 6 FYE. In addition, Solid Mechanics has 2 Postdocs and 10 PhDs.

## Leadership:

The Solid Mechanics division has presented several rather significant scientific achievements combining sophisticated experimental methods and advanced modelling and simulation approaches.

## Priority setting, including goals for external research funding

In their presentation, Solid Mechanics identified both short-term (five years) and long-term priorities. Short term priorities include filling positions, strengthening the connection between computational modelling and advanced experiments as well as applying for large-scale grants that will integrate divisional strengths. Long-term priorities include an additional recruitment, establishing a master program on computational material modelling integrating experimental characterization, and continued research on material systems.

The unique expertise in nonlinear constitutive modelling of materials and structures generates longterm cooperation with industrial partners. One of the important research areas of the Division is Paper Mechanics. The pool of companies with which the Division collaborates on the topic of modelling of paper mechanics is very good, including the largest Swedish companies in the field. The group is strongly dependent on requests from Tetrapak with respect to the definition of the specific research topics. There seems to be relatively little interest in anticipating solutions beyond the current company needs and, for instance, taking into consideration social needs and challenges such as improved sustainability of packaging. The ties to Tetrapak are also very strong with respect to management of staff, with researchers moving to the company and back.

The 4D Imaging Lab is another priority as it creates dependency of other groups on Solid Mechanics. Another strategy is to ensure that Solid Mechanics courses are embedded in many core Engineering programs. This comes with the price of a heavy managerial burden to ensure LTH decisions are influenced in the right direction. This can be a viable strategy, but the Panel would also like to see a strategy in relation to societal and scientific developments.

### Recruitment, promotion and succession

There was an observation that the high number of open PhD positions is a limiting factor with respect to addressing new or complementary research topics. There is substantial funding for attracting postdocs and PhDs but challenges with a lack of interest in projects among students as well as challenges in recruiting suitable PhD students were identified. Tetrapak and other relevant industries could advertise the relevance of Solid Mechanics research for industry and create attractive dual "training" trajectories, where PhDs, funded by Tetrapak, join the company after graduation. It can be difficult to determine who is the good student from, e.g. Asia, but perhaps senior contacts in Asia can be persuaded to help in choosing the best among many applicants.

It is somewhat surprising that hiring an assistant professor is considered a long-term objective, as opposed to hiring PhDs and postdocs. This seems to suggest that there is insufficient effort put into strategy development, despite annual offsite meetings.

## **Publication patterns**

Solid Mechanics has an established publication record with a high number of publications per person and number of citations per person. In terms of citations, Lund University has stated that the group (2014-2018) has 1180 citations with 7.3 citations per publication. In terms of a field-weighted number (2014-2018), Solid Mechanics, overall, has an output of 9.3% in the top 10 citation percentile. This figure has varied from year-to-year. Some of the variation is likely associated with the shift of Biomechanics to another division.

The Panel concludes that Solid Mechanics has a good publication rate, with the number of publications and h-indexes corresponding to a good research department.

## The balance between activities in research, education and external engagement

Solid Mechanics suggested that it has an even split (roughly one-third each) for teaching, research and administration. They expressed concern that the Board does not realize the extent of the extra duties associated with the administrative burden. However, by taking managerial responsibilities, the educational position of Solid Mechanics is protected.

The Division of Solid Mechanics has an average teaching load over the evaluation period of 5841<sup>6</sup> ECTS. The Division educates an average of 650<sup>7</sup> students per year. The limited teaching load for the research faculty is acceptable and allows maintaining high research standards in quantity and quality.

In general, the balance seems to be fine given the current strong position of the group. Again, the Tetrapak collaboration is a major driver of this balance. A strong point is that experimental research and modelling research are intertwined in each individual faculty member.

The Solid Mechanics group is internationally reputed, as follows from the collaboration with LLNL in the USA. Their research output is up to standard, both in quality and quantity.

### The overarching research strategy

Solid Mechanics identified that constitutive modelling represents the core of the research at the Division and forms the basis for most other research. In general, the overarching strategy is to bring advanced experimental techniques for the extraction of data into advanced computational models. The research at the Division spans a wide range of applications and materials including metals, polymers and fibrous biological materials. The consideration of reduced order models (ROM) and more generally, machine learning techniques, would help in accelerating simulations originally based on complex coupled models (phase field, diffusion and mechanics). These trends in digital mechanics also play a role in attracting students eager to apply AI approaches to complex mechanical problems.

### **Collegial culture:**

### Opportunities for early-career researchers to develop their originality and independence

Solid mechanics has proposed to hire in both the short term and long term. The Division further states that LTH has defined career paths for young researchers and dedicated positions for assistant lectureships (BUL). These present an attractive option for recruitment. PhD students are also encouraged to apply for international postdoctoral positions.

### Sustainability and renewal of research strengths

The Panel notes that Solid Mechanics has difficulty filling PhD and postdoc positions, suggesting that sustainability and renewal of research strength is at risk. There seems to be little interest in opening up new research directions unless explicitly requested by industrial partners.

6 ECTS are calculated by multiplying the ECT of each course by the number of students attending the course.

<sup>7</sup> Sum of students enrolled in each of the courses.

The Panel asked which of the faculty is part-time employed. Among them, a strong researcher, Andreas Menzel, is only 20% (80% at the University of Dortmund).

The Panel is concerned about the lack of exploitation of EU funding.

## Academic networks and collaborations outside the unit

The Solid Mechanics group is well established internationally - collaboration with LLNL in the USA shows this clearly.

The Panel asked about the research on topology optimization and if Solid Mechanics collaborates with the TopOpt group at DTU in Lyngby. Solid Mechanics answered that TopOpt is a very strong group, and that the group at LTH has a number of relations to the group in Lyngby.

The Division states that "*Research at the Division of Solid Mechanics is directed towards materials and structures across scales*". This appears to be well aligned with activities in MMM, although answering different needs. An increased level of interaction between the two Divisions could be beneficial. The Panel has observed this synergy could be exploited through a closer collaboration with Mechanical Engineering.

The micromechanical techniques developed in the Division have been applied to metallic alloys and to granular media for civil engineering applications within the Department.

## Diversity, integrity and ethics

Solid Mechanics, at the faculty level, is homogeneous and entirely male. There are two female PhD students. While the pipeline in STEM (science, engineering, technology and math) remains a problem in many areas of engineering, the statement, "*Since Lund University has set the target that 40% of the recruited professors should be female this might restrict career- paths and promotion possibilities for both current faculty members and new recruits, possibly limiting the division's attractiveness*", was troubling to the Panel.

## Quality in applications and publications

The Panel notes there is a good quality in publications. More active pursuit of EU projects led by others may allow leveraging of a strong research position without a lot of administrative burden. The Panel asked if there have been any applications for the prestigious ERC grants. One Consolidator grant application is in but there has not yet been a decision.

## Quality ecosystem:

# Research strengths and how these are reflected in the educational portfolio

The Division has a substantial teaching portfolio covering about 300 students annually. The subjects overlap the research strengths through the courses: Finite Element Method, Nonlinear Finite Element Method, Computational Inelasticity, Modern Experimental Methods (which includes MAX4 imaging) and Structural Optimization.

The unique expertise of the group in optimization methods for nonlinear material behaviour is internationally recognized as shown by the current contracts with LLNL (USA). Optimization of architectured materials (like beam networks) that can be 3D printed can be taught at the master level and attract PhD students. Combining optimization and additive manufacturing for nonlinear materials is a promising topic.

There is an ambition of establishing a master program on computational material modelling integrating experimental characterization. An increased transfer of research results into education can be achieved if this is successful. This would be a useful cooperation, with among others, MMM.

# How external research collaborations influence the quality of research

The cooperation with researchers working in synchrotron or neutron facilities (in France, Switzerland, UK) followed by the recruitment of an expert in this field is a reason for the current excellent level of the Division in the field of experimental micromechanics.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere The 4D Imaging Lab is very well exploited. The Panel proposes that Solid Mechanics develop plans for follow-up investments to leverage current success.

The development of sophisticated simulation tools is made possible by the use of the LUNARC facility's available clusters. The capacity of the latter can be extended by means coming from contracts gained by the Division.

Solid Mechanics has linkages to industry, e,g, Tetrapak and LLNL. These are to be commended. Nevertheless, the sense of the Panel is that Solid Mechanics has a tendency to look inward. For example, in their report they state, "*The division is currently a very well functioning group – research-wise, financially and socially – and it might be tempting for the management to merge Solid Mechanics with other, less well functioning, units. Such actions are a threat to the balance in the group and would have a very negative impact on the group and its activities.*"

# If the unit is aligned with any of the University's strategic research areas (SFOs)... how opportunities from such connections are utilised

The connections to the SFOs in Nanoscience and in Sustainable Production appear to be clear, however Solid Mechanics has not specifically listed the connection nor the opportunities. They did make reference to the MAX4D imagining lab. Solid Mechanics did not refer to the UN Sustainable Development Goals 2030 Approach.

#### **Recommendations:**

In addition to the comments and proposals presented above, the Panel offers the following points for consideration.

Solid Mechanics is a small but well-functioning division with unique scientific achievements and wellknown expertise in constitutive modelling of nonlinear materials and structures. The role of the University is to protect such a unit from administrative burden and unnecessary organizational changes as much as possible. The Panel notes that issues with respect to gender balance identified in RQ08 remain.

Solid Mechanics has a fine track record for doing good quality research. It is recommended that extra effort be made to find good PhD students, to pass on the capabilities of the faculty members to a larger group of young researchers. In addition, the possibility of incorporating part-time faculty in broader roles could be an advantage in terms of retention and to ensure strengthening and diversifying the research. Inviting reputed researchers to spend sabbatical time at Solid Mechanics could further enhance the visibility and activities and also bring new research topics to the forefront. The Panel notes that the concerns with production of publications identified in RQ08 appear to have been addressed.

The panel has observed that there is synergy that could be exploited between Solid Mechanics and Mechanical Engineering (MMM, PME). Frequent interaction between the groups is encouraged, for instance through yearly seminars for sharing recent research results, co-supervision of master projects, preparation of joint research applications and joint supervision of PhDs.

Solid Mechanics should explore the possibility of changing from "on-demand research" to anticipation of the future research challenges and driving industrial innovation and, in addition, from internal focus to openness for external opportunities outside the current strong collaborations. A main lever can be the development of relationships with more industries and ensuring a balanced external funding stream from various industries.

# Industrial Management and Logistics

The Department of Industrial Management and Logistics (IML) is part of the Faculty of Engineering (LTH). According to the IML self-assessment, IML employs 26 faculty: 4 Professors (one 20%), 3 Associate Professors, 2 Assistant Professors and 5 Lecturers. In addition, IML has 9 PhDs and 3 administrative staff. All resources combined make up 21 FYE.

The RQ08 research assessment emphasized the capability of the IML researchers, in particular within PM, to publish in top journals, but also stated that the number of publications should be increased. The RQ20 Panel comes to the same conclusion now, as discussed below in more detail. In RQ08 concerns were expressed about the reliance on researchers that would retire soon. In the course of the last decade this issue has been addressed, by hiring a new Head of Department and by hiring new faculty.

## Leadership:

## Priority setting, including goals for external research funding

The Department states that it has a clear strategy in actively looking for funding opportunities where they can apply their core competences. However, in that case it is important to ensure that sufficient leads are identified efficiently. Therefore, the Department should consider the possibility of participating in Horizon2020-like industrial projects. Clearly, the Department's scientific EU networks could be used for that, but experience shows that successful proposals may not be developed by scientifically experienced researchers, but by those that closely follow the EU's top program priorities. The Department should consider the appointment of a dedicated resource that supports the identification of opportunities for funding and in the conversion from opportunities to success, i.e. manage the proposal writing process, and add content that does not require scientific expertise. The appointment of such a resource could be done in cooperation with Production and Materials Engineering (PME) which is likely to foster interesting collaboration opportunities.

In general, the Department leaders should articulate the relevance of IML research to the various sources of research funding. It does not suffice to state that there is no research in companies on Logistics and SCM. In fact, this becomes an opportunity if top management is made aware of the relevance of this business function for their top-line and bottom-line. In that case companies need to resort to funding the scarce resources available within universities, where clearly Lund is most prominent in Sweden.

In summary, the current leadership needs to show more pro-activeness in acquiring external research funding.

### Recruitment, promotion and succession

The self-assessment mentions that it is hard to fill PhD, postdoc and assistant professor positions when funding is secured. The Department informed the Panel that it is expected that upon hiring, there is a plan to provide stable employment for the long term and that therefore short-term employment has not been explored. However, this is an accepted solution in many universities abroad. In fact, hiring postdocs on shorter contracts can bridge the time until sufficient funding is available for a tenure track or tenured position. This is good practice in many similar research groups in many EU countries. This hiring policy is likely to boost the quality and quantity of output and builds, over time, a very strong international network.

### **Publication patterns**

The IML group has a number of researchers, including the Head of Department and the Deputy-Head of Department, who are reputed internationally in the fields of OM and (stochastic) OR. This follows from the highlights provided in the self-assessment and the relatively high percentage of high-quality publications.

IML encourages publication in Web of Science journals. The Department has an established publication record. In terms of citations, the University has stated that the group (2014-2018) has 852 citations with 14.2 citations per publication. In terms of a field- weighted number (2014-2018), IML, overall, has an output of 28.3% in the top 10 citation percentile, which is high in comparison with the other UoAs.

IML could create more visibility by striving for a more balanced publication strategy that also strengthens the quantity dimension of their publications. Some of the IML researchers strive for publications in top-tier journals such as Management Science, Operations Research and MSOM (with a high AIS, but not that high JIF)<sup>8</sup>, which requires a much higher effort than publishing in journals with a higher JIF (but a lower AIS). The latter category journals provide visibility and highly ranked when considering JIF, only.

The consequence of the relatively low scientific output is that the cost per publication is a little less than 1 MSek. While this is in line with the other Departments (but higher than in Mechanical Engineering where it is 0.6 MSek), it is noticed that no experimental facilities and related costs are necessary for the Department's research. Thus, the cost per publication appears high. The respondents argued that in their field, it takes longer than in other areas to consolidate enough work to lead to a publication. However, this claim is not backed up by data, nor is this the case for similar research groups in other EU countries.

#### The balance between activities in research, education and external engagement

The current teaching load, with 12 courses in the EL Division, and 20 courses in the PM Division, is substantial. A total of approximately 19500 ECTS<sup>9</sup> is delivered per annum, of which about 45% is delivered by lecturers without research time. However, there is an imbalance between the actual teaching load and the normative teaching load as measured in ECTS/FYE between different members of the faculty.

Compared to similar groups within the EU the teaching load for the research faculty is acceptable and allows the Department to maintain high research standards in quantity and quality. Yet it is important to create a fair balance in teaching load between different members of the faculty.

The teaching load secures funding for a viable group, provided research funding is increased. The above suggestions for attracting research funding can create a department with a perfect balance between research, education, and external engagement. The participation of industrial lecturers in the courses delivered by the Department shows a nice example of integration where research, external engagement and education come together.

In terms of the overall balance, IML commented on an increasing administrative burden.

The Department Head stipulated the attractiveness of MSc students for companies. Many have a contract well in advance of their graduation. This attractiveness could be leveraged, e.g. by extending the annual Forum meeting into a Forum that has a paid membership of reputed Nordic companies that pay an annual fee. The Forum creates a market forstudents and company projects and ensures that scientific and professional knowledge is exchanged.

#### The overarching research strategy

In their presentation IML indicated the link between their research and the UN Sustainable Development Goals (SDGs). Their research strongly relates to SDGs 9, 12 and 13, and to a lower degree to SDGs 2, 8 and 11.

The Panel could not identify an explicit research strategy in either IML's self-assessment or in their presentation. The Panel understands that this is a consequence of the perceived need to maintain the flexibility necessary to enable chasing of funding in different application areas and adapt to changing

<sup>8</sup> AIS - Article influence score; JIF - journal impact factor.

<sup>9</sup> ECTS are calculated as number of ECT times number of students, summed over all courses, as reported by IML.

As mentioned above, the Department's research strategy emphasizes the individual freedom of each member of faculty. But what freedom is effectively put in place when there is a struggle for attracting research funding? The Panel recommends that IML uses it self- assessment to develop a clear overarching research strategy, which was also recommended in the RQ08 report, to ensure long-term viability. As suggested in RQ08, the Panel recommends the Department identify emerging areas of research, e.g. Industry 4.0 and related topics, as well as explore the potential of sustainability in its many facets. The researchers in PM have great mathematical modelling and analysis skills. The mathematical complexity of the analysis of the problems to be studied, together with their immediate relevance for business, can create an attractive niche position. Collaboration with Computer Science MSc students doing projects with IML MSc students at companies. The Department could consider capitalizing and disseminating computer programs developed for the industrial partners, for instance by asking for proper licensing of the codes.

## Collegial culture:

## Opportunities for early-career researchers to develop their originality and independence

The Department mentioned that early-career researchers are mentored by senior faculty in developing their own research profile. Given the strategy that each individual faculty member is responsible for her or his own research, the Panel believes that mentoring should be complemented with funding for PhDs and sabbatical periods. A hurdle on this path is the lack of early-career packages that allow for hiring a PhD student. However, LTH has defined career paths for young researchers and dedicated positions for assistant lectureships (BUL). These present a recruitment option that IML has used.

## Sustainability and renewal of research strengths

Since a few years ago, Logistics and Supply Chain Management has no longer been a priority for Swedish funding agencies. The Panel provided suggestions above to tackle this issue. This similarly addresses the difficulty in attracting experienced researchers as mentioned in the self-assessment.

The Department employs 26 faculty, but these amount to 21 FYE. This implies that a substantial number of faculty have a part-time appointment elsewhere. This creates a risk that these part-time faculty might decide to assume a full-time position elsewhere. As it was already mentioned that it is hard to hire senior faculty, the Panel advises that this risk be carefully assessed. One may question the sustainability of part-time faculty at this scale, also considering the number of activities that normally require physical presence (e.g. teaching and supervision).

As with many areas in engineering, the majority of master program graduates move on to industry rather than immediately beginning a PhD. This reduces the pipeline to academic recruitment.

## Academic networks and collaborations outside the unit

As was mentioned above, there is a need for more active participation in academic networks, but there is also great potential for collaboration with PME on topics, such as maintenance, production system design, robotics, and 3D-printing. This collaboration, both within and outside LTH, is a clear win-win, as reputed research groups in OM and OR face similar difficulties in acquiring EU funding.

The Head of Department, who is well-established in European academic networks in OM, can leverage these connections to promote younger faculty into these networks.

## Diversity, integrity and ethics

The Department had stated that they have a very good gender balance. When asked, it was revealed this includes the administrative staff, which is mostly female. The senior faculty is mostly male, but there are a number of female PhD students. So, the gender balance remains a point of attention. Regarding ethnic diversity, there is little. Given the difficulty of acquiring senior faculty, this seems an obvious direction to explore.

Overall, 20% of the IML students are non-Swedish. The Panel notes that in the International Master Program of IML, most students are from outside Sweden. Most PhDs are Swedish citizens.

The Panel notes that Ethics, as a course, was introduced into the undergraduate curriculum.

## Quality in applications and publications

The Mechanical Department, in its self-evaluation had included a table with a list of names, number of publications, and h-index. Therefore, the Panel has used Web of Science to find similar numbers for several of the faculty members. Regarding IML, the Panel concludes that apart from the Department Head and the Deputy-Head of Department, the number of publications and citations are quite low, even when taking into account the age differences among the researchers. The Department Head explained that it was a rather new decision to focus more on journal publications, so these numbers will increase in future. Some of the work is close to applied mathematics, where a reasonable number of publications is expected. As indicated above, the Panel has identified some opportunities to increase the quantity of output and, in turn, visibility and recognition.

The Panel asked if IML has applications for the prestigious ERC grants. They had sent in one application for an Advanced Grant, which had gone rather far but was not successful. Another application is in process and will be submitted in August 2020.

The Panel asked why IML spends time on publishing in Swedish, in national professional journals. IML answered that smaller companies wanted that, and that it was not overly time consuming.

## Quality ecosystem:

### Research strengths and how these are reflected in the educational portfolio

IML is well-embedded in the educational portfolio of LTH through a basic course in Industrial Engineering and Management for all educational programs at the engineering school. Furthermore, IML has 6 undergraduate courses and 4 graduate courses on Business Administration and Marketing for the program in Industrial Engineering and Management, 1 undergraduate course and 14 graduate courses in Logistics and Supply Chain Management. The viability of IML is further underpinned by an annual outflow of about 80 MSc graduates.

### How external research collaborations influence the quality of research

The unit could use more intensely the opportunities offered by master student projects in companies and by consulting activities of the permanent researchers to increase the number of research contracts with industry. The unit mentioned the existence of Industrial PhDs which represent excellent platforms to develop cooperation with industry. Their number could be increased.

By exploiting these opportunities for collaboration with industry on real-life problems, primary and secondary empirical data can be acquired to generate and test hypotheses, formulate new mathematical models, validate these models, and use them for decision support, creating a virtuous circle that makes publications more relevant, of higher quality, and of higher quantity.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere IML does not need research infrastructure, apart from access to CPU time for verification of large-scale models. In case IML develops experimental research, e.g. on behavioral operations, they might team up with other experimental research, possibly from the Department of Economics and Management.

# If the unit is aligned with any of the University's strategic research areas (SFOs) how opportunities from such connections are utilised

IML mentions collaboration with the PME Division, representing a link to the Production SFO. However, the Department clearly articulated the relevance of its work with respect to the UN Sustainable Development Goals (SDGs) 2, 8, 9, 11, 12 and 13. IML should pursue developing connections to other SFOs to strengthen its position within LTH.

### **Recommendations:**

In addition to the comments and proposals presented above, the Panel offers the following points for consideration.

From a national perspective, in terms of industry support, the publications in Swedish as well as the ability of most master students to work comfortably in Swedish, are assets.

IML has a significant number of international master students each year. It could be beneficial for them to receive a larger fraction of the tuition fees paid in order to provide additional services.

Introduction of the 3+2 BSc-MSc (Bologna Agreement) program could help to attract high quality international students that can apply for a PhD after graduation.

# Energy Science

# Panel overview

Within the energy panel P2, there is a plethora of high-quality energy related research ranging from policy research to detailed analysis of components and phenomena's. Most of the involved research topics have been discussed in some detail in the four individual self-evaluations reports. LTH has a long tradition within the energy research fields and it is worth mentioning that what is today Energy Sciences and IEA was establishes as one of the initial departments when LTH was formed in the 60s. There are several well-developed collaborations within and between the departments/divisions and an exhaustive list is not possible to give in such a short text. One example could be the long-term collaboration between the experimental engine research (EES), Combustion Physics (Prof. Marcus Aldén) and the CFD-group at Energy Sciences (FM). Within this environment, a complete chain ranging from running advanced optical engine experiments with lasers to explaining the finding with state-of-the-art reaction CFD, has been established. Another example is an emerging field where research on electrification of aero engines has been established between Energy Sciences and IEA. This has a similar structure as for the engine research and IEA is responsible for the electrical machines and Energy Sciences for the aerodynamic design of the involved compressor and turbines. LTH has allocated funding for establishing a full jet engine test rig at the Ljunbyhed Airport. This facility will be erected during -20 and is a collaboration between Energy Sciences, Combustion Physics and the Lund University School of Aviation (LUSA). The division of Environmental and Energy System Studies has already established research on renewable fuels for the aero industry. This together with a full engine site will give LTH a unique possibility in terms of research on future air travel.

LTH has never had any formal coordination between all involved departments and divisions, except for a portal with only minute funding. This has changed since last year and the faculty now fully funds a coordinator position. During the course of the project, it was decided by the steering committee to involve three persons rather than having one dedicated person. The group reports to the steering committee where all involved stakeholders are represented. It is, however, safe to state that the steering committee per se promote cross-borders collaboration through, for example, a workshop with the purpose of promoting collaborations on energy research within the faculty.

# External panel report

Final Report, 13 September 2020 Erik Dahlquist César Dopazo Sture Eriksson Peter Lund (Chair) Alex M. Taylor Wim Turkenburg

## **Executive summary**

The Energy Science Panel dealt with 4 units of assessments (UoA), with a total of 7 divisions at the Faculty of Engineering of LTH. The UoAs covered a broad range of topics from fundamental engineering research to practical applications. This report contains the specific observations from and recommendations for each of the UoAs touching the three main areas of the evaluation (leadership, collegial culture, quality ecosystem). The report concludes that the quality of research is in general good. The units have scientists with high international visibility. The funding situation for research is mostly satisfactory, the share of external funding being high, typically around 70%. The divisions mostly have a critical mass of personnel to maintain their operations. The divisions demonstrate a good level of research collaborations with stakeholders, in particular industries, and international partners. The coordination of energy-related activities at LTH has increased internal collaboration as well.

Each of the UoAs face various types of challenges that may affect their future development and progress, described in detail in this report. To mitigate these and to provide advice for improvement, the evaluation team has prepared a set of key recommendations:

A publication policy with goals should be prepared aiming also at journals with higher impact level than currently. Alterative metrics to quantify the socio-economic impacts of research should be considered, as tracking mere publication intensity and quality may not be adequate for this purpose.

A better balance between internal and external funding should be sought for, allowing more free and strategic funding to investigate riskier research themes. Lund University is encouraged to seek ways for increasing the share of internal funding. Present imbalance could hamper research renewal and the path towards the world-class level in Energy Science.

Establishing a structured and continued strategy process for planning research and teaching activities and setting common goals would be very beneficial. Fields of research experiencing major changes in the external environment may require more strategic bridging to new fields or opportunities. Forming a stronger common vision and strategy on future energy research and education is recommended. Science Advisory Boards (SAB) or similar with external and international members to provide feedback and advise to the divisions would be beneficial. Stronger recruitment on an international level should be encouraged. The complete education value chain Bachelor-MSc-PhD should not be neglected as education and research form an important symbiosis at a university, important for recruiting.

Stronger and more resilient institutional structures for Energy Science at Lund University should be supported. Restructuring of the divisions may be considered to improve coherence and to make small groups more resilient to external 'shocks'. Restructuring should, however, be carefully evaluated prior to any actions to ensure true advantages instead of mere redistribution of divisions. Moving to stronger coordination efforts among the divisions, *e.g.* by establishing a stronger platform of collaboration with strategic resources, is endorsed.

13 September 2020

# Introduction

The panel on Energy Science (Panel No.2) covered four units of assessments at the Faculty of Engineering of LTH, as follows:

- 1. Energy science and engineering (FBM+KVT+EH)
- 2. Heat transfer and fluid mechanics (ST+VÖ)
- 3. Environmental and energy system studies (IMES)
- 4. Industrial electrical engineering and automation (IEA)

The common denominator for these units is "energy", covering the whole range from fundamental engineering research to practical applications. The four units of assessments included seven divisions (division is the basic operational unit at LU/LTH).

The evaluation team of the Energy Science Panel had the necessary expertise to assess the fields represented by the units of assessments and it constituted of the following six experts:

Professor Erik Dahlquist, Mälardalens Högskola, Sweden

Professor Cesar Dopazo, University of Zaragoza, Spain

Dr. Sture Eriksson, formerly adjunct professor, Royal Institute of Technology (KTH), Sweden

Professor Peter D. Lund, Aalto University, Finland (Chair)

Professor Alex M. Taylor, Imperial College London, UK

Professor Wim Turkenburg, Utrecht University, The Netherlands

The panel organized the review work in a way that for each unit of assessment a Head Reviewer and Deputy Reviewer(s) were assigned for preparing the main questions of the review, providing a more detailed analysis of the assessment material incl. interviews, and writing the assessment chapter of the unit. All panel members read through the material and participated in the interviews.

The division of the review assignments among the reviewers were the following (I=head reviewer, II=deputy reviewer):

- 1. Energy science and engineering: Taylor (I), Dopazo (II) (with help from Turkenburg);
- 2. Heat transfer and fluid mechanics: Dopazo (I), Taylor (II) (with help from Eriksson);
- 3. Environmental and energy systems studies: Turkenburg (I), Dahlqvist (II);
- 4. Industrial electrical engineering and automation: Eriksson (I), Dahlqvist (II).

The background material and information sources, used for the evaluation report, include the following:

• Self-assessment reports of the units, including bibliographic data;

- Internal panel meetings for planning the evaluation exercise, interviews, and forming a joint opinion based on the observations made;
- Remote interview meetings (5-8 May 2020);
- Complementary information and data from the units (during and after the interviews).

The report has been reviewed, commented, and approved by the six experts and it represents a unanimous opinion on the observations and recommendations to Lund University RQ2020 and the four units of assessments. The Appendix gives the team's interpretation of the requested advisory document.

The UoAs were allowed to comment the report before its finalization.

## Key observations and recommendations

For each unit of assessment, specific observations and recommendations have been prepared touching the three main areas of the evaluation (Leadership, Collegial culture, Quality ecosystem) requested in the panel report guidelines.

Here, the main observations and recommendations for all units of assessments as a whole are presented, based on common denominators identified:

(1) The quality of the research in the units of assessments is in general good. The units have scientists with high international visibility. The publication profile is similar to many other engineering and applied disciplines. Most of the units have not published in the topmost science journals (*e.g.* Nature, Science). The h-indices of senior scientists span a wide range from rather modest to a few high levels. However, the quality of work and dedication of personnel clearly indicate that there is further development potential for improvement.

Recommendation: A publication policy with goals should be prepared aiming also at journals with higher impact level than currently. It would be useful to better define alternative metrics to quantify the socio-economic impacts, as tracking mere publication intensity and quality may not be adequate for this purpose. It is important to devise metrics which are not time-consuming or complicated for the individual researcher. The purpose of such metrics needs to be transparent: are these to be used for ranking at either the level of "who is performing in their respective fields" or for the level of the University in world-wide rankings (mention was made about the need to maintain Lund's ranking in the top 100 international Universities)?

(2) The funding situation for research is mostly satisfactory. The share of external funding is high, typically around 70%. The divisions have very little internal 'free' funding, *e.g.*, for new research openings, which to some extent also hampers renewal of research targets. The requirement of co-funding by the Swedish research funders, such as in the case of the competence centers, and some EU Programs ties up the university's own internal funds to research themes defined by them. Funding of 4-year PhD projects within a single project seems difficult in the present situation. External project funding seems to have a too high influence on research contents, but also influences the recruitment of senior staff. A part of senior staff (incl. professors) salaries is paid through project funding, which also limits the efforts of more strategic research and planning. The funding scheme and situation have effects on the performance of the divisions, some of which are adverse and indirectly reflected in the evaluation outcomes.

Recommendation: There should be a better balance between internal and external funding, allowing more free and strategic funding to investigate riskier research themes and avenues or for the funding of large, central, multi-use facilities. Seed or exploratory research projects funded by the LU/LTH to examine the viability of innovative topics and techniques could be considered; for example, 1-2-year projects with 500-1000 kSEK budget. Though the funding schemes of universities in Sweden are strongly regulated by the state and government, Lund University is encouraged to seek ways for increasing the share of internal funding. Present imbalance could hamper research renewal and the path towards world-class level. Efforts for increasing endowments could also be considered.

The existence of strategic funds may imply a discussion on management, and specifically: -How should 'strategic decisions' be made (top-down or bottom-up)?

- How should change management apply (for example for entities facing 'uncontrollable' changes to their research landscape)?

-At which level should resource be: at the faculty - or even university - level?

- Is there a need for structure to support researchers to write proposals?

- Is there a need for an office to 'put Lund on the map' to make sure that a wider audience, within Sweden and abroad, is better aware of what Lund has to offer?

- There are now 5 areas and a research framework can be created around these 5, with researchers able, and encouraged, to contribute to more than one area. "Thematic collaboration projects" - funded for a 3-year period – to provide seed for researchers to meet across borders could be interesting to consider, *e.g.* this might stimulate contacts between Medicine and Engineering.

(3) The evaluation team recognizes the usefulness of the work of the coordination group of energy-related activities, which has increased the internal collaboration. However, missing is a systematic strategic planning process and an overarching research strategy, important for renewal and improvement of research, is missing: the current structure of the university has grown without a particular rationale. Long-term goals and associated metrics are absent. Research contents are often driven by personal research interests, which may lead in some cases to path-dependencies hampering renewal of research. The funding schemes which are based on external project funding strengthen this tendency further, thereby reflecting the interests of the sponsors and industries. A strategic planning process could help the divisions to better meet unexpected external changes, e.g., such as experienced in the combustion field.

The directions and renewal of research is very dependent on individual efforts and visions. The role of outside input has been minor in most divisions, though an outside view could be useful.

Recommendation: While continuing the strengthening of coordination within the energy disciplines, establishing a structured and continued strategy process for planning research and teaching activities and setting common goals would be very beneficial. This could involve the faculty, department and division levels to line up the process. Fields of research experiencing major changes in the external environment such as combustion may require more strategic bridging to new fields or opportunities. Forming a stronger common vision and strategy on the future of energy research and education is recommended and would be helpful in this context. This exercise should be initiated and led by the upper management of the divisions and faculty.

Establish Science Advisory Boards (SAB) or similar with external and international members to provide feedback and advise to the divisions on a yearly basis.

(4) Though the divisions mostly have a critical mass of personnel to maintain their operations, the times at which senior faculty retire and declining trends of doctoral students deserve more attention. Recruitment of faculty staff, e.g., senior researchers and later promotion to professors, are mostly done internally from Lund University graduates.

Recommendation: Support stronger recruitment on an international level. The vision and strategy definitions should be followed by a near- to mid-term recruitment plan.

- (5) The placement of the divisions into the units of assessments for the RQ2020 evaluation may not have been optimal as most of the divisions within the units indicated that there was no, or minor, interaction among the other divisions within the unit. We also found, that some divisions are small in size and would benefit from being a part of another Department, in terms of methodological approaches, teaching load, administrative burden, funding stability, among others. The contents and work of Divisions of IEA currently as a part of the Biomedical Engineering Department are not well captured by the name of the Department. The work within the units falls under the technology and society field. Recommendation: Forming more optimally the units of assessments may require a stronger dialogue within the university, which could be considered in future evaluations. There should be support for stronger and more resilient institutional structures for energy science at Lund University. Restructuring of the divisions in terms of the departments involved should be considered to improve coherence and to make small groups more resilient to external 'shocks'. Restructuring should, however, be carefully
- (6) The divisions demonstrate a good level of research collaboration with key stakeholders, in particular industries, and international partners. Chosen research fields often reflect the 'needs' of the society and industries. Whereas interdivision or intra faculty collaboration opportunities are not fully utilized. Recommendation: The recent initiatives of allocating coordinators for better coordination among the energy disciplines is welcome. Moving to even stronger coordination efforts among the divisions is endorsed, *e.g.* by establishing a platform of collaboration with strategic resources to establish stronger collaborative ties in research and teaching.

evaluated prior to any actions to ensure true advantages instead of mere redistribution of divisions.

(7) Undergraduate education implies a large source of revenue for Lund University and a pool of potential future graduate students and researchers. Although the main objective of RQ2020 is to evaluate the competitiveness of research, the complete education value chain Bachelor-MSc-PhD should not be neglected as education and research always form an important symbiosis at a university.

## Energy science and engineering

This unit of assessment (UoA) comprises three divisions, namely (i) Combustion engines (CE) – mainly experimental research into piston engines; (ii) Thermal Power Engineering (TPE) – mainly gas turbines for power production. There are three tenured staff members from 2014 to 2018; PhD from 4 to 0; overall 'written' output is 80 items over this period. Seven theses have appeared in the period 2014-2018; (iii) Efficient Energy Systems (EES) – mainly district heating at the system level. Tenured staff numbers have declined from 4.5 to 3 from 2014 – 2018; PhD risen from 1 to 2; overall output is 28 items over this period, 11 of which are in peer – reviewed journals.

This UoA is one of three others within the Department of Energy Science, and this latter department is one of five others within the Faculty of Engineering<sup>10,11,12</sup>. This UoA has been created for the purpose of RQ20 to be as coherent as possible and has been identified by the faculties in consultation with the RQ20 secretariat. However, there is little or no connection between the three group, although there are several either well-developed, or evolving, collaborations with *other* UoAs within the LTH-Panel Energy Science (P2) Grouping.

<sup>10</sup> The faculty is one of 8 at Lund University (the 9th, a special one, is directly under the vice-chancellor).

<sup>11</sup> The Faculty of Engineering is the largest single faculty in Lund University, 1/4 of the University.

<sup>12 157</sup> Professors; 1 000 researchers, teaching staff and doctoral students; SEK 400 million in direct government funding, SEK 800 million in external funding.

Direct government funding ("*fakultetsmedel*") is distributed by the department head among the groups and senior researchers according to a template, part used to support projects where the external funding obtained does not fully cover the costs. Most of this funding is spent on salaries for staff - department level, but it does not cover all the salary expenses of the faculty members.

A video meeting between the panel and this UoA took place on 5 May 2020 in which the division presented itself and answered further questions put by the panel, as well as by written reply to some questions put by the panel. In this subs-section the findings, views, comments and suggestions of the panel are presented concerning the research activities of the division.

### Observations

The self-assessment report is written as, essentially, three separate texts, although RQ20 has provided publication data for the UoA overall. The CE group is roughly twice the size of the other two groups together (21 out of 30 in 2018). In 2014, there were about 40 faculty staff and employed PhD students (for all 3 divisions): this had declined to 30 by 2018: over the same period, the total revenue<sup>13</sup> declined from MSEK 50 to MSEK 40. The H-index for most senior staff is 15-25, although for one member (who works in the engineering science field of 'control') it is twice as high. It is, however, lower for the EES group which has younger staff, and moreover many of their publications are in Swedish.

#### Leadership

#### Priority Setting (incl. goals for external funding)

<u>CE group</u>: Senior researchers have historically supervised about 4 PhD students each, because external and government funding has been strong. This group is well established and has been doing relevant and interesting work from both a scientific and applied point of view.

Funding has been traditionally from KCFP<sup>14</sup>, FFI, EU, Formas and directly from Industry. The group is to be commended for having renewed funding of the KCFP (10 MSEK/4 years). The threat is the decrease in external funding, especially from a single important source (*i.e.* the Swedish Energy Agency) and the planned future reduction of funding<sup>15</sup>, driven by national policy.

The group's priority is to increase the number of PhD students again, partly by securing funding from new sources. This will build on ideas for decreased emissions, improved fuel conversion efficiency<sup>16</sup>, and renewable fuels.

See also under 'Quality Ecosystem' / 'conflicts of interest'.

<u>TPE group</u>: It seems that the number of PhD students has declined from four to, apparently, zero in the period 2014-18. The priority is to reconstruct the group (see under 'Promotion') with projects large enough to fund PhD students<sup>17</sup> on renewable energy sources, although this activity is still limited. This research will build on the strengths of: knowledge base, extensive experience and available competences in many niche-projects.

The threat is that funding for TPE's traditional research areas<sup>18</sup>, largely from the Energy Agency, may be in strategic decline as focus shifts to "renewables".

A weakness, and threat, is the self-acknowledged "... Unclear leadership<sup>19</sup>, difficulties finding its role

<sup>13 2.5</sup> MSEK comes from funds to the Competence Center

<sup>14</sup> Competence Center for Combustion Processes: 10 M€ for 4 years: salaries of technicians are partially covered by this budget

<sup>15</sup> The Ågency will deprioritize research within mature technology areas (including piston engines).

<sup>16</sup> For example, novel combustion methods (Low Temperature combustion, the so-called DCEE, etc., as summarized in the group's SWOT analysis).

<sup>17</sup> The group has recruited two CSC-funded PhDs.

<sup>18</sup> Historically through thermal processes such as steam cycles and gas turbines.

<sup>19</sup> Related to the fact that the department head is drawn from the TPE group.

in a changing environment...". Nevertheless, new partnerships have started<sup>20</sup> and these may result in increased research funding.

<u>EES group</u>: The number of PhD students has risen from one to two over this period. The goal is to recruit a senior researcher and several PhD students. Opportunities exist from research funders, *e.g.* a current EU project and the advanced district heating (DH) research platform.

These opportunities build on the strengths in efficient energy systems at a system level covering a broad spectrum from production to distribution, to customer installations, customer behaviour and energy use. Research topics cover system optimization, asset management, business models and customer relations, environmental, economic evaluations.

Weaknesses are: a knowledge gap in the group, due to staff recently retired; that the EES group has not been allowed to grow organically (see below); that the group turns down opportunities due to the lack of a critical mass (see below).

#### Recruitment, promotion and succession

<u>CE group</u>: An associate professor was recruited 2018 and a junior researcher was recruited in 2017 as a tenure track (no further recruiting is likely). The former is to be promoted to full professor as soon as possible, and the latter should be promoted to associate professor to generate direct government funding.

<u>TPE group</u>: This size of this group has shrunk from 12 to three senior academics and one post-doc.

A weakness in the submission is that there is no consideration given to *recruitment* in terms of *'succession'* and seems to be silent on *'promotion'*. *Recruitment* to group size is nevertheless a financial question. As described below, education and administration take up so much time that it is hard to invest in research activities which would ease the financial situation.

The group is however heavily involved in the department's application for a master's program to increase the number of students (planned autumn 2021).

<u>EES group</u>: *Promotion*: For promotion, the two senior researchers need time and resources for paper generation. This implies a reduction in teaching because the *recruitment* and *succession* at the start of the reporting period<sup>21</sup> led to the two EES staff being engaged in their teaching load<sup>22</sup> of 4-5 members of staff. This left little time for research applications and publications: one academic was prescribed sick leave for fatigue syndrome stemming from the workload.

*Recruitment*: the group argues the need for critical mass by recruiting another senior researcher, although it is difficult to find qualified people given that few people have a PhD focusing on district heating.

Despite the group's ability to finance a lecturer or assistant professor for at least 3 years, the poor budget forecast at the department level has stood in the way.

#### **Publication patterns**

Publication in "applied energy" has, for many decades and world-wide, been in well-established communities (*e.g.* SAE<sup>23</sup>, ASME). The publications of two groups have reflected this state of affairs. Nevertheless, these channels do not enjoy the prestige associated with Journals associated with basic engineering science. This may be a source of weakness in future, although these peer-reviewed conference papers<sup>24</sup> have strong research and industrial impact and are a vital networking forum.

<sup>20</sup> Aerodynamic design in electrification of aero engines (between Energy Sciences and IEA) and a jet engine test rig (between Energy Sciences, Combustion Physics & Lund University School of Aviation)

<sup>21</sup> There has not been continuous growth in the group in many years.

<sup>22</sup> Six courses and supervision of more master thesis projects than elsewhere in the department.

<sup>23</sup> Society of Automotive Engineers; American Society of Mechanical Engineers.

<sup>24</sup> Comparison amongst the publication channels available shows little difference in either the peer review processes or in the number of citations obtained between SAE papers and journal papers.

<u>CE group</u>: Publication and recognition are indubitable strengths of this group and are highly cited, particularly those with international collaborations which help the group to reach more readers. Wisely, the group has, recently, internally set goals for at least one journal publication in each doctoral thesis. Generally, the number of publications and citations in the CE group is increasing over time.

<u>TPE group</u>: The group has traditionally published at ASME conferences but the last five years there has been a noticeable change towards journal publications, related to, amongst other, inclusion of new research topics. The "Google Scholar" pages of the group members shows a commendably high publication rate<sup>25</sup>, which maintains the reasonable H-index of the researchers.

EES group: Publications had been in Swedish research reports but recently, publication in scientific journals (*e.g.* "Energy", "Applied Energy" and "Sustainable Energy Management and Planning") has been a requirement for PhD students.

There has been a total of 11 peer-reviewed publications, two licentiate theses, 6 peer-reviewed book chapters.

#### Balance between research, education and external engagement

<u>CE group</u>: The group is mostly occupied with research, which is its strength, and its teaching load is reported to be relatively light, though it has increased lately.

External engagement is a strength (chairmanship of committee on automotive control of IFAC<sup>26</sup>; and leadership of a task within IEA<sup>27</sup> TCP on combustion; public lectures at libraries, elementary schools, and other public venues; publishing popular scientific articles and opinion pieces; approached by journalists to explain its research or to provide technical explanations of topics covered in the news).

<u>TPE group</u>: The group now includes renewable energy in lectures but the research in this field is limited to 'slow redirection'. Teaching takes up to 45% and there is a large share of administrative work. (head of department  $\approx$ 50%?; member of LGGU educational board,  $\approx$ 30%; the departmental director of PhD studies). This leads limited time for development, application work and research.

External engagement is varied ("turbo power program<sup>28</sup>"; cooperation with combustion physics (LU); Siemens (Sweden) and the European Spallation Source (ESS/Lund); companies in the field of: Organic Rankine Cycles, Stirling cycles and externally fired gas turbines; active in the European Turbine Network and the Scandinavian Nordic section of the Combustion Institute).

<u>EES group</u>: Although successfully in research funding for several research projects, the balance between educational<sup>29</sup> and research activities must be improved to improve funding abilities (actual load is  $\approx$  60% on teaching and  $\approx$ 40% on research). The requirements to find external financing for this group has more than doubled, for the same number of hours in teaching activities.

External engagement: part of EU Horizon project; appointments to missions<sup>30</sup> for the Swedish Energy Agency and Energiforsk; cooperation with Halmstad Högskola; participant in the European district heating conferences.

#### Overarching research strategy

<u>CE group</u>: The strength is its strategy "to enable the transition to sustainable transportation by providing society with knowledge and experts on powertrains and renewable fuels through world-class collabo-

<sup>25</sup> A rate which is, *prima facie*, at odds with the rather gloomy (and laconic) submission of this group.

<sup>26</sup> International Federation of Automatic Control

<sup>27</sup> International Energy Agency

<sup>28</sup> It is not clear what this program entails.

<sup>29</sup> Five courses at advanced level, and 46 master thesis projects in the four year period.

<sup>30</sup> Member of the strategic council for the innovation and research program TERMO; expert on the Swedish District Heating Board; evaluator of applications to programme SamspEL; selected to make a synthesis of the research projects in the Swedish research program <u>Fjarrsyn</u> 2013-2017).

rative research". The group's research is switching from minimizing harmful emissions towards energy efficiency, greenhouse gas emissions and renewable fuels. Furthermore, it collaborates with other research groups, within LU and outside it, to make unique research contributions and has built up a vast portfolio of specialised hardware (*e.g.* optically accessed engines; many dedicated test cells). It recognizes the need to broaden into electromobility and assessments of the combustion engine's role in the energy system. Through the SWOT analysis, identifies hybridization as potential new research areas.

EES group: The strength of the group is its ability to combine a broad spectrum of technical, economic, environmental and behavioural studies due to the different research backgrounds in the group. The group reports great interest in the research it is delivering such as: the new design of smart thermal grid; growing interest for DH<sup>31</sup> because of the need to decarbonise the energy industry and the building sector; Demand Side Management is growing in society; Digitization in the energy industry opens up for new types of research; expertise and knowledge in the area of Low Temperature District heating<sup>32</sup> is in demand right now; Sweden is a leading country in district heating technology, implying collaboration with highly developed district heating utilities.

There are other dimensions in the more general research area of the DH industry, which may involve changes of research direction of the group<sup>33</sup>.

<u>TPE group</u>: The threat/weakness is that there is no "overarching" research strategy in the group, partly because there is "there is a lack of consensus in the group and thus possibly no common vision". These observations reflect the current, extremely rapid, changes in the industrial and policy environments.

The strength of the group is that it continues to be able to make its way by tentatively trying several new avenues, some of which will naturally turn out to be short-lived<sup>34</sup> as the world has started to engage with the manifold implications of combating climate change. Opportunities for modelling and systems studies to understand how different energy sources and technologies might interact in a zero-emission society would entail working at a higher level than heretofore but may be in a direction into which the group should move.

#### **Collegial culture**

<u>CE group</u>: There is a strong culture. PIs discuss applications and research strategies between them. As an example of *sustainability and renewal of research strengths*, such discussions have identified the need to broaden the existing collaborations to groups dealing with electrified transports and groups working with life cycle assessment. *Early-career researchers*, a new associate professor is inducted into doctoral student supervision. PhD students go through a deliberate process to help them claim the intellectual ownership of their projects, to engage in scientific thinking and, to some extent, start practicing academic writing at an early stage<sup>35</sup>. The critical mass of PhD students<sup>36</sup> is critical to the smooth running of the for continuity<sup>37</sup>

<sup>31</sup> EU funding for DH has grown tenfold the last years.

<sup>32</sup> For example, ideas about boosting the temperature level at the customer for domestic hot water with different electrical solutions (electric heat tracing, micro heat pump, instantaneous electric heater) to meet the temperature requirements to avoid the growth of Legionella bacteria.

<sup>33</sup> Heat pumps are getting better and cheaper, so the high market share of DH in Sweden may be joined by hybrid systems of heat pumps and DH; the introduction of competing technical solutions to make heat for space heating and domestic hot water; Customer reaction to the monopoly situation for DH supplier; Government taxation policy raised on CHP.

<sup>34</sup> For example: projects on CCS did not lead to long-term funding streams; broadening the research remit to include renewables; the combined use of renewables as well as other energy sources, even in a zero-emission society using CCUS and Negative Emission Technologies.

<sup>35</sup> The "competence center" provides good opportunities for this, as its projects are typically not strictly defined in term of milestones and deliverables, and provide some freedom.

<sup>36</sup> In turn, this is due to the existence of a critical mass of academic staff *who are ready to cooperate with each other* (which is, in itself, a separate and huge strength of this group)

<sup>37</sup> It is surprising, even to Mechanical engineers outside this area of engineering experimentation, how complicated it is to run engine experiments. The fact that engines are ubiquitous belies the sophisticated packaging and use of complicated control electronics that are necessary to run engines.

in knowledge of lab practices, software skills between cohorts of students. In terms of *academic networks and collaboration outside the unit*, PhD students are also encouraged to spend a few months of their PhD studies in a group abroad, using the strong links of the CE group with many institutions around the world.

<u>TPE group</u>: There seems to be no explicit information under this heading for this group.

<u>EES group</u>: In terms of *academic networks and collaboration outside the unit*, the generation of new research and project collaborations is helped by the group's broad networks of energy companies, manufacturers, consulting companies and municipalities. The maintenance of these networks is achieved through involving of the energy industry in the group's courses and master thesis projects, as well as participation in local, national and international networks.

## Diversity, integrity and ethics

<u>CE group</u>: The staff are academically diverse (physics, computer science, mechanical engineering), but only one is much younger than the others, and all are male. The group has made attempts for gender diversity. Formerly up to a third of the CE group's PhD students were women. It is commendable, and shows initiative, that the group organizes a recruitment event where female 2nd and 3rd year students are invited to listen to presentations by female professionals from the engine industry, and to mingle with researchers and PhD students in the engine laboratory. After two consecutive years, this initiative seems to pay off in a greater share of female students in the engine courses. Ethnic diversity among PhD students continues to increase.

The SWOT analysis notes what is perhaps a worrying weakness, namely that there are "...[i]ncreasing problems with recruiting top students to our courses and top PhD candidates to our research program...".

<u>TPE group</u>: The staff has is fairly homogenous faculty staff, but has a history of diverse PhD recruitment, both in gender and ethnicity.

<u>EES group</u>: Two senior researchers come from different disciplines (mechanical engineering and behavioural sciences) and has more women than men in the research group (two of three). The courses that EES teach is in Swedish and the group contains persons from Sweden only. Students appreciate the fact that the group invites a mix of women and men for invited talks.

# Quality ecosystem

# Research strengths and how these are reflected in the educational portfolio

<u>CE group</u>: The group has research strengths for which the group is to be congratulated: critical mass; "superb" infrastructure; longstanding cooperation *across* groups (*e.g.* combustion physics & aerosol group at LTH); a strong international network and long-term collaborations, both in academia and industry.

The research results appear in the courses given by the group, especially in the more advanced course which improve the course quality, help the group recruit talented PhD students, and gives such students a 'flying start'.

<u>TPE group</u>: The strength of the group lies in its store of knowledge and extensive experience which make it valuable in many niche projects.

Its strong background in conventional heat and power production is highly valuable in a large part of the educational portfolio. The group knows, however, that more research in renewable energy would also benefit teaching.

<u>EES group</u>: The group has strong links to external bodies, and the associated research projects are reflected in its taught courses<sup>38</sup>. The group involves these external bodies with its teaching.

<sup>38</sup> Advanced Energy Management; District Heating and District Cooling; Energy Use; Energy Supply and Energy Markets

The extensive teaching duties provide the group with good possibilities to recruit students for master thesis - or PhD - projects.

## How external research collaborations influence the quality of research

<u>CE group</u>: The group has built up strong research collaborations through: international prominence<sup>39</sup> within the SAE; discussions with industrial partners raises the research quality by providing feedback on the relevance<sup>40</sup> of the group's research; this network also helps attract funding from the private sector.

<u>TPE group</u>: No specific information is provided under this heading but some has been given under the sub-heading of "Priority Setting (incl. goals for external funding)".

<u>EES group</u>: The group reports a network of energy companies, municipalities, real estate companies, manufacturers of district heating components, consultants, research institutes - Swedish and foreign - and other universities. This provides opportunities for collaboration in research applications and in projects.

The contact with students, which is extensive due to the large teaching load, grows the group's network as the students begin their professional careers.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

<u>CE group</u>: Ethical conflicts are rare because research projects tend to be pre-competitive. A weakness is the "conflict" between topics of *current* interest to industry versus topics of longer-term interest<sup>41</sup>. A weakness is the absence of a solution: government funding to ameliorate the 'conflict' is difficult to obtain.

<u>TPE group</u>: There is no information under this heading.

<u>EES group</u>: The group seeks early communication about matters that could be potential conflicts of interest with the various partners. For collaboration in teaching, the group tries to alternate between the companies which are invited. The risk is that the amount of innovation may be limited.

### How the unit uses infrastructures inside and outside Lund University

<u>CE group</u>: The group has made good use of 'infrastructure', including: the LTH *career academy*<sup>42</sup>; infrastructure (financial) support<sup>43</sup> from the faculty level; faculty strategic funds to update a test cell for testing electric machines and fuel cells in collaboration with IEA<sup>44</sup>; a donation to the faculty may result in the installation capacity to run engines and fuel cells on hydrogen; access to the laser laboratory at the division of Combustion Physics; the *research services unit* helps researchers to apply for, and administrate, EU projects.

<u>TPE & EES groups</u>: There is no explicit information under this heading other than the statement that "...The activities at the [TPE & EES groups] are less dependent on experiments, but nevertheless have or aim for experimental capacity...".

#### Recommendations

Although the purpose of this document is to be forward-looking<sup>45</sup>, the panel is also tasked to highlight things "to be commended" and that inevitably entails casting an eye back on the performance of the three groups over the period 2014-2018. The two smaller groups, TFE and EES, have successfully delivered very large amounts of teaching and administration. The largest group, CE, has continued to produce

<sup>39</sup> The senior researchers' have engagement with the SAE, for example as editors and organizers of conference sessions.

<sup>40</sup> Contacts in industry have detailed technical knowledge, evolving as government regulations become stricter. Feedback ensures that the research does not focus on "non-problems".

<sup>41</sup> Example: there is little interest from industry in investigating non-legislated emissions.

<sup>42</sup> Assistant professors working for promotion; courses for managerial responsibilities

<sup>43</sup> To the engine laboratory, on which the CE group is critically dependent

<sup>44</sup> CE and IEA groups intend to co-localize experimental facilities to create closer bonds as a foundation for joint research in this expanding research area

<sup>45</sup> Specifically: "...assessing (and giving advice on) the preconditions for high-quality research as they are expressed in procedures, strategies, resource allocation and networks...".

strong, internationally leading, research. This is not to belittle the research activity of the two smaller groups nor the teaching contribution of the largest group.

At least the TPE and CE groups face challenges for research, as has already been outlined above, owing to the switch society is making away from traditional energy carrier and conversion systems to modern ones using mainly electricity, and fuels (as well as technologies and approaches) causing zero or negative GHG-emissions, to meet the targets set in December 2015 the agreement on climate change was achieve. The TPE and CE groups have made an attempt to respond to this development during the reporting period but viable long term directions have not yet emerged. This is in part understandable as societies and governments examine the costs, the life cycle analyses and the viability of proposed solutions. These groups will continue to face the same situation for an extended period of time and perhaps inputs will be needed from Lund University help the transition in the research fields.

#### Requiring immediate attention

#### TPE & EES groups:

Both the TPE and EES groups have been relatively weak over the period of review in terms of the production of PhD theses, which the panel view as a 'precondition for high-quality research'<sup>46</sup> – essentially, international competitiveness - in the long term. This makes the evaluation, required by RQ20, of the future development potential and abilities of these two groups somewhat uncertain. The H-factor of the TPE group seems adequate; that of the EES group is lower, however, and is attributed to the age profile of the tenured staff. The EES has ambitions to grow by one tenured senior member in more-or-less their current field of research; however, their comment that there may be 'knowledge gaps' points to some level of deficiency in abilities. The TPE have ambitions to enter into renewables and, although the description of the group is somewhat too brief, it seems plausible that the group has the requisite abilities in this direction. The issue of the rate of thesis production and, by implication, development potential, is one which may require more or less immediate attention. This will depend on the groups' - and Faculty's view on the direction(s) for financially and academically viable long-term teaching and research futures of these two groups. Then, other decisions should be made about promotion and retention – or generation - of critical mass. Suggestions for a strategy to address these points is deferred to the sub-heading Issues that should be addressed at other levels of the University.

It is argued by these two groups that this situation has arisen - in part - because they are hampered in delivering bids for research, owing to a unviable balance between Education and Research allied to inadequate resource allocation (staff) implying loads, in the former case, from administrative and teaching duties and, in the latter case, from long-standing teaching duties. The evidence presented by the groups suggests, prima facie, that these loads<sup>47</sup> may impede the ability to compete for research funds and from being able to supervise more doctoral students. The way in which this arose for the EES group has been clarified, but less so for the TPE group. Be that as it may, the ability for these two groups to improve their research standing might benefit from renewed review of teaching load at the departmental level. However, were such a review to recommend reduction in these loads, it would take time to implement and, depending on how these were implemented, might imply an increase in teaching and administrative loads for other members of the department. The decisions should be taken and implemented in a times-cale, and with any redistribution of load, which are acceptable to all groups involved.

<sup>46</sup> Italics in this section indicate phrases taken from the terms of reference of RQ20

<sup>47</sup> Although further details are in principle required, the reported need for sick leave from one member of the EES owing to fatigue gives rise to concern and adds urgency to the need for some sort of attention.

#### In part, additional reasons for the situation are:

In the EES group it is argued that there is a need to recruit another senior tenured staff member to permit the formation of a 'critical mass'. It is claimed that there is development potential for funding research as well as this recruit, although the directions and strengths of these perceived current prospects must be weighed against their likely longevity over the lifetime of employment of a senior, tenured researcher. An issue to be answered by the group is how quickly "...research on renewable energy sources has commenced..." can move past the "...presently still at a limited level...", given that the EES group themselves identified plausible medium term 'threats'. However, the networks available to the group seem strong, although these networks may be limited to the DH sector which may well not represent the totality of the group's development potential in the medium- to long-term. In the context of the latter sentence, the group comes across more as a service provider and a consultant on DH activities than a research group: if this is an unfair characterisation, that is all the more reason to ensure that this perception is countered in future. There also needs to be clarity as to the extent to which the financial difficulty at the departmental level will continue to prevent a recruitment process - provided that the case for viable long-term funding can be made credible - from taking place. This has been the case for virtually the whole of the period under review and suggests that deep-seated concerns exist in the department. If these concerns continue to be the case, the procedure might be better served by treating this an issue that should be addressed and resolved at other levels of the University, such as at the faculty level and/or by the central university management. There may be departmental-wide implications for strategy, resource allocation and probably procedures.

TPE group argues that it has faced – and on current form will continue to face - reduced funding prospects for research areas - an 'external' resource allocation issue - which were well-funded as recently as RQ08. In addition, there are "...difficulties finding its role in a changing environment...": little can be done about the 'changing environment' but the 'difficulties' may be exacerbated by a procedural issue regarding 'leadership' (see later). The information given by the TPE group is somewhat sparse so that it is hard to assess the extent and value of the network which is available to the group, although some sort of network does exist. This may reflect procedures within the TPE of 'unclear leadership' associated with one of the TPE being also Departmental head. The current strategy, such as it is, foresees development potential for funding based on the use of renewables: this rather begs the question of why the "redirection towards renewable energy" "started ...slowly...". The question to be addressed is whether the speed has been dictated by the group, as either a deliberate decision or one taken by default, or by availability of funding? A less certain proposal for development potential was raised during discussion with the panel, which would entail research at a different level, concerns opportunities at the "systems level" to understand how different energy sources and technologies might interact in a zero-emission society. The question might then arise as to how good a fit this would be, given activities in the EESS group and indeed it is unclear as to whether the necessary abilities exist within the group, at least at present. The success, or otherwise, of the strategy depends not only on decisions taken at the university sector (see below), but also beyond in society and in industry.

The reason for a high teaching loads of the TPE and EES division is not clear. Was the teaching load assigned by LTH regardless of the number of teachers? Is the lack of strategic mission and vision a reason for the Department not solving the shortage of staff of the EES division?

#### CE group:

The CE group, the largest of the three in this UoA, has world-class ability and ambition and has been making good use of its resource allocation which has been adapted to the use of hydrocarbon fuels. There is, at least in the reviewing period, a good balance between Education and Research. However, the group faces the prospect

of reduced funding in the medium term<sup>48</sup> and possibly longer<sup>49</sup>. Through adequate procedures, the group has already started to collaborate in the context of electromobility<sup>50</sup>. This will represent a radical departure from previous research expertise but make use of some current resource. There is also development potential on renewable fuels: the group has looked at biofuels and will, presumably, monitor the situation as it develops. As

with the TPE, it remains to be seen to what extent this strategy will be effective in the long term. There seems to be no pressing issue in the context of resource allocation and the group's network is superlative.

#### Requiring long term attention (5-10 years)

Homilies about the need for all three groups to diversify funding are easily made in the context of evaluations of needs to maintain or improve research quality in future: these are, no doubt, equally difficult to put into practice in the current climate. The groups and the department must maintain a 'watching brief' with respect to research opportunities and associated funding.

There may be some merit in consideration being given to merging the CE and TPE divisions within the "Heat Transfer and Fluid Mechanics" UoA from an organisational point of view. Similarly, the EES group might fit well within the EESS group. The LU administration has expressed a desire for a more streamlined approach to administrative levels and there may be advantages to smaller groups being subsumed into larger one. By themselves, however, such mergers do create any new conditions for improving research quality in future.

The Operation and Maintenance of the CE experimental test rigs is a crucial point. These are expensive and manpower intensive tasks, requiring a large annual budget. Consideration may be required as to how such expenses are met should funding reduce for extended periods.

Is there any merit in expending the effort to structure and define experimental databases in agreement with computational experts to simplify the comparison and validation of numerical codes?

Even if combustion research is assigned a low priority as a mature subject, a decarbonized energy system does not necessarily imply no combustion: work will still be required into, for example, hydrogen gas turbines. Also, ICE will not disappear in the foreseeable future and new lines of research and technical inroads will be a must. Continued thought and discussion into the future of this UoA is required, possibly including continuous dialogue with funding bodies and the government from a Faculty, or university, level.

The EES pursues an engineering systems approach. Is there merit in integrating this group within a unit dealing with Urban Services, dealing with water supply and sanitation, transport and energy (*e.g.*, DH), all of these treated from an Engineering Systems perspective?

There should be continuous review of the policy and culture in the groups to publish research results in scientific journals, and preferably journals with a high Impact Factor. This is already required for promotion but there may be reasons related to evaluation of UoAs in future. The reasons for publishing in the SAE and ASME are clear but the threat of rapid changes evaluation procedures to such practice, emanating from the university or national level, should be anticipated. Similarly, the number of published journal articles in a PhD thesis needs continuous review.

Will goals for external funding be formulated in the future? The economic principles by which the department is run should become more transparent, but these should not be at the level of detail for managing individual researchers.

<sup>48</sup> It is not clear to what extent this shift in funding extends also to heavy duty, on- or off-road, vehicles.

<sup>49</sup> Both policy makers and students share the negative public image of the piston engine emissions which has justifiably arisen, but it is less well-known that technical solutions for meeting real driving emissions (RDE) regulations are already in place.

<sup>50</sup> Current policy concentrates on 'tailpipe emissions'. Battery-electric vehicles (BEVs), at least policy-wise, are in the ascendant and electrification may well result in new research areas to be explored by the CE group, often within areas that are on the public agenda. Hybridization improves the energy efficiency of engines and facilitates attainment of stricter emission regulations by electrically supporting the exhaust aftertreatment system.

#### Issues that should be addressed at other levels of the University

Historically, what is today Energy Sciences and IEA was established as one of the initial departments when LTH was formed in the 1960s. The new procedure to be applauded is that, since last year, the faculty now fully funds a coordinating group which reports to a steering committee which promotes "cross-border" collaboration on energy research within the faculty. We suggest that this coordinating group should consider amplifying its function as follows:

The strategic research areas of the university tend, currently and as the panel understands it, to be formed around areas such as the life sciences, environmental sciences, and digitalization. Where do several Agenda 2030 goals (mainly those of sustainable energy, sustainable cities, life cycle analysis and reduced climate change) receive similar strategic attention? Our understanding is that Professor Lars Nilsson is currently relevant to this<sup>51</sup> but he essentially leads a "one department show" and is focussed on the industry sector. The role needs substantial expansion – perhaps an expanded role for the steering committee - because, if there is no such Strategy with some consideration given for Resource Allocation, it is unrealistic to expect the groups of this UoA to be able to "fight their corner". They are unlikely to be able to build, by themselves, on their abilities and ambitions given the massive external changes which are being contemplated in funding and energy use.

It is within this context that the future strategy for the TPE and EES groups must be considered. Specifically, consideration should be given to resource allocation from the faculty funding a limited number of highest quality doctoral students over an adequate, but limited, period of time to maintain and expand research expertise and to permit the groups to adjust to the diversification of 'Energy Futures'. Students from the top universities in the PRC and from the Indian IIT system may be an important "catchment area". If this route is followed, other action must be taken not only on issues covered in this section but also in terms of establishing at Faculty - and perhaps university - level contact with partner universities abroad. The decision to finance such students is not, on its own, adequate.

Such procedures at a Faculty level, only, are probably palliative measures. There has to be a visible strategy at the university level, with appropriate resource allocation as has been pursued at, for example, Chalmers University in Sweden and elsewhere. The strategy is to argue the 'Energy Future' matters (with which this UoA deals) at many network levels – those of government and funding agencies as well as in other forums more generally in society.

There would thus be a central Faculty/University champion (not just of this UoA) to provide balance in the debate surrounding the views of tenured staff and UoAs at national and international policy level: and at student levels. The university could maintain and extend external engagement, lobbying the relevant Swedish funding agencies to consider subjects more broadly and not in isolation<sup>52</sup>.

The envisaged central resource would have other functions to perform. It can lay the groundwork for a long-term recruitment drive for both non-Swedish Europeans and non-European students. With suitable heft and university branding, it can attract students of high quality, ambition and energy – as well as better pursue gender diversity – than can individual groups. It can also stimulate, across all groups but particularly for the EES and TPE groups, "....The "third task" of the university – to inform the public of research results...".

Chalmers has a strategy at the organisational level, forming "areas of strength" as umbrellas under which researchers can operate. It seems<sup>53</sup> that each area has a management team which forms a network

53 See, for example, under "contact", the supporting functions available:

<sup>51</sup> He is also co-author of one of the IPCC panel's chapters

<sup>52</sup> A common example is to consider emissions ("current") separately from global warming ("future")

https://www.chalmers.se/en/areas-of-advance/energy/Pages/default.aspx

https://www.chalmers.se/en/areas-of-advance/Transport/Pages/default.aspx

of industry partners and public organizations to work strategically around a given topics. As a result, Chalmers seems effective at attracting funding in a way that a small group, let alone a single researcher, could never do. There are many competence centres based at Chalmers, such as f3, the electromobility centre SEC, the fossil-free-freight centre triple-F, and is involved in multi-party-initiatives like ElectriC-ity. These "areas of advance" also have professional-looking newsletters coming out regularly, explaining what is happening at Chalmers in a style directed at non-specialists. Therefore, an additional task of such a management team might well be to promote (taking the CE group as a specific example):

- electrification so that it leads to long-term, new research areas to be explored by the CE group;
- coordination of a policy group to investigate the life cycle analysis of BEVs, particularly in the light of their role as "zero emission vehicles", and the life cycle analysis of the energy- and materials-intense manufacturing of batteries;
- an examination of what a carbon-neutral society means for piston engines.

As a general point, and not one related just to this UoA, it is reported that "…recruitment process [is] very lengthy, however, and this seems to be a recurring pattern. There are several examples … [with a] a risk that interesting candidates are lost during such lengthy processes…". This is, perhaps, an issue to be examined.

Relevant material the panel was missing

This is adequately covered under this heading for the other main headings.

Other relevant matters that were omitted

It might have helped LU - and the groups - had the title of this exercise been FRQ20 – 'Future Research Quality'. An impression is that this UoA, at least, viewed the exercise as, at best, a bureaucratic exercise given LU's apparent lack of interest in RQ14 and, perhaps, RQ08 also; and, at worst, an evaluation of the past effectiveness of the UoAs.

# Heat transfer and fluid mechanics

This unit of assessment (UoA) consists of two divisions: Heat Transfer (VÖ) and Fluid Mechanics (ST), which are a part of the Department of Energy Sciences, one of the 19 Departments of the Faculty of Engineering (LTH) at Lund University (LU). Three other divisions of the Department of Energy Sciences, namely Combustion Engines, Thermal Power Engineering, and Efficient Energy Systems, were grouped together as a UoA called Energy Science and Engineering only for the purpose of the RQ2020 evaluation.

# Observations

The presentation of the UoA at the Panel meeting provided a good complementary source of information to the self-assessment report. Although this UoA was instrumentally divided into two divisions by the RQ2020, the UoA in question covers three distinctive research themes: i) Heat and mass Transfer; ii) Combustion modelling and numerical simulation; iii) Fluid Mechanics, other than combustion. The three groups, though constitutive parts of the Department of Energy Sciences, do not exhibit meaningful interactions.

# Leadership

# Priority setting, including goals for external research funding

All three groups are highly skillful in the use of versatile tools both in the modelling and numerical simulation fronts and in the experimental diagnostics of aero-thermo-dynamical problems. The research portfolio of the Heat and Mass Transfer group is highly diversified, including conventional and novel heat exchanger geometries, film cooling, pool boiling, cavitation, fuel cells, etc., combining numerical methods and laboratory scale experiments. The Combustion group specializes on the direct numerical simulation of simple and moderately complicated systems, modelling and computations, via either large eddy simulations (LES) or Reynolds Average Navier-Stokes (RANS) equations; there are no experimental activities within this group. Hydrogen combustion seems one subject under investigation probably relevant during the energy transition and in the future zero carbon economy.

Finally, the Fluid Mechanics group combines numerical and experimental methods to investigate a variety of practical problems, such as: ice accretion on wind turbine blades, flow/structure interactions, rheological flows, food processing, bio-medical problems, etc. This broad spectrum of activities provides multiple future options to focus the group research on, which should, given its current size, reasonably concentrate into a few high value-added subjects.

External funding of the three groups average a high share of about 70% annually. Basic research is mainly sponsored by the Swedish Research Council, the Swedish Energy Agency, the KAW Foundations and the European Commission, under FP7 and H2020 Programs, whereas applied work is funded by Vinnova and through R&D contracts with companies such as Tetra Pak, Volvo, Scania, SAAB, MAN, etc. This diversity of funding sources is an indicator of the vitality of these groups, as well as of their capacity to overcome challenges and to benefit from opportunities along the energy transition. Near and mid-term funding prospects make setting goals a futile exercise. The groups aim at maintaining a basic/ applied balanced research portfolio as a secure practice. The co-funding of applications is pinpointed as a management issue, which needs clear rules.

#### Recruitment, promotion and succession

The number of senior investigators (i.e., Professors, Associate Professors, Post-Doctoral Fellows and Researchers) in the three groups has declined from 17 in 2014 to 11 in 2018, while the number of PhD students, employed by LU, decreased from 18 to 8 during the same period. A significant number of visiting scholars and visiting and exchange PhD students attests to the international reputation of these groups. Currently, the technical staff is composed of 4 Professors, 3 Associate Professors, 1 retired Professor (part time), 3 Post-Doctoral Fellows and 3 Researchers, with 12 PhD students.

Establishing staff mobility patterns based on the limited number of new open positions in these groups is likely a risky and irrelevant exercise. The recent recruitment of a Professor to head the Heat and Mass Transfer division, replacing the retired senior scholar, should foster an effective collaboration with the combustion group. Ongoing promotions to Senior Lecturer position confirm the interest of LU/LTH to maintain leadership in basic combustion research.

### Publication patterns

The academic performance indicators, in terms of the number of publications and citations in archival journals with high impact index, are excellent. The Heat and Mass Transfer group is the most prolific with one retired, though still active, staff member who has an h-index of 45 and an impressive number of journal papers. The h-index of the leader of the Combustion group is 28 with a very high publication record. The number of journals papers on Fluid Mechanics topics, other than Combustion, is also high. Most investigators in this UoA have h-indices in the range of 10 to 20. The number of PhD dissertations during the period 2014-2018 is 21: 10 on Heat and Mass Transfer, 8 on Combustion and 3 on Fluid Mechanics.

### Balance between activities in research, education and external engagement

Generic statements on the connection between research and education are made in the self-assessment report: "Most professors and lecturers have a rather low level of teaching and there is a capacity reserve". This

Ħ

UoA teaches basic engineering disciplines in undergraduate and specialization programs; advanced courses on turbulence, combustion and numerical methods are offered as a part of the PhD program.

The actual swift shift toward renewable energy generation and its impact on both education and research perspectives is described; the groups rely on their wide spectrum methods and skills to adapt to the energy transition requirements. A new "International Master Program on Renewable Energies" is mentioned as a possible solution to increase the UoA teaching load, although, surprisingly enough, nobody provides details on the goals and content of this program. Remarks on a course on "Combustion Modelling", attended only by a few undergraduate students, are unclear and propose no specific action to correct the present situation; the low attendance in this course might require a group proactive attitude to foster better enrollment in this course. Very little external engagement to disseminate information on the groups' achievements is declared. "*External engagement and outreach have been sadly neglected within the unit for some years*", according to the self-assessment report.

## Overarching research strategy

A flexible opportunity-driven research strategy describes the current situation of the three groups. The groups have not engaged in developing a vision, examining possible future scenarios and defining strategies to transit the pathway to a decarbonized economy. Vague descriptions of the impact of the renewable transition on the UoA future education and research activities are merely mentioned.

## Collegial culture

## Opportunities for early-career researchers to develop their originality and independence

Career planning and development has apparently no written rules, apart from the generic targets of fostering high quality education and research, and depends on the division and department heads. This issue is also linked to the lack of a common strategy on energy research and education at the LU, LTH or Department levels, leaving the maintenance and upgrading of the research strengths to the responsibility of the group leaders. These three dynamic groups promote research creativity and autonomy in early career development.

## Sustainability and renewal of research strengths

The Heat Transfer and Fluid Mechanics (other than Combustion) groups have a more diversified research portfolio than the Combustion group. In principle, the former exhibit better prospects than the latter to adjust and impact the transition toward a low carbon energy system. However, the wide applicability and robustness of the experimental and numerical core competences of the three groups are unique strong-holds of this UoA.

The emerging appraisal from the SWOT analysis is, in general, realistic and well founded. Although the energy transition, occurring over the next few decades, poses serious challenges to these three groups, it also offers a great opportunity to adapt to a changing research environment. These issues must be examined by this UoA despite the fact of their vantage point due to their deep knowledge of basic engineering disciplines.

Minor weaknesses on geographical networking actions and on a lack of some experimental facilities are declared. Outlined threats are not well argued.

## Academic networks and collaborations outside the unit

Collaboration within LU (*e.g.*, with the Center for Combustion Science and Technology, the Competence Center for Combustion Processes, NanoLund, eSSENCE, etc.) and with other Swedish universities and research organizations is a sign of a high scientific and technical reputation. Extensive working connections with East Asian universities benefit the three groups through the recruitment of PhD students and the exchange of ideas and scholars. Apparently, more limited contacts exist with EU research organizations (*e.g.*, VKI, DLR, ONERA, etc.) and USA universities.

### Diversity, integrity and ethics

No apparent problems on these issues. Diversity issues are only superficially mentioned, ascribing all actions and decisions to a departmental level.

#### Quality in applications and publications

The three research groups are very concerned with maintaining a good publication quality. Applications, interpreted in the sense of submitted proposals to funding agencies and contracts with companies, abide by high quality standards of this UoA.

### Quality ecosystem

## Research strengths and how these are reflected in the educational portfolio

Comprehension of fundamental physicochemical concepts, mastery of powerful numerical and computational tools and dexterity in advanced diagnostic techniques in Heat Transfer and Fluid Mechanics are the valuable research assets of this UoA. This wealth of knowledge naturally permeates through the teaching tissue, specially to impact the PhD courses. The description of the content of some advanced courses attest to this fact.

Research projects and contracts are an excellent mining source to extract examples, which brings education closer to real life and makes it more attractive.

Moreover, pedagogical training, through formal courses, are considered a relevant merit for career promotion within LTH.

# How external research collaboration influence the quality of research (e.g., with industry, governments and states, county councils, municipalities and non-governmental organizations)

Research experiences and expertise, gained through participation in research projects and industrial contracts, is accumulative and tends to improve the output quality. Staff exchange between the three groups and either industry or other institutions is positively valued.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

No apparent conflicts. Only one brief and uncommitted paragraph appears in the UoA self-assessment report. It seems thus pertinent to express no comments on this issue.

### How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere

The UoA expresses satisfaction with the LU general Research Services. The Faculty leadership is praised for creating and funding a group to coordinate all energy related activities, and for supporting the OH of EU projects and the open access publication costs.

While collaboration among divisions within this UoA seems rather limited, the interaction of the three groups with another research groups within and outside LTH appears to be significant. For example, some investigators of this UoA have participated at the EU level on HPC tasks, using computational facilities in two member states.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized

Members from this UoA have participated in a project the Pufendorf Institute, which apparently has led to many new contacts and ideas. This UoA has also been aligned with eSSENCE (a SFO within e-science), a collaborative action between universities at Lund, Uppsala and Umeå.

#### Recommendations

The Heat Transfer division seems to have a thematically diversified offer and be aware of new trends that the energy transition is imposing on research and education. Adaptation to foreseeable changes in energy technologies seems possible.

On the other hand, the Combustion group has strong core competences and dedication solely to reactive flows and shows apparently no doubts about near and mid-term demand for its expertise. However, current combustion topics likely to survive along the energy transition pathway (e.g., hydrogen combustion in GT, use of biomass, burning under oxy-fuel conditions, ...) should be critically examined in the light of Swedish and EU policies on combustion-based technologies. Mid and long-term strategies should ideally adapt to these policy trends. The viability of opening a research line on the science and engineering of forest and urban fires (incl. ignition, propagation combining satellite data and modelling, extinction, ...) should be analyzed. Forest fires pose important threats as a result of global warming. Scientifically based understanding of fires would complement the Boras center activities on fire safety, risk assessment, ...

The current activities of the Fluid Mechanics division are dispersed amongst various fields; a process of definition seems appropriate in the near to mid-term to establish one or two major research areas, either on renewable energies or on non-energy related subjects (*e.g.*, bio-engineering), analyzing pros and cons of the various options. Building up research capacity in a few topics of high socio-economic impact is important to the efficient operation of this group in the near- and mid-term.

The departmental policy to publish in high impact factor journals should be pursued and reinforced. Simultaneously, alternative metrics to assess the performance and socio-economic impact of important contributions in the form of technical reports or practical prototypes deserves a detailed analysis.

The interaction among PhD students and Postdoctoral Fellows should be promoted through technical seminars and continuing debates on social, economic or engineering issues of current relevance.

The low teaching load must be corrected in both undergraduate and specialization educations. Rigorous and attractive teaching of basic core disciplines should continue, whereas more specialized courses should be dynamically renewed and adapted to evolving environments. Formal exposure to pedagogical training of young teachers would add value to first-rate technical knowledge transfer. The recruitment of potential PhD candidates among LTH undergraduate students is an incentive for excellence in the first cycle education.

The new International Master Program on Renewable Energies (IMPRE) is mentioned as a possible solution to increase the teaching assignment to this UoA. However, the precise focus of this program was apparently unknown to the staff members at the time of writing the self-evaluation report; should the emphasis of IMPRE be on energy economics, markets and policy, the expectations of this UoA might be greatly deceived. This UoA should be actively involved in the definition of IMPRE.

Energy contests among groups of Bachelor and MSc students to design, build and demonstrate innovative energy gadgets would enhance the creativity of young future engineers. Informal social gatherings would also contribute to build up an established community with common interests.

The needs for additional high-performance computing and building up the experimental capacity up are only vaguely expressed. Specific requests must include a precise definition and justification, a quantification of the required investment, identification of possible funding sources and cost/benefit analyses.

The engagement in external activities is to be decided by every unit. While some UoAs emphasize their contribution to influence energy and environmental policies, some investigators prefer to dedicate all their efforts to scientific research. The three groups in this UoA should be persuaded to dedicate a small fraction of their activities to let the society know of the importance of their findings and teachings.

## Environmental and energy system studies

Related to the self-assessment of the division on EESS, the review panel invited the division by letter to provide additional information and also to answer a number of written questions. Based on all inputs received, a video-meeting between the panel and EESS took place on May 5, 2020 in which the division presented itself and answered further questions of the panel. This was followed by some additional interactions between the panel and the division to clarify some specific items. In this report the findings, views, comments and suggestions of the panel are presented concerning the research activities of the division.

## Observations

The EESS division is well established and doing relevant and interesting work from a scientific and also socio-economic and policy perspective. The division is innovative. They are able to attract external funds from a range of sources including the European Commission. Within the field of Energy and Climate Change the division is visible, nationally as well as internationally. The quality of the research articles is quite good and deserves to be published in scientific journals having a higher impact factor. Based on the research input (in fte) of the division, also the number of articles published in scientific journals published could and should be improved. This will also enhance the H-factor of tenured staff members being active in research; this factor ranges at present from about 8 to 34, which is relatively low.

Looking to the future, the research subjects covered by the division are relevant and interesting. Additional research suggestions are made in this report.

The back-ground of most staff members is rooted in engineering. Given the research area of the division this expertise may deserve some broadening towards especially computer modelling and simulation and also economics.

The balance between staff members versus PhD students should be improved. The number of PhD students could be enhanced in principle by a factor 2 or 3. This would also strongly enhance the number of PhD theses published each year, which figure is at present too low (1.2 per annum).

Within Lund University the collaboration between all energy research groups should be enhanced. In such a network the EESS division could play an integrating role.

## Leadership

### Research strategy

The research of the division is focussed on innovations to achieve a transition towards a decarbonized economy as agreed upon in Paris in December 2015. The division doesn't have a formalised research strategy. The overarching approach for selecting research subjects is 'challenge driven and problem oriented'. New research subjects are explored 'when relevant in the intersection between energy, environment and society'. In practice this exploration co-evolves with policy developments in Sweden (*e.g.*: policy on biofuels), the EU (*e.g.*: EU strategy on plastics) and globally (*e.g.*: Paris Agreement on Climate Change; UN Sustainable Development Goals). One of the aims of the division is 'to have a high impact'. Policy relevance and societal impact are also important research aims. They are participating in several new, interesting areas like the Hybrit-project where coal should be replaced with hydrogen from electrolyzers for reduction of metal oxides. This is of global interest.

The division tries to combine breadth, covering the total energy field, with expertise in depth, focusing on specific subjects. In their research a mix of theories, methods and approaches is used. Every third year (2012, 2015, 2018) the division organizes a research strategy workshop to discuss topics such as the current research focus and strengths, the development of research in the near future, funding opportunities and strategies, collaboration within the division and with other partners, the development of PhD
education and supervision, and also links between research and teaching. The division often works in consortia to attract funds from external sources and to renew its research portfolio. At present they see as a priority the exploration of opportunities for joint research within the Department of Technology and Society of Lund University.

<u>Comments</u>: It is advised to formulate a clear vision, mission and research strategy, in order to make clear what the division is standing for, what the goals the division wants to achieve, and how this should be accomplished.

The panel supports this so-called T-shaped research approach concerning its breadth and research in depth. It advises to broaden the expertise of the division to especially computer modelling and simulation as well as economics.

It is advised to enhance the frequency of organizing a strategy workshop, given the required dynamics of the energy transition.

The panel would welcome an enhanced collaboration between energy research groups within Lund University.

### Priority setting incl. goals external funding

<u>Priority setting</u>: The division is largely oriented towards (industrial) decarbonisation, especially "hard to decarbonize sectors" such as basic heavy industries - producing steel, plastics (the petrochemical sector), paper and cement - and the transportation sector. Special attention is given to the potential of electrification to mitigate CO2 emissions. Research activities are focussed at present on subjects like: the development of biorefineries, biomass & land use, the social and geopolitical dimensions of a decarbonisation transition, sustainable transport planning, the role of data centres in the energy system, and the development of energy & climate change scenarios. The division is planning new research on *e.g.*: biobased economy meeting the electricity-based economy, sustainable power systems, resource security, transforming the petrochemical industry, and governance towards a green state. The sustainable use and recycling of plastics and use of electricity for production of hydrogen in the Hybrit project to replace coal in steel industry are other interesting and important areas.

<u>Funding</u>: There is no goal for external funding. At present external funding covers about 75% of the total research funds of which about 60-65% comes from Swedish sources (STEM, MISTRA, FORMAS, Kraftringen etc.) and about 10-15% from the European Commission. The division aims to attract funds from a variety of sources. To avoid short term funding problems, some money has been accumulated.

<u>Comments</u>: The panel endorses the relevance of these research subjects both from a scientific as well as socio-political point of view. Given the required decarbonisation of the economy as well as the research fields presently explored by the division, the division may also explore research opportunities on one or more of the following subjects: Modelling and simulation of (integrated) energy systems; Bioenergy & CCS; Bioenergy & Carbon debt; Nuclear energy & Sustainability; Negative CO2 Emission Technologies; Using atmospheric CO2 as a major feed stock for the hydrocarbon industry; Energy Storage and Transportation.

The success of the division related to external funding is noticed with appreciation. Nevertheless, the panel wants remark that the availability of research funds from internal sources is important too. In general, a percentage of at least 25% is estimated to be needed to guaranty enough independence, flexibility and potential to develop new approaches.

The panel would like to see more staff members involved in generating external funds.

## Recruitment

The division aims for a good balance between researchers at different stages in their career, from PhD student to postdoc, BUL, senior lecturer, assistant professor and full professor. The research staff was

expanded relative to RQ2008 and is at present in a process of further expansion. In 2018 the division counted 21-22 staff members (3 of them focused on education only) and 7 PhD students. The recruitment is done both internally and externally. Most staff members have a background in engineering.

<u>Comments</u>: Relative to the number of professors (3-4) and the total number of staff members (21-22) active in the division, the number of PhD students (7) is quite low. As a consequence, the number of PhD theses generated each year is low too (1.2 per annum in the period 2014-2018). The panel advises to enhance the number of PhD students by a factor 2-3.

The disciplines for which the recruitment of staff members is done could be broadened to *e.g.* computer modelling and simulation and also economics.

### Publication patterns

In the period 2014-2018 the division published its research in 6 PhD theses, 67 scientific journal articles, 33 reports or books, 18 peer reviewed book chapters or conference papers, 10 not peer reviewed book chapters of conference papers, and 15 other publications. The division didn't develop guidelines on where to publish and never worked strategically for the purpose of getting high citations. Due to the diversity and interdisciplinary nature of the research, the division uses a wide variety of scientific journals to publish its results. The impact factor of these journals ranges from 0.5 to 12.

<u>Comments</u>: The percentage of scientific articles published in scientific journals is at present 46%. This figure could be enhanced. The division might look to strategies to combine the requirement to draft reports with publishing results in scientific journals.

The panel also noted that the number of scientific publications is low relative to the research input (23 fte in the period 2014-2018) and relative to the total number of staff members and PhD students at the division (28-29 persons in total in 2018). This figure could be improved.

According to the division its publications are achieving a high number of citations relative to the impact factor of the journals in which they were published. Assuming this is true, it suggests that the standards for selecting journals could be raised. The division may publish (or publish more) in a number of appropriate journals having an impact factor ranging from 8 to about 40.

Both approaches would enhance the impact of the division. Also, it could strongly enhance the H-factor of the staff members. This factor ranges at present from 8 to 37 (based on the short CV's provided to the panel) which, from an international perspective, is a rather low figure.

To achieve this, the panel advises to monitor the annual performance of each staff member and to formulate guidelines for publishing research results.

## Balance between research, education and external engagement

<u>Education</u>: The division is in a transition phase since the full-time teachers will go into retirement. Within the division, all staff should be engaged in both research and teaching, to various degrees. The researchers are budgeted 5-20% percent of their time on teaching, but sometimes spend more time on this task. In the period 2014-2018 guidance was given to 64 Master theses in total. Two of these resulted in an article that was published in a scientific journal.

External engagement: The division wants to share its knowledge and results also with a broader audience, by writing articles for professional magazines and daily newspapers, by interacting with policy makers and stakeholders, by interviews on Radio & TV, and by public talks. In the past 10 years the participation in policy processes and in public outreach was enhanced. The division sees a high scientific quality as an important requisite for its relevance and impact.

<u>Comments</u>: The balance between research, education, administration, management and external engagement is good, and favourable for research (about 60% on average). Relative to the number of staff members and PhD students (28-29 in total) the number of Master thesis projects supervised at the division is low (11 Master theses published in 2018).

## **Collegial Culture**

## Opportunities for early-career researchers to develop their originality

The organizational structure of the division is flat. PhD students in the latter part of their studies, and particularly post docs, are encouraged to be independent and find their own areas of expertise and collaborations. PhD students generally have a high degree of freedom to choose the courses they wish to attend as part of their education.

## Sustainability and renewal of research strengths

<u>Comments</u>: The panel expects that the main focus of the division - i.e. innovative technologies and approaches towards a low-carbon economy - will remain relevant for a number of decades. The sustainability of the research strengths available at present and the potential to attract external research funds doesn't seem to be or to become problematic. The division is also innovative and regularly moving into new research areas. Some broadening of its expertise (see before) could enhance its research strengths.

## Academic networks and collaboration outside the unit

The division is having a rich diversity of collaborations with research groups and institutes inside as well as outside Sweden. It is now exploring opportunities for more collaboration between divisions within Lund University.

<u>Comments</u>: The panel would welcome enhanced collaboration between energy research groups within Lund University. It deserves attention that the external funding in Sweden is driving groups like EESS towards collaboration with other Swedish universities instead of collaboration with groups within Lund University. Given the rich diversity of collaborations, the panel would have expected more joint scientific publications.

## Diversity and integrity issues

The gender balance among research staff is essentially half men and half women in total. Most of the staff members are native Swedes. However, the number of international scholars has increased in recent years. The department had once some disagreement on its reporting with an industry.

<u>Comments</u>: Although there is a balance among research staff with respect to gender and age, the low percentage or lack of female professors and senior staff members deserves attention. Also, recruitment of staff members having experience with doing research outside Lund University – preferably abroad - deserves attention. The panel has the impression that the division is handling integrity issues related to its publications in an appropriate manner.

## Quality in applications and publications

The division is seeing a high scientific quality as an important requisite for its relevance and impact. It assesses its research output and research quality as high, partly evidenced by a strong track record in receiving funding, including large national and EU research projects. Another indicator is the citation rate of its journal articles relative to the impact factor of these journals; according to EESS this citation rate is relatively high. The division compares itself to similar research groups at Chalmers, KTH, and Linköping University. It recruits its PhD students and staff members both internally and externally.

<u>Comments</u>: How to evaluate research quality deserves attention by the division. Indicators not presented yet are *e.g.*: the number of articles published in high impact journals and their citations, the H-factor of individual tenured staff members, the number of invited lectures at (international) conferences and symposia, and the membership of important boards and committees. On these indicators the panel is seeing room for improvement.

It would be interesting if the division could apply methodologies to compare its performance with the performance of co-institutes, inside and outside Sweden.

## Quality ecosystem

### Research strengths and its reflection in education portfolio

The long-term plan of the division is that staff will mix research and teaching to a larger extent and that all researchers, to various degrees, will be involved in teaching. The thesis topics of Master students align with the research areas of the division.

<u>Comments</u>: The education of the division is in general well aligned with its research fields. More Master thesis topics could be developed related to the ongoing research projects of the division. Also enhancing the number of Master theses which result in scientific articles deserves attention.

### Influence external collaboration on research quality

According to the division the collaborations with non-academic partners have been beneficial for the quality of its research. It gives the researchers access to practical knowledge and real cases to study. Collaboration has in some cases resulted in the exchange of staff with other universities and research institutes.

<u>Comments</u>: The panel has the impression that the collaboration with highly qualified external research groups and non-academic partners indeed has been beneficial for the research quality of the division. Also it is an indicator for this quality.

### Handling potential conflicts of interests related to external collaboration

High pressures for co-funding and industry participation may limit the academic freedom and critical research of the division. There are a few instances where the division was feeling that special interests wanted to influence the research outcomes. In those cases, they have brought the issue to the programme broad, management group or the like. In autumn 2017 the division had a seminar to discuss guidelines and responsibilities related to externally funded research and conflicts that may arise.

<u>Comments</u>: The panel has the impression that the division is able to handle (potential) conflicts related to externally funded research in an appropriate manner.

### How the unit uses infrastructures inside and outside Lund University

The division is not dependent on physical infrastructures for its research, but relies on various soft infrastructures within Lund University. It benefits from the support delivered by *Forskningsservice* on administrative issues with research applications. The division also received good support related to individual study plans (ISPs) which are mandatory for PhD students. Collaboration within LU has increased in recent years and includes cooperation with *e.g.* political science, chemical engineering, biotechnology and human geography.

Outside Lund University, the division a.o. coordinates the H2020 project REINVENT, is having a WP-leadership in MISTRA-STEPS (on sustainable plastics) and HYBRIT (on hydrogen steelmaking). Lars Nilsson is CLA for Chapter on Industry in IPCC AR6 while Pål Börjesson is on the Board of Södra. The division also contributed to *e.g.* the Environmental Objectives Committee, the Climate Policy Council, the European Environmental Agency and Government Inquiries.

<u>Comments</u>: The division uses available infrastructures inside and outside Lund University quite well and sometimes also creates these structures in a beneficial way. The division could play an integrating role when initiating infrastructures and activities to create or strengthen collaboration between divisions within Lund University on energy research and education.

## Alignment with any of the University's SFOs and broad research areas

Sustainability and climate change are important research areas at Lund University. On these subjects the division collaborates with researchers from departments within the technical faculty and other faculties as well as IIIEE. Concerning SFOs, the division collaborates with the strategic research area BECC.

<u>Comments</u>: As already indicated, it could be beneficial for Lund University and the divisions and institutes involved, if collaboration on energy research and education would be (strongly) enhanced. Apart from BECC, the division may also play a role within the SFOs called Climate System-MERGE and Sustainable Production-SPI.

### Recommendations

**Requiring immediate attention** See comments made above.

Requiring long term attention (5-10 years) See comments made above.

### Issues that should be addressed at other levels of the University

Introduction at Lund University of a database like ACUIS (?) - as mentioned by Peter Lund at the panel meeting with EESS.

Within Lund University the collaboration between all energy research groups could and should be enhanced. It is advised to develop an (infra)structure to initiate, stimulate and strengthen joint energy research and education activities towards a sustainable development of economies and systems.

### Relevant material the panel was missing

It would have been easy and also helpful if the self-assessment reports had contained more quantitative information on the composition, productivity and quality of the group, including *e.g.* the CV of each tenured staff member, the H-factor of each member, and the external activities of each staff member. And in addition: the amount of fte the division spent on research, education, management, and social engagement respectively.

### Other relevant matters

The evaluation teams noted that the EESS systems know-how could also be useful for identifying new promising research fields together with the narrower disciplines in energy.

# Industrial electrical engineering and automation

The RQ20 review of the division Industrial Electrical Engineering and Automation is based on the division's self-assessment, information obtained in the video meeting on May 6<sup>th</sup>, two written addendums with replies to the panel's questions communicated both before and after the May meeting, and minor clarifications received via telephone. All the information has been sufficiently comprehensive and well structured. The SWOT analysis, included in the self-assessment, gives a short but relevant picture of the division's current situation and challenges.

The division is well established and has extensive collaboration with academic partners as well as industry and other stake holders. The research is application oriented and represents in some areas state of the art. The faculty staff is experienced and the senior members have high visibility both in academy and society. Areas for improvement are strategic planning and publication rate. Recruitment and funding also require special attention.

## Observations

### Leadership

#### Priority setting, including goals for external research funding

Industrial Electrical Engineering and Automation (IEA) is a division within the Department of Biomedical Engineering consisting of three research groups: Electric drive systems, Electric power systems and Water systems. The first two groups are intimately connected through scientific base, education and technology and other universities such as Chalmers and KTH also keep their corresponding units together as electric power engineering. The water systems and electric power systems groups have their common ground in systems automation and infrastructure networks, a concept that has proven to be satisfactory. As indicated by the name of the division, priority is given to application-oriented research in cooperation with industry but also public institutions and utilities. The IEA has been successful in securing research projects with external financing from the Swedish Energy Agency and other public sources, usually combined with in-kind financing from industrial partners. The external financing covers 70 % of the research costs, approximately 20 MSEK annually. IEA's fields of research are in line with societal goals with a relatively high potential to attract external financing, which is nevertheless a difficult and demanding task. The ambition is to expand the research activities with a few faculty members and if possible secure some long-term financing. Participation in competence centers is one alternative for such financing, shared equally between industry, government agency and the university, which means 1/3 self-financing.

#### Recruitment, promotion and succession

IEA's faculty staff has, during the actual period, amounted to 14 - 16 members with an increasing number of persons older than 50, indicating a need for successive renewal. Most of the senior researchers have been internally recruited despite the division's industrial profile. The academic staff is well qualified and experienced but shows a severe gender imbalance which needs attention in future recruitments. The number of PhD students, including the industrial ones, has decreased and was 2018 low in relation to the faculty staff. The number has increased somewhat since then.

It has been common practice to promote merited researchers to assistant professors and encourage qualifications for associate professor (docent) positions. Replacement of a co-worker leaving IEA is often arranged so that his/her tasks are taken over by one or more members, thus enabling a reorganization of the work. IEA will face a critical succession matter within the next five years when professor Mats Alakü-la (59) approaches retirement. He has held his position for 25 years and has a unique network both in academy and industry. The division manager Ulf Jeppsson is 56 this year.

### **Publication patterns**

IEA's strategy is to present research results primarily in scientific publications but also in various trade journals. The rate of scientific articles is somewhat low, and the emphasis has been on peer-reviewed conference papers rather than peer-reviewed journal reports. Most important for the electrical engineering groups have been various IEEE Proceedings and Transactions. The water system group has publications in Water Research (IF=7.9) and a large number of other journals and magazines, many of them with low rating. The group, which is considered a world leader in waste-water treatment modelling, claims that being in the field of industrial automation they need to publish their results as soon as possible, also outside the academic world.

An important observation concerns the low H-indices (4 - 29) for most staff members with only a few exceptions.

## Balance between activities in research, education and external engagement

IEA has a comprehensive education program, a fact that is apparent from a summary of the faculty staff's time allocation. 2.84 fte are research, 7.00 education, 2.31 management and 0.15 outreaching activities. In addition, 20 percent of the 15 PhD students time are usually education, i.e. further 3 fte on education and 12 on research, but of course not directly comparable. The industrial PhD students do not participate in the undergraduate education and their number has to be limited due to their need for academic supervision. IEA is responsible for all electrotechnical education in the B.Sc. program in Helsingborg. Four assoc./assistant professors are not active researchers but lecturers. It was expected a larger engagement from the faculty staff in the research and somewhat lower on management. The division has a clearly public related profile despite only 0.15 fte spent on outreaching activities.

## Overarching research strategy

IEA's overarching research strategy, as presented in the self-assessment, is very much in line with the four research objectives given in LTH Strategic Plan 2017-2026. Implementations of the strategy for each of the three research groups have been expressed as follows:

Electric drive systems have shifted focus from hybrid-electric vehicles to battery-electric vehicles and electric road systems. Fuel cell driven vehicles are included in the plans.

Electric power systems' reliability focus has been extended with integration of renewable energy sources and energy storage. Water systems' wastewater treatment has been extended with greenhouse gas emissions, micropollutants and resource recovery aspects. All these meet the overarching strategy, but the panel would like to see more visionary road maps for the next five years. Common for the three groups are that they are practically oriented with a solution-driven philosophy. In general, all ideas are taken into practical prototypes.

### **Collegial culture**

## Opportunities for early-career researchers to develop their originality and independence

IEA offers good possibilities for PhD students and early-career researchers to develop competence, originality and independence through great freedom to plan and execute their projects, through scheduled review meetings and internal seminars. Young faculty members are encouraged to spend time as postdocs at foreign universities and to engage in relevant external organizations. A handful of industrial PhD students are encouraged to develop both their academic and industrial skills.

## Sustainability and renewal of research strengths

IEA's research is characterized by its clear application orientation. Taking this into account it can be concluded that it has a high international standard and is in the forefront in certain niches. An excellent example is the Stacked Multi-Level Modulator for ESS. Several of the research projects demonstrate highly creative and professional engineering. The research is well adapted to societal goals for energy and environment conservation.

## Academic networks and collaborations outside the unit

It is inherent in IEA's scope of activity to have extensive networks and many collaboration partners. Within LTH can be mentioned the Department of Automation Control, the Department of Energy Science, the Department of Production and Materials Engineering and others. (IEA belongs to the Department of Biomedical Engineering but has not much cooperation with the two other divisions except for some common seminars and gatherings for PhD students. IEA's management is anyhow satisfied with this situation except for the department name which is misleading.) IEA has extensive cooperation with Swedish universities such as Chalmers, KTH and others, sometimes organized in common long-term programs or competence centers as the Swedish Electromobility Centre, VA-cluster Mälardalen and the Swedish Wind Power Technology Centre. These favor cooperation ahead of competition. IEA collaborates in the field of electrical engineering with a few European and American universities, some of them the result of guest researcher periods. The water systems group presents a surprisingly long list of global university collaboration. Faculty staff from IEA participate actively in international organizations such as IEEE, CIGRÈ and IWA.

As the name of the division indicates, IEA has many partners in industry but also in institutes and public utilities, most of them in Sweden. Prominent examples are AB Volvo, Volvo Cars, Scania and RISE. It is significant that professor Mats Alaküla has been employed half-time by Volvo as Senior Scientific Advisor since 2007, a situation which means both advantages and disadvantages to IEA.

### Diversity, integrity and ethics

Diversity, integrity and ethics have, so far, not caused any problems in IEA. The co-workers represent a wide international spectrum, especially the PhD students. The only difficulty is the gender unbalance. Integrity problems have not been reported and IEA's research project do not require ethical approvals.

## Quality in applications and publications

IEA usually submits project applications to national funding agencies such as the Swedish Energy Agency, the Swedish Innovation Agency Vinnova, the Swedish Foundation for Strategic Research and Formas – a Swedish research council for sustainable development. Internationally IEA targets calls of the European Commission. Most applications are made in cooperation with external partners, *e.g.* industrial companies, which participate with in-kind financing. IEA is experienced in writing these applications and fulfils the requirements of the agencies but has nevertheless experienced a reduced hit-rate on the applications, a matter for analysis.

The problems of low publication rate, choice of journals and low H-indices have been addressed in the Publication patterns section.

## Quality ecosystem

## Research strengths and how these are reflected in the educational portfolio

Teaching is to a large extent carried out by the active researchers even if five members of the faculty staff are engaged only in education. Research results have impact on the course content and there are examples of new courses which have been introduced as consequence of new research areas. IEA also presents external courses to industry, either on campus or in industrial premises but even as open webinars. These activities enable fruitful exchange of knowhow and needs between academia and industry. The courses do not generate any profit, a breakeven is appreciated. The Water systems group grants open access to its proprietary codes, even without a minimum fee, which can be questioned as excessive altruistic engineering.

### How external research collaborations influence the quality of research

Collaboration with industry and other stakeholders is a key issue for IEA and has led to close cooperation for several years with a number of these. Common project applications are based on deep understanding of the industrial needs and good personal contacts between the partners. The research projects are carried out with stakeholders participating in steering committees and reference groups and even through direct in-kind work, thus securing that professional aspects will be considered. IEA has been successful in this respect and one indication can be that more than 50 percent of PhDs who have left IEA have been employed by industrial partners such as Volvo, ABB and E.ON.

# How the unit deals with integrity and ethics, including potential conflicts of interest

Many of IEA's projects require access to stakeholders' confidential information which can affect publication of results. This critical matter is routinely handled with Non-Disclosure Agreements (NDAs). Intellectual Property Rights (IPR) agreements are used for controlling rights to inventions and patents. These issues normally cause no problems except for being time-consuming and sometimes source for delays. The PhD students are encouraged to select some minor courses focusing on commercial and legal conditions of research, ethics, history of science, sustainability etc.

## How the unit uses and capitalizes on available research infrastructure

IEA has an electric power engineering laboratory for both research and education used primarily by the electric drives group. These electrical installations strongly link IEA to the Mechanical Engineering building. IEA is critically depending on this infrastructure which will be affected by the upcoming renovation of the building in 2020-2022. The renovation opens the possibility for modernization of IEA's laboratory and the division has received funding from the faculty for this. IEA will install an electric drive test rig in one of the combustion engine test cells that can be used for collaborative research with the Department of Energy Science, *e.g.* as discussed for hydrogen and fuel cell systems.

## Alignment with any of the University's SFOs and broad research areas

IEA is not aligned with any SFO but has been engaged in developing the power electronic power supply for the ESS modulators. This pulse power technology can form a base for new challenging research projects in which IEA will participate with European partners.

In 2019, a co-operation between all energy research groups at LU was established with assigned coordinators financed by the faculty. The aim is to initiate more collaborative energy research across the university and attract more funding. IEA has a natural place in this and ought to use it as a leverage.

## Recommendations

The evaluation teams recommend the following:

- 1. To increase the visibility of the divisions, consider finding a more descriptive name for the department which now stands as Department of Biomedical Engineering. A name common for the three divisions IEA, BME and GEO is recommended. For instance, Department of Applied Engineering, or similar.
- 2. Benchmark the performance against a few relevant, leading national and international universities.
- 3. Document the research strategy for the next five years in road maps for each of the three groups. Electric drive systems are recommended to coordinate its electromobility strategy with the Department of Energy Science, division FBM. Include a long-term vision for how LU can be a leading actor in the future of electric transportations.
- 4. Investigate the possibilities for long-term financing through engagement in new competence centers or other strategic research initiatives. Of special importance is to monitor the Swedish government's next research proposition, which will be presented this autumn, in order to position IEA for participation in some relevant program.
- 5. Make a plan for active recruitment of faculty staff members with respect to desirable expansion, upcoming retirements and improvement of gender balance.
- 6. Review the publication strategy focusing on peer-reviewed journals and conference proceedings with higher impact factors. The number of publications per annum needs to be increased.
- 7. PhD theses ought to be based on a minimum of two peer-reviewed journal papers.
- 8. Review the education program aiming at reduction of the education load and the number of courses.

9. Analyze the consequences from being active at two campuses, Lund and Helsingborg. Is it a risk for under-critical groups? What benefit does a possible involvement from companies and local institutions in Helsingborg give?

# Appendix. Interpretation of the assignment

The 'brief' is to deliver an advisory document (15-20-page report) to be used:

- Immediately for Planning Operational description
- For funding applications internally and externally

Specifically:

- To provide  $\approx$  5 pages of a list of recommendations and advice for each unit of assessment.
- To indicate issues that call for immediate attention as well as issues that need to be addressed in the long term (5-10 years), and how.
- To refer back to the self- assessment to clarify the connection between observations and advice.
- To highlight things to be commended, rather than corrected.
- To indicate issues that should be addressed and resolved at other levels of the University, such as at the faculty level and/or by the central university management.
- To indicate if the panel was missing any relevant material to make observations and recommendations, or if any other relevant matter was omitted.

The aims of the advisory document are to

- Assess the preconditions for high-quality research (= 'internationally competitive') among the units. 'Preconditions' =
  - Procedures
  - Strategies
  - Resource Allocation
  - Networks
  - Provide advice (= 'constructive observations" & = "recognise achievements") on how to improve performance;
- Identify Development Potential;

The objectives of the advisory document are to determine if

- Resources are adequate;
- The balance is viable between
  - Education;
  - Research;
  - Outreach.
    - (1) The strategic direction and scientific and societal networks are sufficient and conducive to quality, including the
  - Recognition of achievements in the past
  - Highlighting & critically evaluating abilities and ambitions

Self-evaluation report (< 7000 words, excluding figures) from each research environment responding to the questions A-C below:

A. Overarching summary

- B1. Leadership
  - Priority setting, including goals for external research funding
  - Recruitment, promotion and succession
  - Publication patterns
  - The balance between activities in research, education and external engagement
  - The overarching research strategy
- B2. Collegial culture
  - Opportunities for early-career researchers to develop their originality and independence
  - Sustainability and renewal of research strengths
  - Academic networks and collaborations outside the unit
  - Diversity, integrity and ethics
  - Quality in applications and publications
- B3. Quality ecosystem
  - Research strengths and how these are reflected in the educational portfolio
  - How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research
  - How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration
  - How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere
  - If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized
- B4. Transversal themes
- C. Final Remarks
  - Bibliometry. Excel-files per UoA:
    - Sheet 1: Publication List
    - Sheet 2: LUCRIS Statistics
    - Sheet 3: SciVal Statistics

# Information and Communication Technology

# Panel overview

The ICT panel consists of three assessment units: the departments of Electrical and Information Technology (EIT), Computer Science (CS), and Automatic Control (AC). EIT deals with a wide range of hardware and software implementation challenges, particularly centered around wireless communication. CS is focused on theory, technical solutions, and methodology for computational processes and for systems with software. Finally, AC is developing theory and design methodology for large-scale systems and learning, autonomous real-time systems, and innovative control applications. In common for all three departments is close attention to applications and strong industry collaborations while still doing fundamental, curiosity driven research. With respect to volume, CS and AC are comparable, whereas EIT is about twice their size, see Figure 1.



Figure 1: Basic numbers for the units of assessment. Data taken from the LU system Kuben, the financial background data supplied for RQ20, and budget 2020.

The three departments have close collaboration. The strategic research area Excellence Center at Linköping-Lund in Information Technology (ELLIIT) was initiated in 2010, and has been a major driving force in reinforcing the collaboration. This also includes the Department of Mathematics, which is evaluated in a different panel. Thanks to the positive experiences of ELLIIT, Lund was included in the Wallenberg AI, Autonomous Systems and Software Program (WASP) starting in 2015, the single largest research program in Sweden ever. This program has enabled a number of essential recruitment efforts, which will significantly influence the future of the departments. The departments are also involved in the strategic research area NanoLund. CS and AC have a very close collaboration in their joint Robotics Lab. EIT and AC have made significant joint development efforts for the new European research facility ESS.

The departments are closely located, with EIT and CS in the same building and AC in the adjacent one. Under the umbrella of Digit@LTH, the departments (together with the mathematics department) run a common series of seminars every other week, both internally at LTH and explicitly inviting external guests from local companies and organizations. Practically the same network of people also participate in the recent LU initiative for AI. The Heads of Department interact frequently, having meetings on common issues like ELLIIT, WASP, and the Robotics Lab as needed. A number of joint PhD student projects

155

with shared supervision are running, as well as joint PhD courses and collaborations within international master's programmes given at LTH.

# External panel report

Ivica Crnkovic, Matti Latva-Aho, Simin Nadjm-Tehrani, Heike Riel, Sigurd Skogestad, Diomidis Spinelli

# **Executive summary**

The ICT panel assessed three Units of Assessment: The Departments of Automatic Control (AC), Computer Science (CS), and Electrical and Information Technology (EIT). The panel found that all three departments have a number of both established and younger researchers internationally recognised providing the departments a good ground for keeping and excelling their reputation. Overall, the departments perform well in research and education, in some cases excellently. In general, the management is sound and there is a good collegial culture. There are many positive indicators of the departments' work. On the other hand, there is also space for improvement. Common to all three departments is the lack of overall strategy with respect to new research areas. CS and EIT have several small research groups with lower research impact; the departments should consider changes in the internal organisation. The average number of PhD students per professor or associate professor is lower than three, and in CS and AC there has been a declining trend caused by lack of efforts towards attracting external financing. Funding from WASP plays an important role in providing stability and increasing the recruitment of young faculty and PhD students. The departments should continue to be actively involved in shaping WASP programme, but should also consider other means of external funding, including EU projects and cooperation with industry. Some groups show excellent results in attracting external funding, but in general there are opportunities to increase these activities. All departments suffer from gender imbalance. While there are some great examples in recruiting young female researchers, a significantly more active involvement in improving gender balance is desirable.

The recommendations specific for each department are the following. AC is a relatively small department and there might be a risk that it will have difficulties in keeping its excellent level with this size. Our recommendation is to consider increasing the size of the department or become a unit as a part of a larger department, and to continue in renewal and extension of its tended research area. CS has research groups with different achievements. Several research units are too small to achieve a critical mass needed for top-level research. We recommend promoting collaboration within the department and outside it, diversifying and increasing research funding, implementing an internal funding strategy with possible prioritisation of the successful groups, and in particular putting more focus on publishing in top-ranked conferences and journals. EIT, the largest department, needs a clearer structure by building larger divisions from smaller groups. We also recommend smaller groups to work on increasing their external funding. The department should give a stronger support for young researchers, and promote collaboration between different groups. EIT has a good record in technology transfer; we recommend keeping it in that way.

# Introduction

The ICT panel assessed three Units of Assessment: The Department of Automatic Control (AC), Computer Science (CS) and Electrical and Information Technology (EIT), three of 20 departments and other subunits of the Faculty of Engineering, LTH at Lund University.

The Department of Automatic control (AC) counts 51 employees (21 PhD students, four postdocs, one researcher, one project assistant, five research engineers, four administrators, one lecturer, five associate professors, one adjunct professor, one senior professor, and seven professors). Since its foundation in 1965, the department has followed a path of evolutionary changes in research directions following mainly the research interests of the senior faculty. During the last 10 years the department has not changed much in size and priorities. The current research directions are Large-Scale Systems and Learning, Autonomous Real-Time Systems, and Innovative Control Applications (although the last one is somewhat difficult to classify as a research area).

The Department of Computer Science (CS) includes 60 employees (14-15 PhD students, three industrial PhD students, 7-9 postdocs, 15 senior lecturers, four lecturers, three part-time or guest lecturers, two associate senior lecturers, nine professors, one guest professor, and one senior professor). The department has a large teaching portfolio with impact on the education for several undergraduate programs. The research in the department can be seen as divided into two domains: software engineering as a major topic, and a collection of other research topics that provide the breadth at the department. CS has undergone some reorganisation in the past 10 years and is considering its current organisation as one to stay for a while.

The Department of Electrical and Information Technology (EIT) has 123 employees, with 22 professors, 12 associate professors, 30 junior and technical staff, 47 PhD students, and technical and administrative support. EIT deals with a wide range of hardware and software implementation challenges, particularly cantered around wireless communication. It consists of seven research groups: Broadband Communication (BB), Communication Engineering (COM), Electromagnetic Theory (EM), Integrated Electronic Systems (IES), Nano Electronics (NANO), Network Architecture (NET), and Security (SEC).

The ICT assessment team consists of six researchers with different backgrounds in ICT-related sciences, and the areas of their competencies match quite well with the profiles of the departments being accessed. The assessment is based on the self-assessment reports from the departments, the instructions from the university, and on-line interviews. In addition, the ICT panel members used additional information from the University, Faculty and Department web pages, publication resources, and some other resources (e.g ShanghaiRanking's Academic Ranking of World Universities 2019). The self-assessment reports have the same structure, which is also followed in this report. The interviews were held online; with the three individual departments on 5-6th May 2020, and with the engineering faculty leaders (Deans) and with the heads of the assessed departments on 7th May. The interviews with the departments were predefined with focus on department vision, discussions with the research groups, and separate discussions with young faculty and with PhD students. The interviews with the heads of the departments were focused on relation between the departments, relation between the departments and the faculty, the departments' visions and management aspects. The meeting with the faculty leaders was not planned in advance but includes Dean's presentation of his view of the engineering faculty management, relation to the Lund University, relations between the departments, as well as discussions. Although the interviews were organised on-line due to known circumstances, the impression from the panel is that they provided a lot of additional and complementary information, sufficient for the assessment. The interviews were also very well-organised, and in particular all participants were enthusiastic and put additional efforts to make the interviews successful.

In addition to the interviews, the panel had nine virtual meetings discussing the assessment, and the report itself.

The assessment report used the template provided by Lund University. The main sections are 2. Observation and 3. Recommendation. Each section is divided in three subsubsections, one per department. This was done as the departments have many specifics. Some common findings and recommendations are placed in the last section Conclusion.

## Observations

This section includes observations found during the assessment process, and presented for each department separately, grouped in "Leadership", "Collegial culture", and "Quality ecosystem" subsections.

## Leadership

### Leadership Automatic Control (AC)

The vision of the Department is to be a "A world-class department that explains, explores and expands control technology".

Except for this statement, the research goals and visions are not explicitly articulated, but rather depend on opportunities and the researcher's abilities to generate new ideas. As long as one has a strong and forward-looking faculty this may be a good approach. However, the department is now working on a new research strategy. It was drafted in the fall of 2019 and has been discussed by the department board. It will be finalized in 2020. When it comes to recruitment, the "focus is on hiring young, promising researchers with good prospects for attracting their own research funding". This is indeed a good strategy for developing originality and independence, and also for sustaining and renewing the research. However, it makes it more challenging for the department to steer the research in a certain direction and build larger research groups.

The department is performing very well and has a good policy for external research funding which fits well into the Swedish system, with external research approximately double of the governmental research funding. The funding includes a few large projects, like the LCCC Linnaeus Research Center (funded by the Swedish research Council) and more recently the Wallenberg AI and Autonomous Systems and Software Program (WASP) and the European Research Council (ERC) Advanced Grant to Anders Rantzer and FP7 and Horizon 2020 (in total 12 projects) with additional funding from the Swedish Research Council. This provides a good combination of stability and novelty. Funding from industry (direct or indirect) is not prioritised.

The Department mentions in the SWOT analysis that a threat is that they heavily rely on external funding (like WASP) but this can be said about most strong research departments in the world. They also say that it is difficult to find long-term funding for large research infrastructure, such as the robotics lab, but again this is the same in most places. The obvious solution to these issues is to increase the internal university funding, but this is a political issue which is probably outside the control of the department.

The main research strategy of the department seems to be to hire good people. Until recently, most of the faculty were recruited internally, but the recent recruitments are from the international community. Since several senior researchers are approaching their retirement, it is important for the department to have a strategy for recruitment of new faculty, with inclusion of new research directions.

The department says in the SWOT analysis that they run the risk of losing both funding and good students if Automatic Control starts to be perceived as something old-fashioned, compared to more trendy topics like AI or machine learning. On the other hand, the current focus on Automatic Control is seen as one the main strengths. In the SWOT analysis they say that there is a risk that the inclusion of new research directions will lead to a fragmentation where not everyone shares a common language and understanding. Indeed, there is a danger that this will happen. Nevertheless, the panel feels that the recent focus on AI, including a new Master program in cooperation with the Computer Science Department, is a promising novel direction. On the other hand, the field of automatic control is still growing in importance in practical use in society. For example, the increase in automatic control in cars has been enormous over the last 20 years and in the growing robotics field there is a large need for automatic control, as there is in communication technology and in most industries. Thus, there are lots of opportunities for the department to rebrand the somewhat old-fashioned name *Reglerteknik* towards including terms like robotics, self-driving vehicles, cybernetics, environment and so on. At least, such trendier names could be used in recruiting students and attracting funding.

The publication pattern follows the excellence principles, and the senior researchers reach a high level of excellence in publishing and citations, including the top-level conferences and journals in the area.

Approximately 25% of the budget comes from teaching, which might be on a lower level compared to some other departments, for example Computer Science. The AC intention to renew the course portfolio in combination with CS and EIT is a good strategy. Rebranding of some course names may be considered so that the relevance of the courses become clearer to the students.

In summary, AC is a homogeneous environment, with a common research strategy (though not explicitly defined), with different flavours of control systems, which facilitates to reach the excellence goals. With such an established position, there is also a risk to stay with the current research areas and by this become less attractive. For this reason, building a renewal culture is important - either by new recruitments or by new applications for new research funding.

### Leadership Computer Science (CS)

The department has a leadership structure that appears to be two-tiered, the Department Board with formal working procedures, and a group consisting of the unit leaders, the department chair/co-chair, and the head of administration. The units are responsible for personnel matters whereas the research, recruitment and funding strategic decisions are discussed in the latter tier of leadership. The budget is approved at the board level and allocated to the units. It is somewhat unclear how the short-term imbalance in unit budgets and long-term visions for the department are managed. In the past few years two injections in funding have had a major impact on the department namely the volume in education (doubling the number of students between 2007 and 2016) and the initiation of the national WASP investment in AI.

The report gives the impression that none of the units individually nor the department as a whole sees a possibility for priority setting in terms of goals for external funding. The proportion of external funding has oscillated considerably since RQ08, and research is in a 50%–50% relationship compared to education. Of the total external research funding the WASP financing amounts to 45%, indicating a lack of strategic control, since the historically large national WASP funding has emerged by four universities participating in its shaping, at least for the autonomous systems part. The department is fully aware, and mentions as a weakness, that the support for faculty through WASP is limited to five years (the whole program is currently estimated to end 2029). During the interviews it became apparent that the robotics research in the department has a long track record in attracting European funding. It seems natural to continue applying for funds from diverse sources to counterbalance the WASP dependence.

In terms of recruitment, the department has been successful in attracting new senior faculty both in theoretical computer science and AI and cognitive systems (with the WASP support). There are also plans for becoming more active in the second round of ELLIIT applications in 2020 and attract new external funding for the junior faculty.

The publication numbers are very uninformative across disciplines within computer science. There is no possibility to match the mentioned "strive for excellence" in research strategy to the quality of the publications without further information. On a quantitative level one can only make two rough deductions: 1) the average number of publications per year for senior (researching) faculty is somewhere between 3–5 papers per year, 2) the reduced external financing and lack of refilling vacant PhD student positions in the past four years have left their mark on the research output (with the exception of the SERG group). In the absence of reshaping the groups or changing research directions explicitly targeting excellence in publications would be a natural research strategy.

The publication venues range from highly competitive and selective such as *Empirical Software Engineering* (Clarivate Analytics Impact Factor<sup>54</sup> 4.4, Clarivate Analytics Category rank 93%), *IEEE Transactions on Software Engineering* (4.7, 94%), *IEEE Access* (4.1, 85%), *Computer Graphics Forum* (2.4, 69%), to less so, such as *Data Processing* (unrated), *Journal of Computer Graphics Techniques* (unrated), *Procedia Computer Science* (unrated, controversial series). We note here that the journals where the theory-oriented work is published appear less competitive: *Algorithmica* (0.9, 36%), *Information Processing Letters* (0.9, 14%), *SIAM Journal on Discrete Mathematics* (0.8, 32%), *ACM Transactions on Algorithms* (0.8, 23%). However, the venues' ranking suffers by being ranked together with journals where life-science research is published. In terms of conference publications, the venue rankings according to CORE<sup>55</sup> include almost none with an A\* rank (PODC), quite a number with an A rank (ICSME, ISAAC, ICALP, ISR, ESEM), and more with B (SEA, SEKE, SLE, TAMC), C (ICPC, EMBC) and no CORE ranking. For the future, we recommend targeting work that can be published in the area's most competitive conferences, such as FOCS, ISSAC, SODA, STOC, ICSE, ESEC/FSE, OOPSLA, PLDI, AAAI, IJCAI. Finally, we note that the success of the different groups publishing in competitive venues seems to be highly uneven.

The department has a well-balanced division between research, education, and external engagements and the latter is visible in terms of two mentioned start-ups, adjunct positions or industrial PhD students. This has yet to be leveraged for attracting more research funding for applied research. An overlap between the SERG and the SDE group is both a concern and an opportunity for finding and exploiting synergies.

### Leadership Electrical and Information Technology (EIT)

The management structure of EIT is quite typical: The Department Board handles strategic issues, budget, and hiring of faculty staff. The Head of Department is responsible for all activities at the department. Each research group is headed by a Research Group Leader, who has the responsibility to coordinate the activities in the research group and its budget.

The scope of research within the different groups seems to have some overlap. With the information provided it is quite difficult to judge how different groups compare to each other in terms of external funding, research priorities, academic output, etc. The BB, EM and NET groups are very small compared to other groups and have an unhealthy imbalance between faculty members and PhD students. Overall, within the EIT Department there are 1.4 directly employed PhD students (1.8 when including also industrial PhD students and other not employed at the faculty) per professor (including associate profs.) which is somewhat smaller than in a typical research unit in the field.

EIT seems to be active within ELLIIT, NanoLund and WASP; however, very little information is given about how important those activities are scientifically and financially, e.g. how many PhD students are funded through those activities.

External funding has been quite stable over the years (~70M SEK). Given the size of the department and the number of independent research groups, 8 EU projects in 2014 - 2018 seems a low number and could be improved. Interaction with industry is very lively and active with companies like Ericsson. Several joint initiatives have been pursued with great success (e.g. world class demonstrations and

<sup>54</sup> https://jcr.clarivate.com/

<sup>55</sup> http://www.core.edu.au/

landmark papers on massive MIMO implementations). Over 70 patents have been filed in 2014-2018 by department researchers, either directly or in cooperation with our industrial partners. This is a great achievement as well as the demonstrated ability to start up a few companies in Lund.

EIT has been able to publish a few well-cited papers in the past with great citation numbers. However, the publication record shows a declining trend. This seems to correlate with the decline in the number of PhD students. This makes us wonder why this is happening with a rather solid level of funding.

EIT gives 71 undergraduate courses which sounds like a large number on the upper end. The department has also international master programmes on wireless technologies as well as embedded electronics. No information is given about postgraduate education and researcher training.

### **Collegial culture**

### Collegial culture Automatic Control (AC)

AC is a quite small department and seems to have an excellent collegial culture with open and non-prestigious relations between the faculty and students.

The younger researchers, the PhD students and postdocs, have a large possibility to choose their own topic, although many externally funded projects require specific topics. PhD students are mainly hired based on their overall competence, and only later do they select a specific topic. This is similar to the US system, but different from many European countries. AC has mechanisms to ensure PhD students from improper supervision and isolation and to encourage cooperation with researchers from other universities.

The self-evaluation report refers to a support of development of younger researchers to be independent. The self-assessment report mentions that the researchers are given "substantial freedom to formulate his/her own research questions". Also, young faculty are shielded against having too much teaching and administration. Although the younger researchers have freedom in their research, there is extensive cooperation within the department and senior research actively contributes to development of young faculty.

The department has a stable situation with incremental renewal. Recently two new faculties have been recruited. The international recruitment has not been prioritised, but that has been improved in recent years. New recruitments are planned for next few years as a replacement for the upcoming retirements of senior faculty in 2021 and 2022. The department has no plans to increase, but rather to keep, the present size. The gender balance, similar to most of Swedish universities, is not good on all levels, from students to professors. Although there is an awareness about this, there are no concrete powerful measures to decrease the lack of balance. This may be a general question for Lund University, special efforts on the university level, or at least Department level should be done.

Some of the major partner universities outside Sweden are California Institute of Technology, University of Minnesota, University of Cambridge, and University of British Columbia. There are very strong universities and departments, but the report is missing details about the extent of this cooperation.

The department maintains high requirements for publications, with ambition to be on top level, and with publishing in leading conferences and journals in the domain. The number of journal publications is about 80 each year, which is good taking into account that there are only about 20 PhD students, with about 4 PhDs finishing each year. In other words, the number of PhD students is low for a faculty of 13. An average of more than 3 PhD students is common internationally, and this would mean doubling the number of PhD students. The work is also well-cited and published in good and relevant journals.

#### Collegial culture Computer Science (CS)

Some potentials for early-career development towards independence exist: i) acting as a co-advisor for a PhD student, and ii) attracting externally examined junior faculty and providing opportunities for their

growth. Both of these measures seem to face some difficulties to be effective. Since staff development has in the past year been delegated to the unit level (as opposed to department level), and given the small size of the units, we cannot see how long-term development can be aimed for. This is especially hard to achieve since central funding for engaging the first PhD student for a junior member is lacking. Of the four associate senior lecturers employed in the past five years, three were LU graduates. It is not clear whether the 5 of the 25 faculty members who have long-term engagements outside LU (industry or other university) should be considered as an asset or as a sign of compaction.

On the other hand, a successful policy seems to have been the conscious steering of external funding towards junior faculty from the underrepresented gender and pairing up with guest professors. Three of the four mentioned associate senior researchers are female. Two of the four have already been promoted to senior lecturers. Overall, the representation of women among the assistant/associate professor category (40%) seems promising.

In terms of external collaboration, there is little evidence of research collaboration with other units at LU or other Swedish universities (with the exception of BTH). More information on the size and type of European collaborations would have been useful. It was not possible to directly identify evidence of attracted WASP funding using WASP's specific collaborative schemes. LU has a wide range of informal networks (DIGIT, AI, Compile) but these seem to be more of a public/media outreach character than aiming to expand or renew research collaborations.

The quality in applications and publications may be hampered by the lack of processes for internal peer review within the department. The self-evaluation report mentions "competition" and also lack of transparent research excellence criteria and the fact that the "sharp assessment of research quality" is delegated to individual groups. Given the small size of several groups this could be complemented with incentives at the department or university level.

## Collegial culture Electrical and Information Technology (EIT)

Bi-weekly meetings of group leaders are held to ensure information flow within the department. The group leaders have the main responsibility to manage the collegial culture, development of staff and research activity planning.

Since the vast majority of students work in externally financed projects, there is a strong driving force to deliver results within a set of predefined areas of the projects. Junior faculty are largely hired to build their own research agenda, which often is complementary to the existing groups. LTH Career Academy gives different types of support to junior faculty.

EIT heavily relies on research laboratories for hardware and physical layer research activities. The lab is continuously developed, but many of the acquisitions depend heavily on external funding. EIT does not have a formal common department strategy for how to develop and foster inter-group collaboration to increase interdisciplinary research.

EIT faculty members are mainly composed of persons of Swedish origin, as they state. Their gender imbalance is present like everywhere in the field. However, the relative number of female PhD students is increasing.

International research collaboration is active with some leading research institutions in the field. Special emphasis has been given to attract female visiting professors as role models which is a great approach.

Quality improvement measures include sparring with each other research proposals. EIT targets publishing mainly at the highest quality publications.

## Quality ecosystem

### Quality ecosystem Automatic Control (AC)

AC has a very good experience in transferring knowledge from research to education. The senior researchers are involved in education. The department has published several textbooks and has the highest evaluation grades from the students. The department utilizes undergraduate and master's students for PhD recruitment. Also, the department has a large portfolio of PhD courses, now also given for WASP students from other universities.

The Department has a very good record in terms of producing spin-off companies based on software developed at the department, for example, the Dymola/Modelica software development.

The national academic collaboration is performed within ELLIIT (The Excellence Center at Linköping– Lund in Information Technology) and WASP, with academic partners primarily at Linköping University (LiU), KTH, Chalmers, and Umeå University. AC is a part of ELLIIT, the SFO (Strategic Research Area funding), with a smaller part of the total funding, but which enables continuous cooperation with LiU. ELLIIT was a good preparation for getting funding from the WASP program. Since there are expectations of a significant increase of SFO funding, this is a good opportunity to make new strategic research plans. Via WASP, AC has cooperation with several Swedish companies (SAAB, Ericsson, Axis) mostly via industrial PhD students, though the number of industrial PhD students is not high. Ericsson has an adjunct professor, and a long tradition in cooperation in research and education activities. AC is using Vinnova funding for applied research in cooperation with companies and the public sector. The cooperation looks stable and well-maintained, in combination with external funding.

During the past five years, AC researchers have been involved in building ESS (The European Spallation Source), a linear proton accelerator which is located at Lund. The department has also been involved in several research projects together with a company, contributing with a few master thesis projects. This cooperation does not have very high priority for the department. The department is also active in building up and using infrastructures from WASP Arenas (WARA).

The department is continuously engaged in outreach activities (e.g. the Robotics Week, HerTech Future, AI Nordic Powwow, LTH Science and Innovation Talks, Digit@LTH, Breakfast Seminars), which ensures continuous communication with the surrounding local environment.

The department advocates openness and transparency in research. In cooperation with companies usually special agreements are signed, which may limit openness due to companies' requirements on IP. The department could have a more active role in relation to AI that is becoming of increased interest in the research, as well as a more active policy towards gender balance.

### Quality ecosystem Computer Science (CS)

According to the self-assessment report, research influences education in a direct manner on the advanced level through the teaching of research faculty and the development of specialized courses by new faculty. External research collaborations take place through EU projects, the EASE excellence center, and master thesis projects conducted in an industrial context. No quantitative data were provided in terms of industry-sponsored funding, which would provide a useful benchmark. Some of the described actions seem to be initiated in a reactive fashion to satisfy funding conditions. For the reasons rightly identified in the self-evaluation report, sections B.3.2, it would be helpful to take a more active approach, encouraging and incentivising industry collaboration as a departmental strategy. This is also reflected in the self-evaluation by referring to potential for exploitation of the digitalization agenda in Sweden.

Although integrity and ethics have a strong cultural aspect, which seems to form a working basis of existing collaborations, it would be useful to formalize specific guidelines as well as checks and balances

at the departmental or university level. Several areas in which the department's faculty performs research, such as machine learning, robotics, and software engineering, can have important ethical repercussions in the areas of human experimentation, handling of personal data, and safety and security. Appropriate guidelines and reviews can help prevent mishaps.

The self-assessment report rightly claims that software artefacts should be classified, maintained, and funded as research infrastructure. This is something that the department should continue to lobby for. In addition, the department could benefit by investing in the development of data sets that can be used for empirical research and in obtaining access to high-performance computing facilities for conducting research based on deep learning methods. This can be furthered by collaborations with existing high-performance facilities available at the national or European level.

The graduate education program has in the latest national evaluation (by UKÄ) reached the "high quality" assessment grade. This is a positive sign as among the 14 Swedish universities with graduate education in computer science, only 8 were assessed to have high quality. This could be a sign of good synergy between research and education.

### Quality ecosystem Electrical and Information Technology (EIT)

The research strengths of the Department are well reflected in the teaching. Apart from degree projects, the department gives 71 courses out of which 34 are classified as advanced courses.

EIT has close interaction with industry via exchange of staff (adjunct profs., industrial PhDs, etc.), participation in EU projects and more importantly via different research centres over the years. Through those research centres, industry has had a direct path to be involved and influence the research at EIT. Several successful joint activities with industry have been taken, like the world's first massive MIMO project with Ericsson leading to major impact on current 5G standardization as well as leadership position to Ericsson in related technologies. This indicates a great synergy between leading industry and EIT.

ELLIIT is a good example of a national collaboration network leading to high scientific impact. EIT is also very active in various European consortia, like COST IRACON. Some of the groups are active also within EU programmes. EIT has demonstrated significant leadership in EU projects e.g. in INSIGHT as a coordinator to develop the semiconductor nanowire technology for next generation device technology.

## Recommendations

This section includes the recommendations divided per department. A summary of the main recommendations and a conclusion are described in the next section "Conclusion".

### **Recommendations Automatic Control (AC).**

AC stands out from the other two departments, and from most other departments at LTH in several ways:

- AC has a centralized recruitment process of PhD students,
- AC attracts mainly Swedish PhD students, in particular from Lund University,
- The department is selective in attracting external funding,
- The department is pleased with its current size and has plans only for a modest expansion.

The social environment at the department is very good - everyone meets on a daily basis in the fika (coffee) breaks and they act as one single unit or family. The colloquial culture in the department seems to be excellent, with younger faculty getting a lot of support from more senior faculty but also getting freedom to choose their research area. This strategy has worked well. The department belongs to one of the better Automatic Control Departments in the world (ranked 51-75 in the world in the 2019 Shanghai ranking of Automatic Control Departments; KTH is ranked the best in Sweden at no. 16, whereas Chalmers is third in Sweden at rank 151-200). Also, the publication record, including impact is high on the international level.

The aim of the department is to focus on basic research and on funding where there is a lot of academic freedom. This is of course the dream of most academic researchers, and indeed the department has been successful in attracting such long-term funding (WASP, ERC and a few other EU projects). However, it could be argued that this strategy is not sustainable, especially taking into account that the field of automatic control is well established so that new theoretical results do not come easily, and more importantly that such funding is difficult to obtain.

Furthermore, the department has a policy of funding their PhDs over quite a long period, which may be difficult to sustain. The number of PhD students (less than 25) is lower than one would expect when comparing with other good automatic control departments in the world, though similar numbers can be found at other departments at Lund University and some other Swedish departments. However, with a faculty of 13, one would expect in such a research-oriented department to have about 40 PhD students at any given time.

Another somewhat unusual thing is that the department leadership do not seem to consider gender equality as a problem that needs specific measures, although the Department has few females among its faculty (2 of 14 professors and associate professors are female).

### Recommendations

• Increase the department size. While the department does not belong to the smallest departments, it is a small department at Lund University. With this size there is a risk that the department will have less power to compete with similar research groups in the future. The research directions follow an evolutionarily change, keeping care about top quality, which is a good and proven approach. However, with a relatively small number of faculty it may happen that important international shifts in research directions are lost.

For this reason, we would recommend the department to consider the possibility to increase its size. There are several possibilities to achieve this, and we would recommend considering a combination of them:

- Increase the number of PhD students. This will increase the strength of the groups and increase the impact on the short and long term.
- Increase the number of younger researchers. The department is at a stage where several senior researchers are about to retire. The department is already planning new recruitments, but the planning could be more ambitious and focused.
- Consider the internal organization while growing the department. The flat organisation that is valid today has limitations for a significant increase. If aiming for a larger department, some departments should be reorganised in two-three substructures (divisions), according to research directions. Further you can consider to merge with other departments, and keep the unit together within the department. This can bring opportunity to increase the research area, but it also introduces a risk of reducing the focus on the core research activities of today.
- Extend the research area. Automatic control is an established discipline but there are many opportunities to extend its use in different domains (such as robotics, AI-based applications), and new infrastructures (5G, cloud and edge-computing). In addition, new types of questions are arising in relation to automatic control, and the department should support ideas (in combination with recruitment of young researchers) that extend the traditional automated control area.
- Extend the sources of funding. While the department presently has good long-term funding, including WASP, ELLIIT, and ERC, the department could consider other instruments of funding,

including other EU funding sources, which also enables closer cooperation with centres of excellence in Europe and recruitment of international PhD students, and cooperation with industries where Sweden is strong, with inclusion of industrial PhD students.

• **Revisit the gender policy.** The department has only a few female researchers. Nevertheless, the leadership's attitude seems that they do not see their own role and impact as part of the overall gender policy in society. The department should make concrete and measurable goals on the number of female researchers.

## **Recommendations Computer Science (CS)**

The department does not seem to enjoy a top international ranking (no. 201-300 on the 2019 Shanghai ranking of computer science) and it has a relatively low number of PhD students, but it impressed us on many levels. The department's aim is to focus on applied research. The department also brings value to the university as a whole through its teaching service. The graduate school is also of high quality, as evidenced by the graduate education program's latest national evaluation (by UKÄ), which reached the "high quality" assessment grade.

The large breadth in research topics has several advantages. First, it positively supports the teaching of the correspondingly diverse topics. Second, it brings in the department knowledge of methods ranging from theoretical to empirical research, which can provide useful skills for PhD students. Third, it can potentially promote cross-disciplinary research among the department's research groups, e.g. software engineering studies of graphics applications is possible. The department is to be commended for its strive towards diversity in the staff's composition improving representation of underrepresented gender.

On the other hand, we found room for improvement in several areas that impact the quality of research.

## Recommendations

- **Promote collaboration.** The existing research units appear to be too small to have the required critical mass for attracting funding and staff as well as performing ambitious large-scale research. The Department should aim to collaborate with excellent groups in other universities in Sweden or the EU. This will allow the units to mobilize a critical mass both to promote excellence (through collaboration with other good colleagues) and to attract funding.
- Diversify and increase research funding. This will allow the department's size and impact to grow, help excellent academic staff and PhD students, and decrease the risk of a single funding source drying up. To do that aim at attracting international researchers with an excellent track record in research funding, PhD supervision, and high-impact publications.
- **Plan strategically.** The groups within some units do not appear to have a lot in common regarding research. One unit seems only to offer a perfunctory umbrella for disconnected research groups. We recommend that the department thinks strategically regarding which groups should grow and aim at helping these. In addition, the department should resist the temptation to branch into new areas, e.g. through opportunistic hiring, in order to avoid worsening the current situation. This was also recommended in the RQ08 assessment.
- Target highly-regarded publication venues. Publishing at and attending top-ranked conferences, such as AAAI, IJCAI, ICSE, ESEC/FSE, POPL, PLDI, SIGGRAPH, SODA, and RSS will provide several benefits. First, attending these conferences allows the researchers to discuss ideas with the top and up-coming colleagues in their field. Second, researchers are likely to obtain high-quality feedback and reviews, due to the excellent program committees of the mentioned conferences and editorial boards. Third, networking at such venues can attract new excellent academic staff and postdoctoral researchers.
- Implement an internal funding strategy. The department appears to be understaffed given the substantial teaching it provides as a service to multiple educational programs. While the teaching load

is within the normally accepted limits and staff appear happy to be engaged by it, the load may be too high to attract young, ambitious, research-focused colleagues. Establish internal funding policies that support young researchers in early career states. Reducing the teaching load of these colleagues and supporting them in attracting their first PhD student will help them focus on research, PhD supervision, and avoid burnout.

• Formalize specific guidelines regarding ethics as well as checks and balances at the departmental or university level. With the rising amount of work on AI and internet of things applications, this is something that needs to be looked at.

## **Recommendations Electrical and Information Technology (EIT)**

EIT has several world class research groups and the department is ranked no. 18 in the world in the Shanghai ranking of Electrical Engineering in 2019 as the best in Sweden. The groups with large external funding from various sources are active in their own fields and have a sufficient number of PhD students with respect to staff members. The number of PhD students within smaller groups is quite unbalanced with respect to the number of staff members. The current formation of research groups seems to be a result of "history" and does not necessarily reflect the current needs. There is also some overlap between research themes of different groups as well as obvious synergies to the CS Department, in particular in the security area. Based on the interviews, a joint research vision and strategy is missing at EIT.

An overall summary of EIT is that although it research-quality wise is of world class, the organisation could be streamlined and all groups within the department should be activated to acquire external funding from diverse sources.

### Recommendations

- Reconsider the internal structure. Some of the existing research units appear to be too small to have the required critical mass for attracting funding and staff as well as for performing ambitious large-scale research. There are clear synergies between some of the groups and they could be easily merged. In the most extreme case one might think of having two major research lines / divisions within EIT: Materials & integrated electronics (IES, NANO), and Connectivity solutions (BB, SEC, NET, COM, EM). The latter could be further split into Networks & systems (BB, SEC, NET) and Radio technologies (COM, EM).
- Increase external funding. Smaller groups would need to increase both funding volume and sources. Salary system of LTH should be rewarding successful and active groups and individuals which are continuously attracting external funding and good PhD students resulting in high quality output.
- **Prioritize strategic planning.** Some department level strategic planning with common goal setting along the research lines / divisions would lead to higher synergies and deeper collaboration between the groups. This does not of course mean that all activities should be aligned to common strategy but would increase synergies of different groups for making even a bigger impact in future.
- Give stronger support for young researchers to grow independence and team up within the larger organization. Young faculty members seem to suffer a bit from work overload due to large teaching load and building their research teams. More internal funding as a starting package for the first 3-4 years would solve some of the problem.
- Increase interaction and collaboration between different groups and synergies. Better alignment of different research agendas is needed. How to make better synergies from communication systems research all the way to materials and electronics might be a key to even better success.
- Maintain technology transfer efforts like industry collaborations, joint laboratories, startups, etc. These activities seem to be at a very high level already and should be kept there as active elements of research. What comes next after a successful MIMO joint centre with Ericsson?

# Conclusion

The panel of reviewers made a detailed evaluation along the guidelines provided for each of the units of assessment above. In this section we try to highlight some commonalities and some special differences in the research environments that we observed through the studies of the self-assessments and the dialogues in the meetings.

The three units of assessment (AC, CS, EIT) have some commonalities. They all have a number of established researchers with internationally recognised work that stand to the highest quality in their field. There are also groupings in each department that are working towards achieving higher research output or quality, among these some newly established by young researchers. Common to all three departments is the lack of overall strategy instruments with respect to forming new groups from existing researchers with a view to consolidate around some topics or strengthen the financing situation for the younger faculty to establish an *independent* line of research. This is more evident in the CS and EIT units, as AC is more like a group in itself.

Also common to all departments is that the average number of PhD students per professor or associate professor is lower than 3, and in CS and AC there has been a declining trend caused by lack of efforts towards attracting external financing. This trend is for the time being reversed by the exceptional injection of research funding by the WASP national program, which however is finite in time. It is important that the culture of testing one's research excellence by applying for funding from diverse sources is not turned into obsolete practice. The need for supporting young faculty through strategy level decisions and central funding schemes can be combined with incentives for keeping this culture alive.

Several topics within the three departments, especially in those that have a smaller size and vulnerable to staff changes, could find strength in other departments or other groups in the same department. For EIT this can be materialised by making larger divisions from some smaller groups, and/or encouraging the Security group to collaborate on the basis of applications. For CS, the generational change and the settlement of the young faculty need to define this resizing or adjustment through new collaborations. For AC there are options outside these three units, e.g. the automation department at Lund has a strong connection to electrical power systems management. Critical infrastructure has been mentioned by some AC researchers as a potentially interesting topic in renewing the application areas for AC.

At the end, we will point out that the entire assessment process went smoothly, due to the excellent preparation, and enormous enthusiasm and support from the organisers and from the researchers. We were impressed by the preparation and in particular by the ability in re-planning meetings from the physical to the virtual meetings. We are sorry that we could not visit Lund, but we are confident that the on-line interviews provided information needed for the assessment.

July 02, 2020,

Gothenburg, Oulu, Linköping, Zurich, Trondheim, Athens

Ivica Crnkovic Chalmers University of Technology ivica.crnkovic@chalmers.se Heike Riel IBM Research hei@zurich.ibm.com Matti Latva-Aho University of Oulu matti.latva-aho@oulu.fi Sigurd Skogestad NTNU sigurd.skogestad@ntnu.no Simin Nadjm-Tehrani Linköping University simin.nadjm-tehrani@liu.se Diomidis Spinelli Athens University of Economics and Business dds@aueb.gr

# Panel overview

The Biomedical Technology Panel contains two Units of Assessment; Biomedical Engineering (BME) and Immunotechnology. All research projects within the units are in the areas of biomedical engineering and life sciences. Within the Faculty of Engineering there are additional research environments also related to the life science area, but they are assessed by other panels within the RQ20 organization.

The Department/Division of Biomedical Engineering was formed in 2014 by merging research groups in electrical measurements, medical signal processing and biomechanics. BME currently has 53 employees including 31 faculty members and researchers, 16 PhD-students and 6 technical and administrative staff members. BME has premises at two locations within Lund University: about 2/3 of the employees in the E-building at Campus LTH and about 1/3 of the employees in the Biomedical Center (BMC) at the Medical Faculty.

The Department/Division of Biomedical Engineering conducts research within the areas: biomechanics, biomedical signal processing, nanobiotechnology, neuroengineering, proteomics and ultrasound in medicine and biology.

The Department of Immunotechnology was formed in 2007 by merger of the former Divisions of Immunotechnology and Protein Technology of the Dept. of Chemistry and the Dept. of Electrical Measurements, respectively. It currently employs 5 professors, 2 senior lecturers, 2 associate senior lecturers, 11 PhD students, 2 postdocs, and 17 researchers, research engineers and technical/administrative staff members. Immuntechnology has premises at Medicon Village, in immediate association with preclinical cancer researchers at the Medical Faculty of Lund University, as well as to the translational environment provided within Medicon Village. The Department of Immunotechnology conducts research within the areas of immunooncology, sensitization, biomarkers, and associated bioinformatical methods. The Dept. of Immunotechnology also hosts a number of infrastructures of critical importance to our own research that also offers services to researchers in Lund, and beyond.

# External panel report

# **Executive summary**

The Biomedical Technology panel had two Units of Assessment (UoA) for evaluation: Biomedical Engineering and Immunotechnology. Both UoA function well and are successful with complementary structures. The information provided by the UoA in the self-evaluation reports, on-line Zoom-meetings and answers to follow-up questions enabled the panel to suggest long-term recommendations to the UoA, the Faculty of Engineering and Lund University. Both of the units, Biomedical Engineering and Immunotechnology, have extensive scientific networks and collaborations locally, nationally and internationally, and conduct front-line research together with medical, clinical, life sciences and bioinformatics collaborators, as well as industrial partners. The two UoA are complementary in their activities. Immunotechnology provides up-to-date competence and infrastructure (instrumentation) for basic and applied research related to immunology and its (clinical) applications, whereas Biomedical Engineering provides their collaborators with newly developed instrument ideas for several biomedical and clinical applications. In this report, we give a few detailed recommendations to the UoA, but most of our recommendations are general, including recommendations for the faculties and university management. Our long-term suggestion is that Lund University establishes an interdisciplinary and interfaculty strategic hub incorporating biomedicine, biotechnology and bioengineering (thus including Biomedical Engineering and Immunotechnology) to strengthen research, education and innovation in an area where LU already has a good international position. Our short-term observations relate to the best faculty home for Immunotechnology, to a consolidation of Biomedical Engineering at faculty and university level, and to the amendment of the formula for distribution of direct government funding to the Faculties of Science and Engineering.

# Introduction

The Biomedical Technology Panel contained two Units of Assessment (UoA): Biomedical Engineering (BME) and Immunotechnology (IT). All research projects within the UoA are in the areas of biomedical engineering and life sciences. Within Lund University (LU), there are additional research environments also related to these areas, but they are assessed by other panels within the RQ20 organization.

The panel was composed of experts covering the scope of the two UoAs in Biomedical Technology. It consisted of six highly qualified and dedicated evaluators, namely:

Sergio Cerutti, Emeritus Professor in Biomedical Engineering, Politecnico di Milano, Chairman of the B-cube Laboratory (Biosignals, Bioimaging and Bioinformatics) at the Department of Electronics, Information and Bioengineering (DEIB). His research activity is dedicated to various aspects of biomedical signal and data processing and modelling, mainly related to the cardiovascular system and in the field of neurosciences. He is a Fellow member of IEEE, AIMBE and EAMBES, and member of other international and national scientific associations.

Susan Gibbs, professor of Skin and Mucosa regenerative medicine, Amsterdam University Medical Center (location VUMC) and Academic Center for dentistry Amsterdam (ACTA).

Research focus lies with developing next generation immune competent skin and oral mucosa tissue engineered constructs to understand the (patho)physiology of adverse scar formation (keloids, hyper-trophic scars) and to understand similarities and differences between skin and mucosa wound healing as well as allergic and irritant contact dermatitis with the aim of identifying novel drug targets and person-alized as well as general therapeutic strategies.

Inger Sandlie, professor at the Department of Biosciences, University of Oslo, and deputy director of a Federation of Clinical Immunology Societies Centre of Excellence. Her research group studies structure and function of antibodies and T-cell receptors and engineers these specific immune system detectors for use in therapy and as research tools. She is a member of the Norwegian Academy of Science and Letters and has received awards for scientific innovation.

Kristiina Takkinen is Senior Principal Scientist at VTT Technical Research Centre of Finland Ltd. Her research is focusing on the discovery of novel recombinant antibodies by the antibody engineering and phage display technologies for diagnostic and therapeutic applications and their exploitation in bioanalytical platforms.

E.M.J. (Sabeth) Verpoorte is Chair of Analytical Chemistry and Pharmaceutical Analysis in the Groningen Institute of Pharmacy, University of Groningen, The Netherlands. She has worked in the microfluidics (lab-on-a-chip) field for 30 years, since the inception of this field. Present research interests include the development of organ-on-a-chip systems, microfluidic particle separations, paper microfluidics and miniaturized analytical instrumentation. She is a Fellow of the EAMBES and the RSC, and is involved in a number of national and international scientific advisory organizations.

Ingemar Lundström, professor (emeritus) of applied physics, Linköping University, acted as the chairman of the panel. Professor Lundström has been working with physics applied to chemistry, biology and medicine; for example biospecific interaction analysis based on surface plasmon resonance, the physical principle used in the Biacore technology. He is a member of the Royal Swedish Academy of Sciences and the Royal Swedish Academy of Engineering Sciences.

Material from the RQ20 leadership together with the self-evaluations and Zoom meetings in the beginning of May provided the background for the present report. On the 5<sup>th</sup> and 6<sup>th</sup> of May, respectively, the evaluation panel had two Zoom meetings each day with the representatives of the Departments. In the morning meeting, research focus, infrastructure and research networks were presented in detail, and in the afternoon meeting, answers to the questions raised by the evaluation panel beforehand and submitted to the RQ20 leadership were discussed thoroughly. These questions were collected at a Zoom meeting early in March and through e-mail correspondence. On 7th of May there was a Zoom meeting with faculty and department leaders to discuss some general questions related to the two UoAs. The Zoom meetings in May also included Zoom meetings of the panel alone (four altogether). Zoom meetings in smaller groups and e-mail correspondence led to the first draft of the report. Follow-up questions to the UoAs (to be formulated before 12<sup>th</sup> of June) were collected by the chairman (through e-mail correspondence) and submitted to the RQ20 leadership in due time. Some of the answers to these follow-up questions are included in this report. A Zoom meeting with the whole panel was held on  $22^{nd}$  of June, mainly to discuss the outline of the final report regarding recommendations, strengths and weaknesses, and the time schedule and work until the 1<sup>st</sup> of September. A new version of the report was ready by the end of June, edited and commented upon by the panel members. An updated report was then submitted to the panel in the middle of August. The report was discussed at a Zoom-meeting with the panel (on the 25th of August) and finally edited again before its submission to the RQ20 leadership.

# **Observations: Biomedical Engineering**

The Division of Biomedical Engineering (BME), the UoA under consideration in this section, was formed in 2014 by merging research groups from three existing departments in electrical measurements, medical signal processing and biomechanics, respectively. BME is actually the largest of three divisions making up the Department of Biomedical Engineering in the Faculty of Engineering, the other two divisions being Engineering Geology and Industrial Electrical Engineering & Automation (evaluated by other panels). In the self-evaluation report, BME calls itself the Department of Biomedical Engineering, which is also adopted by us in the text.

## Leadership

BME was formed to develop and strengthen interdisciplinary (and interfaculty) research in engineering, medicine and life sciences at LU, and to increase the national and international visibility of biomedical engineering research at LU. This last item became rather urgent about a decade ago, when the first programs for funding biomedical engineering at a federal level in Sweden were established, to the exclusion of LU. It was clear to biomedical engineering researchers at LU that they needed to consolidate their efforts to be better recognized both nationally and internationally. Furthermore, it was realized that BME was a much-needed asset to support the Biomedical Engineering BSc/MSc program in Biomedical Engineering, launched, interestingly enough, in 2011, prior to the actual establishment of BME.

At the time of its formation, the research on biological tissue and clinical material at BME was moved from the E-building (Engineering campus) to the Biomedical Center (BMC) next to LU Hospital. Of the employees at BME (~55), about 2/3 are still located in the E-building, with remaining employees at BMC. The very innovative and excellent research at BME is driven by the collaboration with preclinical and clinical research partners through an extensive network which has increased significantly from 2014 until 2018. Noteworthy, the number of collaborative projects with research groups at the LU Medical Faculty has increased from 16 to 42 during this 4-year period. The top-quality, front-line research at the interface between engineering and biomedical sciences, including clinical applications, is performed within six well-established interdisciplinary and translational research areas, namely 1) Biomechanics, 2) Biomedical Signal Processing, 3) Nanobiotechnology, 4) Neuroengineering, 5) Proteomics and 6) Ultrasound in Medicine and Biology.

As of 2018, BME comprised 30 faculty members and researchers, 17 PhD Students, and 6 technical and administrative staff members. This number has not changed significantly in May of 2020, with a total of 58 division members spread over the categories. The six focus areas above are led by four full professors, nine associate professors and three assistant professors at BME in collaboration with professors and PIs at the Medical Faculty and other departments. Running projects employ 21 PhD students, 5 postdocs, 10 researchers, 1 research engineer, and 1 research assistant. Administrative tasks are performed in part by a grant manager and 3 administrative personnel. BME has an organization that promotes initiatives at the group level regarding research planning and initiation of new research (see Recruitment etc. below).

Priority setting, including goals for external research funding. The Department is very successful in obtaining research support from external sources, both with respect to personal grants and large national/international (EU) consortium programs. Funding has been quite consistent over the review period for this group of scientists, as evidenced by the relatively stable number of division members. Several of the senior scientists have or have had prestigious (personal) grants from EU, SSF, VINNOVA and KAW (Knut & Alice Wallenberg Foundation). The Department is to 75% (~60 MSEK/year) funded by external sources with the rest of the yearly budget coming from direct government funding (DGF) in roughly equal amounts for research and educational programs (~10 MSEK/year each). The DGF for research is mainly used for co-financing of external grants. All researchers are required to submit grant applications. This requirement is important both for the long-term survival of the Department and for the opening of new research areas, in which BME has been quite successful. However, more projects require co-financing (matching) than can be covered by DGF, and prioritization of projects for receiving DGF support is thus difficult. The external funds are mainly used for salaries and running costs in the projects. Investments are suggested at the group level and coordinated with the Head of the Department to explore different possibilities for financing, as no substantial funding is available at the Department, as discussed above.

*Recruitment, promotion and succession.* The strategy is to find the needed competence in strategic research areas, which is a challenging task due to the lack of "free" money. The large external funding makes it, however, possible in specific cases to help with "bridge financing" for the establishment of a new position (e.g. "recruitment of successful homecoming postdocs"). Furthermore, BME's engagement in BSc and MSc programs can provide "missing salaries" for a few seniors. All PhD students have part-time teaching assignments (20% of full time). Furthermore, the engagement in educational programs gives an excellent opportunity for the recruitment of new PhD students. The researchers are encouraged to apply for promotion to lecturer/associate professor/professor, when they have obtained the necessary experience (established an independent line of research, proven research and teaching skills, supervised PhD students, achieved international visibility, etc.) and participated in pedagogical and leadership courses. If a young PI cannot follow up with external funding, more teaching can help to keep the position since the DGF for research is very limited. The collaborations/contacts with start-ups and established companies offer inter-esting possibilities for careers outside the academic world both for young and more established researchers.

The replacement of a retiring professor depends, to a large extent, on whether there is any candidate for promotion to professor within the department. Due to the lack of specific/free funding, it is today rare that new professorships are publicly advertised. Younger researchers on time-limited positions are regularly recruited. Currently, this includes 4 PhD students and 2 postdocs financed by grants from SSF (Swedish Foundation for Strategic Research) and VR (Swedish Research Council). *Publication patterns.* Whenever possible the department publishes in open access journals. They work towards strategies to share research data in accordance with open data principles published by VR in 2018. There is a clear indication that manuscripts should be suitable for publication in the top 25% of the journals (Q1) in the respective focus field (an objective formulated within the different research groups long before BME was established). Journal publication is generally preceded by international conference presentations. The editing and writing of books in areas where the research groups have a leading international position are other important parts of the publication strategy. The number of publications (341) during the evaluation period, of which 250 in peer-reviewed journals, many of them in Q1 journals, is certainly satisfactory. With 250 peer-reviewed papers and 16 PIs, each PI published an average of 3.1 papers per year over the 5-year review period.

The balance between activities in research, education and external engagement. There is no doubt that research is the most important activity of the Department. The faculty members have been mainly recruited on their research merits as shown by the fact that they have gained their own external funds to finance (the main part of) their employment. Staff only hired for teaching is rare today as all researchers take an active part in teaching. The BSc and MSc programs at the Department have made teaching more important and demanding at BME. The 28 courses (almost 200 ECTS) range from the first-year introductory course to final-year advanced courses, some directly related to ongoing research at the Department. Some bachelor projects are performed in collaboration with the University Hospital, local start-up companies, or research groups outside the department as a part of the course "Bachelor Projects in Clinnovation" to explore ideas coming from various clinical settings. Among the MSc projects, half relate to health care or industry and half to research problems within the focus areas. Research projects in collaboration with industry have led to the creation of two successful spin-out companies during the evaluation period, AcouSort and Cardiolund, now offering commercial products.

Department researchers, and particularly those in the earlier stages of their careers, are active in many media to highlight their research results, including radio, TV and social media. Researchers at all levels take part in public outreach, such as writing popular science articles and giving lectures to the general public and high school students, and in initiatives to attract future female students. Further, a virtuous fusion of research and training is properly fulfilled through a close interaction between the Department members and the BME curricula, with a clear reciprocal enrichment process. The activities above are strongly encouraged and supported by the Department. In conclusion, the Department seems to have an excellent mixture of high-level research, education programs, industrial collaborations and societal outreach activities.

An important vision is to further strengthen the current close interplay between research and education, ensuring that new research areas are introduced in the BME program.

The overarching research strategy. "The overarching research strategy of the department is driven by the collaboration with preclinical and clinical partners, evidenced by the extensive network established over the years". This citation, which is taken from the self-evaluation report, fits extremely well with the impressions the panel got from the report but especially from the meetings/discussions in the beginning of May. Furthermore, this strategy is in accordance with the strategic plans of the faculty and LU, for example, in relation to the necessity and support of interdisciplinary science and the use and support of large infrastructure investments in Lund and the rest of Sweden (e.g. MAX-IV, ESS, SciLifeLab). The main goal is to perform top-quality, front-line research at the interface between engineering, medicine and life sciences. The Department strives to develop a collaborative research community, including a healthy balance of basic and applied research, and to promote the advancement of technology, innovation, and transformative ideas. It constitutes a fundamental vertex of an ideal triangle describing the relevant interactions with Health Care and Industry in the area of interest. One important task after the first five

years as a new Department is to promote further growth and to maintain the present national top-ranking and internationally highly competitive position in the research. Each focus area has several research lines, which were generally started as engineering developments and have matured into medically or life science-oriented projects of high international quality. It is envisioned that the platform development will give new life science tools enabling breakthrough research in fundamental biology and biomedicine.

While all the PIs presented future plans for their own research lines, the overarching research strategy is somewhat loosely defined. To provide a strong basis for BME, management might consider putting a more concretely formulated overarching strategy on paper. This will provide the possibility for this team to anticipate changes in the funding landscape, as well as remain at the cutting edge of research in the different focus areas.

There was no attempt to identify some internationally leading groups within the focus areas for comparison with BME. Such information would have been interesting even without a full benchmarking procedure.

*Strengths:* Excellent research output; Active collaboration with medical faculty leading to new research lines; Good balance between research, education and external activities; research-infused teaching.

*Weaknesses:* Lack of comparison with (two to three) international front-line research groups in some of the focus areas; Though research goals for individual projects are well defined, research strategy would be further improved by defining a clear vision and mission to guide future recruitment.

## **Collegial culture**

The large engagement of the Department members in educational programs of BME contributes a lot to the collegial culture at the Department. There is a so-called Researcher Forum involving all employees at the Department with a PhD, which takes place four times a year for discussions on topics like research strategies, PhD student supervision, financial matters and university guidelines. Some of the research groups have weekly or biweekly meetings with presentations and discussions.

The Department is very successful in acquiring external grants and in encouraging young researchers to develop their independence. The Department participates in several academic networks and collaborations, as well as in several EU-funded projects. Its extensive collaboration with biomedical and clinical researchers is impressive and important in making biomedical engineering a general asset to, and a successful scientific priority at, Lund University.

Biomedical Engineering is an interdisciplinary science, requiring collaborative efforts with other Faculties dealing with Life Sciences (Biology and Medicine), and enabling development of novel solutions for diagnostic and treatment needs in healthcare. In this way, many collaborations are encouraged with other engineering specialities on determined topics of common interest; but the key role of biomedical engineering and life science applications is played by the BME department for a better optimisation of the overall research and didactical systems. A very strong point of BME is its contribution to the didactical curriculum which is managed and ruled by the Department (Bachelor, Master and PhD levels), making this a clear reference point for educational activities in Sweden as well as across Europe. Such an initiative is important for completing the academic activity in this emerging area of interest, for creating an environment suitable for an efficient educational service to the community of scientists, to industry and to the governmental careers, for implementing the recruitment of young generation of BME's (inside and outside Academia) and to form important professional figures in this discipline.

Opportunities for junior scholars to develop their originality and independence. The Department hires junior researchers who have demonstrated scientific excellence and potential for independence and originality in research, and have obtained individual grants from external sources (VR, KAW, SSF, EU-fellowships and grants). Several former PhD students at the Department have got scholarships, in competition, to pursue international postdocs. The Department offers an excellent environment for junior researchers, helping them to develop their originality and independence. Their research relies, however, on external individual grants. The Department has no tenure-track positions for junior researchers. Such a possibility would be welcomed to recruit and secure long-term employment of junior researchers.

Sustainability and renewal of research strengths. The lack of equal distribution of funding from LU to the different faculties is a problem here, a universal problem for the entire Faculty of Engineering. Sustainability and renewal are therefore achieved through external funding, where the limited DGF is primarily used for co-funding of external projects. A new PhD student requires that the senior researcher has external funding with full cost coverage for four years. As for other environments, large (national/ international) programs can relocate funds easier. The Department will be strengthened and renewed by the recruitment of an internationally leading scientist from Japan as the Guest Professor in Lab-on-a-chip and Bionanotechnology for four years. This is a strategic decision in Nanobiotechnology and Proteomics taken jointly by three faculties (Engineering, Medical, Science) with support from the Vice Chancellor.

Academic networks and collaborations outside the unit. The networks and collaborations outside the Department are well developed both nationally and internationally, spanning over several departments and faculties. The Department has been and is involved in several EU-projects and actions, like BioWings (research and innovation) and three innovative training networks (LAPASO, MY-ATRIA, PEPMIP). We note, however, the lack of collaboration with the Department of Immunotechnology, the other UoA for the panel, a collaboration which could have a large potential for research in some subtopics of common interest.

*Diversity, integrity and ethics.* About 20% of the researchers and the majority of the postdocs and PhD students have international background, which provides a diversity to the Department. There is an ambition to achieve gender balance. Currently, 1/3 of the researchers are women. 7 of 18 PhD students are women, but 60% of the students in educational programs are women, which suggests a better gender balance among researchers in the future. The Faculty of Engineering allocates money to employ assistant professors of under-represented gender. Clear integrity and ethics standards are maintained via compulsory courses and university guidelines.

*Quality in applications and publications.* The Department submitted 52 applications to the Swedish Research Council (VR) during the evaluation period of which 25% were granted, significantly larger than the general acceptance rate for VR (17.3% nationally, 18.4% for applications from LU). Researchers at the Department have been awarded prestigious grants from ERC and the Wallenberg foundation. There were 341 publications, with approximately 50 papers/year in peer-reviewed journals, and 12% of those in the top 10 citation percentile.

*Strengths:* Large local, national and international networks and collaborations; Clear long term goals for individual research lines; Very successful in obtaining national and international (EU) grants; Teaching a strong basis for community building and for "fifth year for Ph.D. students"; Attractive for female students in BSc and MSc programs

*Weaknesses:* Only seven of 18 Ph.D. students are women; Teaching is shared among the focus areas but not research; No active recruitment plan to achieve the long-term goals.

### Quality ecosystem

*Research strengths and how these are reflected in the educational portfolio.* The research is conducted to a large part in close collaboration with the Medical Faculty Hospital or other hospitals. The collaboration provides a direct link between daily clinical work and research at the Department, which significantly improves the innovative nature of the research with respect to applications. Since a large part of the seniors are engaged in education, the research strengths are reflected in the (multidisciplinary) courses, where the

master program contains subjects directly linked to the research. Multidisciplinarity was an important aspect when the BSc/MSc program was established. The three "specializations" of the master program are closely linked to the research at the Department.

How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research. All types of outreach, like joint projects and exchange of people and ideas, are supported by the Department. The main part of the outreach is directed towards hospitals and industry. The Department collaborates very closely with industry and supports joint faculty/company positions. The contacts with the industry, particularly in the area of BME which has a strong presence in Sweden, create opportunities for grant applications and flow of ideas of benefit for both parties. "Vattenhallen Science Center", directed by a researcher from BME, is an interesting meeting place for the university, schools, the general public and industry where researchers contribute with their experience in the development of new experiments. The quality of the research that the Department performs together with industry, hospitals and other external organizations is very high, and is an important fundament for the national and international success of the department.

How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration. All researchers and PhD students are educated about issues related to ethics and integrity. Conflicts of interest with collaborators are avoided through written contracts. The Department has not experienced any research integrity issues or ethically dubious research. Biobanking and data storage are well organized. The use of LIMS (Laboratory Information Managing System), for these purposes is interesting (coming, we guess, from the collaboration with, and use of, the national micro- and nano-fabrication facility, MyFab).

How the unit uses and capitalizes on available research infrastructure in Lund and elsewhere. Through their extensive collaborations in Lund, in Sweden and internationally, BME has access to necessary infrastructure, regarding traditional and innovative biotechnology developments, including clinically oriented research and nanobiotechnology applications.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized. The Nanobiotechnology group is involved in several SFOs (NanoLund, MultiPark, StemTherapy, BioCare). These involvements are considered strategic for the collaborations with the medical faculty, and the development of microfluidics and lab-on-a-chip concepts for research on cancer- and other biomarkers, embryonic stem cells and cell cultures. Through the involvement in MultiPark they provide entrepreneurial experience to other research environments.

*Strengths:* Research well represented in educational programs; Links with industry in the biomedical area is a "win-win" situation; Broad engagement in several SFOs

## Observations: Immunotechnology

### Leadership

The Department of Immunotechnology was formed in 2007 by merging the former Divisions of Immunotechnology and Protein Technology of the Department of Chemistry and the Department of Electrical Measurements, respectively. Immunotechnology (IT) is located in Medicon Village, in immediate association with preclinical cancer researchers at the Medical Faculty of LU, as well as to the translational environment (clinics and spin-out companies) within Medicon Village.

IT is clearly a coherent unit containing three complementary research areas, immuno-oncology, biomarkers and sensitization, with the supporting state-of-the-art infrastructure. The department consists of a young and enthusiastic staff with a good gender balance, and the teams have a good collaboration and collegial atmosphere within the Department, which reflects good leadership by Head and Deputy Head of Department. The quality of the research is very good to excellent using the newest techniques in the field of immuno-oncology and -technology. Secured access to clinical samples and biobank tissue samples through established collaborations with the Medical Faculty of LU is in place, as are the international networks fundamental for ensuring high-quality research.

The Department consists of 37 employees, including 4 full professors, 3 associate professors, 2 associate senior lecturers, 4 researchers, 2 postdocs, 9 PhD students and 13 research assistants / engineers / technical / administrative staff members. Each of the four full professors leads a research group and all groups are above the critical minimum of staff and students. The Department has a management team consisting of Head and Deputy Head of Department and three senior scientists meeting bi-weekly, amongst others to prepare and organize questions for presentation to the Board.

The Department finds excessive bureaucracy particularly troublesome. This includes the requirements set by University and Faculty. Signatures are required multiple times at different levels. There are many formal requirements and exceptionally slow handling of legal documents, e.g. consortium agreements and agreements with Department spin-out companies, handling of open data and issues regarding patents.

*Priority setting, including goals for external research funding.* The priority is without a doubt to maintain a national as well as international top position regarding research and infrastructure in the immunotechnology field. Activities in the Department are mainly funded by external grants. DGF pays 40% of the salaries of the permanent staff. This creates a continuous pressure and stress on staff to "earn their own salaries". It is puzzling that Faculties at LU are different in this regard, as for example the Faculty of Science provides a larger proportion of the salaries for their staff. The conditions at the Faculty of Engineering are clearly stressful, even if the enthusiastic staff in the Department are willing to see this as a driver to stay alert and competitive. To date, no PI or tenure-track staff has been let go due to a lack of external funding. Nevertheless, a sense of insecurity may certainly be associated with this funding structure, in particular as Faculty funds are quite limited at the Faculty of Engineering.

Goals for external funding are ambitious, and IT has been very successful in external grant raising, despite the strong competition, mainly due to the high quality of publications in good IF journals. Current external funding obtained by the Department is approximately ~ 35 MSEK (two thirds of total budget), which is very impressive. The funding is somewhat flexible, so that technical staff can be moved between projects and are not necessarily directly associated with a single senior staff member. To achieve the presented future research goals, long-term external funding is essential and thus active participation in the coming EU-funding calls is important.

IT has succeeded extremely well in acquiring state-of-the- art infrastructure. This infrastructure is to a large extent funded through participation in several local, national and international centers and research programs. The infrastructure maintenance also requires a lot of external funding. University funding is used to invest in high-end infrastructure facilities, which are extensively used by the research groups in the Department and need to be in close proximity to allow immediate analysis of research samples. The infrastructure runs at break-even costs that do not enable to generate a reserve to solve unforeseen breakdown problems. It would be an enormous advantage if more of the unit infrastructure had Faculty funding. Even if customers pay for service, this does not cover the costs, and overhead costs cannot be included for LU users. Thus, resources are not adequate, and the quality of the research would greatly benefit from consistent and reliable (in terms of amount) funding for the technology platforms. This should be a shared responsibility by LU, as the facilities are used by research groups from Faculties other than the Faculty of Engineering. We note that BME has also established advanced methods with associ-

ated necessary instrumentation of great interest for groups at the Medical Faculty, but it is not possible to make these available to them because of lack of Faculty or LU funding.

If the university would contribute more funding for the infrastructure, the external research grants could be used to finance more PhD students, the number of which, in comparison to senior staff, is relatively low, with 8 seniors to 9 PhD students.

*Recruitment, promotion and succession.* The Department consists of a young and enthusiastic staff, with an unusually good (for the Faculty) gender balance. It has a strong international tradition for recruitment of PhDs, which is partly due to EU-COFUND projects. These projects require that the university co-fund 50%, again emphasizing the limited government funding available, but are extremely important, as they create an important international hub for future collaborations. For each completed PhD thesis, the group receives a substantial bonus, spread over 5 years. This again should stimulate the Department to employ more PhD students, even though it is difficult to obtain the 4-year funding required for each PhD student. An interesting aspect for young researchers is the collaborations/contacts with companies and spin-outs, providing them with attractive career opportunities.

The process of renewal started years ago as the former Head of Department retired, while still remaining an active contributor to the research environment. During this period two past Senior Lecturers further established themselves as Full Professors securing long-term stability in two research areas. An Associate Senior Lecturer (now appointed as Senior Lecturer) was also appointed to secure long-term competence within immuno-oncology. This position is supported by Faculty funds, project funds, and her engagement as Assisting Program Manager in the Biotechnology Civil Engineer program. A proteomics specialist was also appointed in a tenure track position, bringing in expertise in post-translational modification. This position is supported by strategic funding in the field of proteomics, through Faculty funds and future project grants. There is a clear plan to strengthen the antibody engineering by funding a long-term new career position to secure technology transfer before the retirement of the two current professors.

The category "researchers" comprises a heterogeneous group with different aspirations in terms of career development. These aspects are discussed with each individual at annual performance review discussions. If a researcher has a strong desire to move on towards an academic career, the period as researcher may be used to gather additional competences and qualifications to be competitive in an up-coming call for a position of an Associate Senior Lecturer within either the Department or elsewhere.

*Publication patterns.* The majority of publications are open access and peer reviewed in good-level specialty journals. The balance is difficult to find between journal impact factor and the high number of peer-reviewed scientific publications required by the PhD students in order to complete their PhD. It may be difficult to reach the highest impact journals, given the number of publications required for a PhD thesis. This problem is recognized internationally. With 144 peer reviewed papers in journals, a score of 16 papers per Faculty member (FM) is achieved, and therefore 3.2 papers per year per FM. Publication numbers are decreasing, as is the size of the Department and number of PhD students. This could be the result of reduced funding opportunities of the staff and/or the project portfolio being less competitive. This could also possibly be the result of funding being allocated to technical staff, rather than to PhD students.

The balance between activities in research, education and external engagement. The unit has a clear research focus, as teaching currently represents only approximately 10% of the Department's activities. The Department is involved in education programs at the MSc level, but the participation of IT researchers as teachers in existing programs is rather small, leading to limited additional financial support. The research strengths of the Department deserve increased visibility in the undergraduate educational programs. There is likely a great potential for IT to earn more faculty funding for PhD and staff salaries by teaching. Kristina Lundberg is now Assistant Program Manager, and through her engagement in the program management structure, she

promotes biomedical training as part of the Faculty's undergraduate curriculum. Thus, IT is engaged in the proposal to develop the MSc program, Pharmaceutical Technology: Discovery, Development and Production. This MSc program will extend the Department's undergraduate teaching engagement. Historically it has been very challenging to expand the biomedical curriculum within the undergraduate Programs.

At BME, the PhD students participate directly in the teaching, and in this way earn their own salary for a fifth year. However, the CanFast PhDs at IT have EU funding, and therefore teaching is not a strict requirement, but rather an opportunity for them.

Four spin-out companies have been created, which present the double advantage of being an attractive employment for students and post-docs and also providing financial support to the Department in terms of Faculty positions or PhD/post-doc Fellowships and through collaborative projects. The local innovation system (Lund Innovation and their holding company) provides advice, IP background checks, funding for commercial advice and first filing of patents, in exchange for shares in potential spin-out companies and future revenues. Transfer of patent rights, rather than out-licensing to companies, which are spin-outs of the Department, is the norm. Researchers own the IP.

There is extensive societal outreach via schools, culture evenings, presentations / seminars, debates, radio, TV, animal rights organizations and industry. The Department has no direct contact with patient organizations as this is done by their collaborative partners.

The overarching research strategy. The Department presented a clear research strategy with future research goals. Strategic questions are discussed in the management team meetings. The Department has three main research themes, which are excellent. These are within the areas of immuno-oncology, sensitization, and biomarkers, combined with supporting bioinformatics and antibody technology. IT also hosts a number of infrastructures of critical importance to their own research that also offers services to others, both at LU and beyond. Important trends in research are related e.g. to single cell genomics, transcriptomics and proteomics, integration of multi-omic technologies and bioinformatics, spatially resolved tissue analysis and application of novel 3D organoid models and microfluidic assay systems for pre-clinical research and for screening of therapeutic compounds.

*Strengths:* Excellent research infrastructure and (scientific and technical) competence; Efficient recruitment process for replacement of Head of Department; Successful collaboration with Medicon Village, SMEs and medical faculty, Successful translational research; Clear interest in increasing teaching efforts

*Weaknesses:* Decreasing output of research results (number of publications); Limited visibility in Faculty teaching programs (is improving with introduction of new MSc program)

### **Collegial culture**

IT participates as an important member in several academic networks and has extensive collaborations outside the Department. The collaborations are one of their strengths, and a necessity for effective utilization of the infrastructure. One weakness is the lack of close collaboration with other biomedical engineering groups. An interesting aspect for young researchers is the collaborations/contacts with companies and spin-outs, providing them with attractive career opportunities.

Staff meet in research meetings to broaden the scope of feedback and perspective of the research. The Department also collaborates with broader groups on the campus, in particular at the faculty of Medicine. Despite its small size, the Department operates in a larger context defined by LUCC (Lund University Cancer Center), as well as in several local (U-READ, Proteoforms, SCIBLU), national (SciLifeLab, DDD, NBIS) and international infrastructure (EATRIS, Elixir) and Societies (Antibody Society and Adaptive Immune Receptor Repertoire Community). Further, it is involved in various research collaborations (CREATE Health, EU Projects, etc.).
Opportunities for early-career researchers to develop their originality and independence. There is extensive communication between the groups in the Department, which is very important for PhDs and post-docs as well as for initiating new projects. Furthermore, journal clubs, midterm PhD performance evaluations, weekly meetings, national meetings and conferences etc. are organized to further broaden the academic scope of the young scientists. It is recognized that post-docs could receive more grant writing training and therefore postdocs now join an online 7-month program to receive extra training.

*Sustainability and renewal of research strengths.* According to the strategy of the Department, all research topics have senior researchers involved with different backgrounds to ensure transfer of know-how and renewal potential of the research. International recruitment is also strengthening and will presumably bring new ideas to the research.

Academic networks and collaborations outside the unit. There are extensive external academic networks and collaborations in place, but not with other biomedical engineering groups at LU. Internal collaborations with other biomedical engineers could initiate out-of-the-box ideas, as high-impact new research might come from other technology-driven departments which have state-of-the-art complementary expertise. Such collaborations would require a clear university decision plan, which could start initially with a fully funded PhD position.

One might suggest that a guest professor program with some of the international collaborators could strengthen the Department, coming in and co-supervising PhD students and postdocs. A guest professor coming in to lecture, supervise, and discuss for 1-2 weeks is within reach and less of a financial burden than longer-term employments. The research scope of the Department is very well defined, and each guest professor may well be of great interest to most of the staff.

*Diversity, integrity and ethics.* The EU CoFund projects have ensured diversity in the group. Clear integrity and ethics standards are maintained via compulsory courses and university guidelines. All data is stored indefinitely on university servers.

*Quality in applications and publications.* Quality of submitted projects and manuscripts is maintained by colleagues cross reading and scoring. This results in a score from good to excellent (for publications and grant applications). It was also mentioned by the Department staff that IF>20 publications are needed for successful grant applications in the competitive field. However, we find this to be an overestimated assumption e.g. regarding EU funding calls. Active participation in the coming EU-funding calls is important and thus encouraged.

*Strengths:* Strong strategy for future development with well-defined research goals; Strong collegial culture; Strong international network

Weaknesses: Little collaboration with other biomedical engineering groups at LU

#### Quality ecosystem

The quality ecosystem of the Department is excellent. The ecosystem includes national and international research collaborations with clinicians providing the samples. The state-of-art infrastructure of the Department and access to external infrastructure platforms are essential to achieve the high goals of the research. Furthermore, the big data handling of the research results performed by in-house bio-informatics capability strengthened through external collaborations is well established, and increasing this capability continues to be of strategic importance. The Department has a strong track record to commercialize the developed technology platforms and discovered therapeutic lead molecules through established spinout companies. This shows that the research of the Department is in the forefront providing renewal of the biopharmaceutical industry. We consider these spin-outs a particular strength of the Department, showing their capacity for innovation and valorization of the research results. External collaborations are performed with established formal rules and agreements.

*Research strengths and how these are reflected in the educational portfolio.* Mutual positive exchanges are implemented between research and training of the young generation of scientists in MSc courses and PhD training. The Department has been active and engaged to renew the teaching related to one of its core research areas, the development of new biopharmaceuticals. This will be one of the courses in the new Pharmaceutical Technology Master's Program starting autumn 2020. The planned new Biopharmaceuticals course improves the visibility of the IT research in the education. Generally, high-level research activity is carried out where high-level didactical activity and training is carried out.

How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research. The Department collaborates very closely with clinicians from Medicine and has access to biobanks to obtain important patientderived material. Furthermore, they have excellent collaborations with industry, including their own start-up companies. The antibody technology is commercialized via an industrial partner.

How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration. Research integrity and ethics are reached with the help of electronic notebooks, through a proper open access computer coding, which are used for analysing large amounts of data. Data are stored indefinitely, and clinical personal data are stored by clinical staff. Biobanking is well organized. Discussions and documentation of potential conflicts of interest with industrial partners (including their spin-off companies) are continuously taking place. The Department has not experienced any research integrity issues or ethically dubious research. Collaborative project agreements are approved mainly by the Head of Department and, when necessary, also reviewed by the legal department at LU. The Department would like the University to make such processes more efficient.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere. IT has extensive external collaboration networks in Lund and Stockholm as well with international partners, including the use of the available research infrastructure. They are themselves important providers of research infrastructure.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised. The Department was closely associated to the former SFO BioCare with a focus on cancer research, with a vision to "increase survival for cancer patients", and its mission to "contribute to improved and new treatments for cancer patients and improved cancer health care". Prior to the establishment of BioCare, the Department already had a focus on cancer research, for instance through the initiation of, and integration into, CREATE Health. This focus was further strengthened through their move to Medicon Village, near LU Medical Faculty's pre-clinical cancer research, and its association to clinical cancer research at LU and Skåne University Hospital. (In 2019, BioCare was replaced by the University-funded Cancer Center (LUCC, https:// www.lucc.lu.se/) in which the Department is extensively involved).

Strengths: Research results and spin-outs for the biopharmaceutical industry; Involvement in LUCC

#### General weaknesses for Lund University:

Administrative burden-excessive bureaucracy; Salaries for permanent staff not completely covered by LU

#### General weaknesses for Faculty of Engineering:

No substantial funding for sharing faculty technology platforms with potential end-users; No concrete commitment to a tenure-track system that allows recruitment based primarily on scientific excellence

## RECOMMENDATIONS

Lund University has a solid scientific background in the interdisciplinary area of Biomedical Technology (incorporating both of our UoAs, Biomedical Engineering and Immunotechnology). It has an excellent track record in obtaining large external grants related to strategic programs financed by the government, EU and/or private foundations. This is most probably due to the acknowledged competence and activity of the involved researchers and staff, together with their ability to understand early on which political decisions, globally and nationally, will be made to promote different scientific fields. It is of utmost importance that this ability be kept and further developed to maintain and even improve the international position (ranking) of the university. The two UoAs we have evaluated are already internationally well recognized and scientifically successful. We give therefore only a few detailed suggestions for the UoAs we considered, and concentrate on recommendations also involving the Faculty of Engineering, other faculties, and Lund University centrally. We hope that this may increase the competitiveness of the university and the UoAs evaluated in the future.

#### **Concerning Biomedical Engineering**

Short-term (immediate): Create one central Department of Biomedical Engineering, in which all the research units are involved in some kind of biomedical engineering research. The present situation is somewhat confusing to an outsider, as the Division of Biomedical Engineering is embedded in a Department of Biomedical Engineering, together with two other non-biomedical engineering divisions. This situation is apparently the result of some practical considerations with respect to administration. However, it does not give the impression that LU (or the Faculty of Engineering, for that matter) is truly committed to promoting biomedical engineering as a discipline in its own right. From a practical perspective, this action probably should involve splitting the BME division off from its present department of three divisions to form a true biomedical engineering department, with its own board, and placing the other two divisions into a separate entity or entities.

To provide a strong basis for BME, the Department management should consider putting a more concretely formulated, overarching strategy on paper. This will provide the possibility for them to anticipate changes in the funding landscape, as well as remain at the cutting edge of research in the different focus areas.

#### **Concerning Immunotechnology**

The relatively small size of the Department (nine tenured faculty members) makes it vulnerable as a continuous and fruitful research and training entity. The Department should consider strengthening the link with the Faculty of Engineering by joining forces with the BME and/or other departments. This may well increase the visibility of the important multidisciplinary activity which is done and which is hardly appreciated inside a Faculty where only "core" engineering disciplines are represented.

Alternatively, the Department may choose to be a part of the Medical Faculty, as they are located in Medicon Village, close to the Medical Faculty and spin-out companies, rather than at the engineering campus where the Department of Biomedical Engineering is located. The Department consists of an extremely motivated team, and collaboration between the groups within the Department is excellent. Furthermore, the Department has built an extensive infrastructure in the form of proteomics, genomics and flow cytometry. This is not just used in collaborations with the Medical Faculty, but is also provided at a limited fee for service (no overhead included) to other scientists within the Medical Faculty. Therefore, the suggested move might enable the Department to integrate into a larger preclinical unit where it could maintain its own identity, but significantly reduce the amount of administration and bureaucracy which it is now confronted with as a small independent unit.

182

Importantly, such a move may provide a possibility to integrate IT infrastructure into a core facility for a larger group, justifying a request for extra university financing for an operator and maintenance. IT would no longer have to pay these costs as they do now from their own projects.

We suggest that you, within Immunotechnology, discuss the alternatives together, weighing up the pros and cons. Answering the question of whether the research is mainly technology-driven or medically-driven should help with your decision.

Long-term external funding is essential to achieve the presented future research goals, and therefore continued active participation in upcoming EU-funding calls is highly recommended. The research focus areas of Immunotechnology are well presented in these calls. Furthermore, the state-of art infrastructure and existing European networks, as well as collaborations with the spin-out companies, preferred partners in EU grant applications, give a solid starting point for high-level EU project applications.

It may be an idea to include a senior research assistant/engineer in the management team meetings, as the Department is very technology-orientated with 13 research assistants in employment.

To further increase the research output, one might suggest that a guest-professor program with some of the international collaborators could strengthen the Department for co-supervising PhD students and postdocs. A guest professor coming in and giving lectures, supervising, and discussing for 1-2 weeks, is within reach and less of a financial burden than longer-term employments. The research scope of the Department is very well defined, and each guest professor may well be of great interest to most of the staff. A new faculty position (with faculty support) would further strengthen the Department and make a better balance between technical staff and faculty members.

#### Concerning LU, Faculties, Biomedical Engineering and Immunotechnology

Medium-term: The interdisciplinary field of biomedical engineering at LU is an important strategic asset for the future of LU, to build on the present strength of its engineering and medical sciences. We highly recommend that LU prioritize investment in biomedical engineering to consolidate and strengthen the position of the university in this area. Both IT and BME are internationally recognized for their innovative biomedical engineering research. The BME UoA was in fact established in 2014 with the specific goal of putting LU on the "Swedish biomedical engineering map". We strongly believe that biomedical engineering should form the basis for the development of a new multidisciplinary, cross-faculty, research area in Lund. It is worth noting that other didactical and research activities in the field of Biomedical Engineering are carried out in Sweden (i.e. in Linkoping, in Goteborg (Chalmers) and in Stockholm (KTH). Important links could be created at a national level for comparing the different experiences, setting objectives and goals and exploiting possible synergies, with the goal of fulfilling a reciprocal strengthening, even in an international scenario.

*Medium-term:* LU should provide the means to consolidate all biomedical engineering activities at LU into a designated Biomedical Engineering center, whether that center is real (researchers in one organization) or virtual (matrix structure, different groups in different departments brought together). A real center would of course be better, as situating researchers from different areas in close proximity to one another assures more efficient "cross pollination" of research ideas. A real center would also be better, not only for improved coordination, but also for strengthening the biomedical engineering activity, and creating a recognizable and important scientific and cultural interface with the external world.

Long-term: Biomedical Engineering and Immunotechnology are two successful and important activities within the areas of biomedicine, biotechnology and bioengineering at LU. Research in these areas is conducted at the three "wet" faculties in Lund, and some collaboration and coordination exist between the faculties, especially regarding investments in new equipment. However, there is a need to increase the interaction between scientists at the faculties, and promote collaboration, both in research and teaching. We recommend that LU establishes Biomedicine, Biotechnology, Bioengineering as an interdisciplinary and interfaculty strategic area to strengthen quality and interaction in research and education, as well as promoting innovation. Such a strategic area, led by a board with members from (at least) three faculties (Medicine, Science and Engineering), could coordinate and finance interdisciplinary excellent research. The board should have a budget large enough to fund infrastructure investments as well as infrastructure running costs and maintenance, as they often constitute a heavy financial burden for the research group that "owns" the equipment. Researchers within the area, across faculties, have overlapping infrastructure needs, and there is much to be gained by investing in infrastructure that benefits many. Furthermore, the fee for service, which must necessarily also be paid by users from LU, cannot include overhead. LU funding, or at least a contribution to funding of running and maintenance costs, would prevent that research groups hesitate to make their equipment and technology available to others at LU. Furthermore, the strategic area board should have the opportunity to fund ambitious cutting edge or "blue sky" research carried out in collaboration between groups at two or three departments within a faculty or between faculties. They should also invite researchers at different departments and faculties to design and participate in new interfaculty BSc and MSc programs that may be of interest to students. One innovative example could be the area of intersection of Economics and Management with Biomedical Engineering (Bioeconomics) which could take advantage of close proximity to companies in Medicon Village and the collaboration between these companies and research groups at LU.

#### **Concerning LU, Faculties of Science and Engineering**

Both evaluated UoAs conduct fundamental and applied research with advanced medical and biological applications. The success of this research may be measured both in terms of 1) its scientific impact, i.e. how the discoveries influence the direction of future research by opening up new research fields, and 2) its ability to fundamentally alter the direction of an established discipline. The two, "impact" and "transformation", may well occur in different environments (e.g. "isolated" or focused discovery versus front-line collaborative work in larger programs). In our view, both the UoAs fulfil to a large extent these notions of scientific success. It is therefore strange for us that IT and BME systematically receive less DGF for research channelled through LU than they would if they were embedded in the Faculty of Science. It is particularly striking for us as external observers that top-notch, equally successful activities at the two different Faculties are rewarded unequally. Even more striking is that there were really no explanations given during our evaluation for this significant discrepancy in funding, other than that there were "historical reasons" for this. In the interdisciplinary world that is modern-day science, there is no difference in the quality of (applied) research performed at science or engineering faculties in the community of the world's best universities – of which LU is one.

#### Concerning LU

Both UoAs describe excessive bureaucracy as being particularly troublesome. It is important that LU address these concerns.

LU should recognize the added prestige that acquisition of EU funding brings with it by covering possible extra costs.

## Building and Construction Technology

## Panel overview

The Building and Civil Engineering panel consists of thirteen divisions from four departments. Two whole departments are included, one of which, Building- and environmental technology comprises eight departments. For most divisions, the identity lies in the individual division and not in the department. Between some of the divisions there has long been good cooperation, but in general for the panel's divisions this is not the case, there should be a very good development potential regarding cooperation in research, research education and teaching.

## External panel report

Evaluation of P5, Building and Construction Technology

## **Evaluation Committee**

The evaluation committee members are: Professor Anne Steen-Hansen, RISE and NTNU, Professor Berit Balfors, KTH. Professor Johan Silfwerbrand, KTH. Professor Lars Damkilde, Aalborg University. (Chairman). Professor Lauri Koskela, University of Huddersfield Professor Targo Kalamees, Tallinn University of Technology.

The evaluation is based on the 5 self-evaluation reports. In week 19 ( $4^{th}$  to the  $10^{th}$  of May) there was a number of Zoom-meetings with representatives from the different Divisions, Departments and the Faculty. The 5 UoA (Units of Assessment) differ in size i.e. number of staff, teaching and funding resources, and we have not been able to make a total homogenized assessment. The chairman was to a physical meeting in Lund the 9<sup>th</sup> of January.

Based on the discussions the evaluation the panel forwarded a number of questions, and we received answers from the RQ20 secretariat 28<sup>th</sup> of May.

The format of the evaluation report could be chosen freely and we decided a format consisting of 5 separate sections which commented on the 5 self-evaluations. In the sections there will be specific advices/ comments directed to groups or subgroups. Furthermore, we saw some common problems/issues involving the Faculty and Departments/Divisions. These issues primarily deal with the organization of the University, the economy and the educational part, and this is in the last section called Organization at Lund University.

Concerning the University communication, i.e. the web-site, we would suggest that more emphasize is addressed to this. Lund University is by no means an exception; however, this is not an excuse. The logic in the web-page is not clear at least for outsiders. The web-page should be usable for coming students, students, researchers at Lund University but also outside Lund University. The industry should also benefit both nationally and internationally. The web-page is, as in many other universities, built over many years, and at some point a redesign is needed.

Due to the Corona issue, we have only had virtual meetings, and members of the group with previous experience from RQ evaluation have missed the more in-depth discussions, which physical meetings allow.

## **UoA 1: Construction**

The Unit is divided into 6 subgroups, and the self-evaluation treats all of them. The evaluation seems thorough and well reflected. We have decided to make 4 separate assessments due to the quite different research areas called divisions. The 6 divisions are all parts of the Department of Building and Environmental Technology.

## **Division 1: Fire Safety Engineering**

The division was not explicitly presented during the meetings in May 2020, so this report is based on the self-evaluation report, as well as on information found on the website.

#### General

Fire safety is a horizontal topic relevant for a diversity of scientific and societal areas. Linking the division to the Department of Building and Environmental Technology is a logical form of organization, which is also found at other universities. Other organizations may also be fruitful, but the main issue is the possibilities and the willingness to collaborate with different disciplines and divisions.

The self-evaluation report states that the unit "Construction" works with all divisions in the department, also Division of Risk Management and Societal Safety and Division of Water Resources Engineering that are organized outside the unit "Construction". Fire Safety Engineering and RISK were previously in the same division, but the group was separated in two divisions (FSE and Societal risk management) after the RQ14 evaluation in order to have two effective smaller research groups.

In the Division, the total number of employees including PhD students, technical and administrative staff is 16 persons. Information on the web site shows that the gender balance seems to be good concerning all categories of the scientific staff.

#### Economy

Research funding is important for the economy of Fire Safety Engineering. The division has received several grants over the last years from different funding sources. A change in boundary conditions for research funding is noted as a threat. Another threat is a possible reduction in the number of students caused by changed conditions for Fire Safety Engineering in fire and rescue services, and by Brexit in the UK.

A recommendation is to further develop strategies for alternative funding, e.g. by identifying potential partners for joint applications.

## Research

Research plays an important role in the division of Fire Safety Engineering. The division conducts research in several areas, e.g. forest fires, development of fire simulation tools, evacuation. New areas of fire safety research are identified, e.g. new energy carriers, effects of climate changes.

According to the Excel document with an overview of publications for Construction unit, about 90-100 peer reviewed journal papers related to different fire safety topics have been published annually over the last five years, which indicates a substantial and sustained quality and quantity within the area.

## Teaching

According to the website, the division is involved in eleven courses related to both BSc in Fire Protection Engineering and in four courses related to MSc in Risk Management and Safety Engineering.

The self-assessment of the unit "Construction" states that research is reflected in the educational portfolio for most divisions in the unit, this also includes experimental work. We assume this is also the case for the Fire Safety Engineering division, as the group has a high research activity and a well-equipped fire laboratory.

#### Laboratories/Infrastructure

The division of Fire Safety Engineering is responsible for a fire safety laboratory. According to the self-evaluation report, the laboratories are financed with the help of the faculty for one year at a time, which makes the continued long-term development of the laboratories very vulnerable. A more long-term stable funding from the faculty or from LU would be desirable for a positive development of the laboratories. This would also be the case for the fire laboratory facilities, and it should be searched for long term funding for this.

The new tunnel facility at MSB's rescue training centre at Revinge is a good opportunity for more collaboration with both authorities, rescue services and industry, both nationally and internationally.

The close collaboration with RISE Fire Research in Borås gives possibilities to use RISE's experimental facilities in both teaching and research activities.

The collaboration in the use of these unique laboratory facilities is a very positive factor and means an extension of the possible fire safety topics that may be studied in research projects and in students' work.

#### **Cooperation and Networks**

The division of Fire Safety Engineering has a broad and well-developed network both nationally and internationally, and the cooperation concerns both education and research.

According to the self-evaluation report, the division is in the process of starting an international consortium for fire research with other universities of *Universitas 21* in order to start international grants at international level.

The two full-time professors are heavily engaged in management of the International Association of Fire Safety Science (IAFSS), which is a highly recognized scientific organisation in this field.

#### Recruitment and development of staff

There is no specific information about this for the division of Fire Safety Engineering.

#### Concluding remarks

The division of Fire Safety Engineering seems to be a well-functioning unit within the Department, with a balanced staff with regard to both gender and age.

We recommend that collaboration in the use of the fire research laboratory facilities is continued and possibly extended to include other parties, as this could increase the financing necessary for maintenance and new investments. The use of fire laboratory facilities is also of great importance in the courses.

Fire Safety Science is a small scientific area, and therefore the focus on cooperation and networking, both internally at LU and externally, should be maintained.

#### **Division 2: Construction Management**

#### Organisation

The Division consists of 1 professor, 8 researchers (lecturers and readers probably included here), 5 doctoral students and 2 technical/administrative members of staff. The division has been moved to this Department since the last research evaluation.

#### Economy

The economic situation of this division is not separately discussed in the self-evaluation, but it can be assumed that the situation is similar to the whole department, with scarcity of direct governmental funding.

#### Research

The university research portal shows 4 ongoing funded research projects where the Division is involved. It can be assumed that doctoral projects are not listed in that portal.

Judging by the publications, this Division has been able, besides providing teaching in its area, to do interesting and continued research in some areas, especially industrialized construction. Current research topics include accessibility, innovation through product catalogues, energy efficient renovation, and contractual matters. The width of the field is clearly visible in the range of the topics.

However, the impression emerges that the Division is under-resourced in comparison to the breadth of the field as such but also to the future (and already current) challenges confronting the field of construction management. There are three major changes underway in this field: requirements for urgent uptake of radical sustainability measures in construction, rapidly advancing digitalization of construction management (for example Building Information Modelling), and new managerial models (lean construction, new collaborative contractual models). These changes lead, firstly, to the need of updating the teaching curriculum to correspond to the new knowledge sets and skill needs. Secondly, the national implementation of all these three changes can greatly be facilitated and accelerated by appropriate research, often in close collaboration with industrial partners. By its nature, the discipline of construction management would be the natural choice for leadership regarding these changes in the whole Department.

#### Teaching

The Division takes care of the teaching related to construction management. All construction students are offered a basic module on construction process and economy in the second year, and there are several specialization modules on construction management to be taken in the fourth and fifth year.

#### Laboratories/Infrastructure

Due to the nature of its remit, this Division does not need laboratories, except perhaps regarding digital environments, not discussed in the self-evaluation.

## **Cooperation and Networks**

An intense collaboration with industrial partners is rightly characteristic to the Division. The Division is involved in multiple co-operations and networks, for example regarding joint offerings in the framework of the SBU (Swedish Building University). The division also benchmarks itself to other similar units in Sweden through SBU. While this is certainly beneficial, there is also a risk of "groupthink" among units in the same country, and therefore benchmarking to units in other countries is suggested.

## Recruitment and development of staff

The gender balance seems appropriate. There are no specific comments on recruitment and development of staff regarding this Division in the self-evaluation report.

## Conclusions

In terms of a small informal benchmarking, we compared the resources of the Division to corresponding units in three universities, Aalto University, Tampere University and TalTech (Estonia). While the two first have two professors in place for construction management, the third has three, and a new chair for digital construction, to start in January 2021, has been set up. In view of this, and referring to our earlier discussion on the width and challenges of the field, we recommend that the Division is strengthened, say with 1 professor and 1 reader/lecturer.

The Swedish name of the Division is "Byggproduktion". While production continues to be a most important topic in construction management, this title hides that many other stages and aspects of construction are also studied in modern construction management, for example design management and facilities management. We suggest reconsidering the Swedish name of the Division (and perhaps the English one for aligning with the new Swedish).

## **Division 3: Structural Engineering**

The division was not explicitly presented during the meetings in May 2020, so this report is based on the self-evaluation report, as well as on information found on the website.

#### General

The division deals with safety and reliability of structures, timber and concrete structures and computer assisted design and analysis. The staff consists of 1 Professor, 5 researchers (senior lectures) and 6 PhD students. The homepage is a little confusing as it mentions 23 researchers.

#### Economy

The division participates in a number of external projects; however, the financial external contribution cannot be found in the material.

#### Research

The division has in the period from 2016-2020 published 115 papers, and 40 was in International Journals with peer review. All the papers fell within the scope of the division, and all the journals are well respected within their fields.

The papers mostly concentrate on timber and concrete structures, and notably many of these concentrate on condition assessment, maintenance and renovation of structures. There are also papers on safety/ reliability analysis and use of information technology in design/analysis.

#### Teaching

The division participates in a number of courses, and the structural engineering is an essential part of Civil Engineering.

#### Laboratories/Infrastructure

The division has according to the homepage their own laboratory, STRENGLAB - The Structural Engineering Laboratory. The laboratory is part of a larger Swedish University cooperation.

#### **Cooperation and Networks**

The division is according to the homepage involved in 8 ongoing external projects. The project partners are industrial companies and other Universities. The subjects for the projects are all central for the development of structural engineering.

#### Recruitment and development of staff

There is no information on recruitment and development of staff. The gender balance is as in many technical fields skew; however, it is most skew for the junior members of the staff. This issue should be a focus point.

#### **Concluding remarks**

The division has a good level of research and teaching. The field of activity is very broad, and this may prevent research area of very high quality. A relatively young professor has left the division for a couple of years ago, and it might be a good idea trying to find a replacement. Preferably with insight in practical structural design, as the previous professor had.

#### **Division 4-6: Building physics and Building Services**

This report is based on the self-evaluation report, based on the meeting in May 2020, as well as on information found on the website. Divisions Building Physics and Building Services are evaluated together due to their strong collaboration.

## Organization

Divisions Building Physics and Building Services belongs to unit "Construction" within the Department of Building and Environmental Technology. Divisions belonging to a department is very logical and found at other universities.

There are still divisions with similar names in the university, but the historical background of their formation was related to the divergence of ideas between people. Now the divisions have good cooperation between.

In the Division of Building physics, the total number of employees including PhD students, technical and administrative staff is 21 persons. In the Division of Building Services, the total number of employees is 17 persons. Technical and Administrative staff is shared between divisions. Information on the web site shows that the gender balance seems to be good concerning all categories of the scientific staff.

#### Economy

The external financing is crucial as the basic direct government funding is far from enough to establish a broad competitive research basis. Both divisions have received several grants over the last years from different funding sources. In SWOT analyse one of economic weakness was listed: *Unit relies too much on national industrial funding for applied projects; the lack of funding for projects of a more fundamental nature makes it difficult to maintain a high level of scientific competence; could benefit from increased international collaboration. Compared to many of our international colleagues, our permanently employed personnel (lecturers, professors etc) do not have their salaries payed by the university, but need to find essentially all funding by themselves.* 

A recommendation is to further develop strategies for alternative funding, e.g. by identifying potential partners for joint international applications (H2020, LIFE, Interreg, Erasmus+, etc.).

#### Research

Research plays an important role in the divisions of Building Physics and Building Services.

The divisions of Building Physics research in basic and applied building physics, primarily heat and moisture transport and air flow in building components and buildings. They study at the construction of building components such as foundations, outer walls, windows, roofs, and their connections to meet demands on moisture safety, conservation of energy and resources, comfort and indoor climate etc. They develop PC applications based on mathematical models.

Research in division Building Services includes clean air, fresh life; development of calculation methods for arbitrary flow systems; conversion of direct electrical-heated buildings to alternative heating systems; heating, ventilation, and air conditioning systems in buildings; fire safety systems and alternative systems to avoid smoke spreading in case of fire; environmental effects because of installations; treat constructions and installations as one constructional system; analyse and calculate indoor climate for different types of buildings; effects on energy usage caused by consumer behaviour; airflow in buildings using the tracer method.

#### Teaching

According to the website, the division Building physics is involved in 17 courses and Building Services 17 courses. Some courses are common to both divisions. Divisions support with own lectures different programs: architecture, fire engineering, construction technology with architecture in Helsingborg, Surveying and land management in Lund, road and water construction.

#### Laboratories/Infrastructure

Although the laboratory area has been somewhat reduced, laboratory studies are possible. Divisions have large climate chambers and test houses. In addition, a lot of field research is being done.

Today, the laboratories are financed with the help of the faculty for one year at a time, which makes the continued long-term development of our laboratories very vulnerable.

#### **Cooperation and Networks**

The division Building Physics and Building Services has a broad and well-developed network both nationally and internationally, and the cooperation concerns both education and research.

In national level good examples are Moisture Research Centre and National Renovation Centre.

The Moisture Research Centre (FuktCentrum) in Lund is a group of around 40 researchers, PhD students and technicians from five different departments from both Lund University, RISE Technical Research Institute, and Chalmers University of Technology. The primary long-term goal behind Fuk-tCentrum is to improve knowledge regarding the design and construction of new buildings and renovations of existing buildings in order to ensure a proper remediation of moisture damages in buildings. FuktCentrum's mission is to ensure that good practices with regard to preventing moisture problems are implemented in every building project in Sweden. The director of FuktCentrum is Lars-Erik Harderup, senior lecturer in Building Physics LTH.

The National Renovation Center (NRC) collaborates with business and academia to support actors in the construction sector through knowledge building and dissemination of information to carry out an efficient renovation process. The goal is for existing buildings to become more environmentally, economically and socially sustainable in a life cycle perspective with an improved or maintained function to meet the demands of users and authorities. The National Renovation Center shall, through knowledge building and dissemination of information, support various actors in the construction sector in implementing an efficient renovation process so that existing buildings become energy efficient and that their function is maintained or improved to meet the changing requirements of users and authorities. The director of NRC is Dennis Johansson, head of division, Associate Professor.

The divisions have organized large international symposia: 10th Nordic Symposium on Building Physics. 15-19 June 2014 in Lund and 9th International Cold Climate Conference Sustainable new and renovated buildings in cold climates in Kiruna 12-15, March 2018.

#### Concluding remarks

The Building Physics and Building Services seems to be a well-functioning division within the Department. The close co-operation of the divisions is understandable, as they have a responsibility for the energy performance of buildings, a good indoor climate, and moisture safety as well as for future decarbonisation of the building stock. As teaching and research aspects are different, the status of separate divisions is understandable. It seems that no structural changes are needed.

A more long-term stable funding from the faculty or from LU would be desirable for a positive development of laboratories.

Research, teaching and cooperation with industry are at a very good level. Greater participation in international research projects may also be considered. The university or faculty must also support the writing of applications and discussions with co-financers to prevent researchers from coming under severe psychological pressure and that they do not have too much uncertainty about the future.

## **UOA 2: Engineering Geology**

The Division of Engineering Geology has compiled an excellent self-evaluation. In order to move towards the vision and enhance quality of research, a number of measures and activities are listed, which are checked and evaluated annually. This provides a good insight into what is important for promoting excellence in research and teaching.

#### Organization

Engineering Geology is a division within the Biomedical Engineering Department (BME); this is not optimal because the Division is not topically connected to the Department BME.

In the Division, the total number of employees including PhD students, technical and administrative staff is 20 persons, which has been relatively stable during the last 5 years. The division has a rather small number of senior researchers and only one full professor, consequently there is limited redundancy in the organization and the vulnerability can have an impact on future activities.

Engineering Geology is organized as one collaborative unit although there are three different areas of research (Geo-resource Engineering, Non-destructive Testing, and Applied Geophysics).

#### Economy

The turnover is 25 MSEK. Research plays a main role, which is reflected by the fact that the budget for research is about 80% and for education 20% of the total budget. It is stated in the report that "Since the department's economy is strained, co-financing of research projects by direct governmental funds is minimal". A recommendation is to further develop strategies for alternative funding, e.g. by identifying potential partners for joint applications.

#### Research

The relationship between activities in research, teaching and external engagement for the Division of Engineering Geology, shows clearly that the research plays the main role. The division conducts research in three areas; Georesource Engineering, Non-destructive Testing and Applied Geophysics, the research areas overlap partly and collaboration between the research areas is encouraged.

More than 80% of the research budget is external funding obtained in competition. This means that the Division needs to be very active in applying for external funding. According to the self-assessment, the Division has an average acceptance rate of 25%. Today, each research group in the Division is shaping their own activities. What will happen if one of the groups fail in achieving funding? Is there a strategy to handle such a situation? Is there a potential to broaden the research field? How to strengthen the innovative capacity? These are some questions to take in consideration in developing the future strategy for research in the Division. Common to all three research groups within the division is the need to develop forms for collaboration with other Departments or/and Divisions or/and Industry in order to secure long-term funding.

According to the self-assessment, about 10 peer-reviewed journal papers are published on annual basis. This scientific production indicates a substantial and sustained quality and quantity, within the limited number of senior researchers in the Division.

#### Teaching

As reflected in the budget, the research budget is much larger compared to the budget for teaching. The Division is involved in nine courses, within six bachelor and master programs.

In the self-assessment is stated "most of the courses are not very closely connected to the research activities at the Division". The self-assessment presents a number of measures to increase the link between the current research and teaching, for example, to take part in a new international master's program, in co-operation with divisions like Geotechnique/Soil Mechanics and Road Construction. Another possibility is to develop advanced courses that today have a relatively close connection to the research at the Division so that they can be offered as continuing courses for professionals in geo industry. These examples provide possible ways to develop the teaching within the Division. However, it is also a question of availability of staff.

#### Laboratories/Infrastructure

The Division of Engineering Geology is mainly depending on geotechnical and geophysical equipment for field studies. According to the self-assessment, the most applied and developed geophysical techniques can be summarized in electrical methods, seismics and georadar. Moreover, it is stated that the division has a modern infrastructure as regards equipment for field investigations. However, there is a need for laboratory facilities, in particular related to the PhD projects. Today all laboratory work must be conducted at other departments or faculties, often sharing the same lab space. In order to keep the quality in research projects, access to basic laboratory facilities is required. This is a question for the Department to handle, in order to strengthen future research within Engineering Geology.

#### **Cooperation and Networks**

The Division of Engineering Geology have listed areas to be developed in collaboration with colleagues at Lund University, for example with the Department of Geology. But also with, for example, the division of Water Resources Engineering, the division of Building Materials and the division of Geotechnics/ Soil Mechanics. Some collaboration already exists but the collaboration can be strengthened in order to develop future research and teaching. The Division of Engineering Geology has also ongoing cross-transdisciplinary research fields that are under development, for example, with the Archaeology department, which pave the way for successful research cooperation.

The initiative Riksriggen, taken by the division of Engineering Geology in 2009, has been successfully developed during the years. The ongoing collaboration within Riksriggen (2018-2022) consists of representatives from Lund University, Uppsala University, Luleå Technical University and the Linnaeus University in the steering group. The cooperation entails an excellent research infrastructure for scientific deep core drilling. In this context, it is important with a continuation of the annual operational support, which is provided by the Faculty of Engineering, as a part of the strategic investments at the Faculty. Furthermore, the Division has an extensive international network, which is shown in the international research projects, for example, in Bolivia and Mozambique.

In all, the Division of Engineering Geology has a well-developed national and international network and excellent links to the industry, which lay a good foundation for developing future research and teaching.

#### Recruitment and development of staff

Concerning recruitment and development of staff, the self-assessment emphasizes the ongoing generation shift at the Division and a new generation of researchers are being recruited. The future work will focus on their professional progress. The self-assessment addresses the gender imbalance and in the Division strategy it is stressed that "at least one active postdoctoral fellow and one postdoctoral fellow of the underrepresented gender should be recruited".

Furthermore, the teams in the Division seem not well balanced. According to the self-assessment there are too few PhD students, too few senior researchers/full professors, in particular in the fields of geo-re-source engineering and non-destructive testing. This is a challenge connected to the resources and fund-ing opportunities, but also a question of attracting new doctoral students e.g. by making the Division more visible and communicating the interesting research that is going on.

#### **Concluding remarks**

The division of Engineering Geology, consisting of three main research areas, is working ambitiously on improving the quality of research and teaching as shown in the self-assessment. That is reflected in the excellent work on developing a research strategy, research goals and vision. The identified strategic meas-

ures and activities are important factors to proceed the future development of the division. The Division has a well-developed national and international network and excellent links to the industry, which lay a good foundation for developing future research and teaching activities.

Engineering Geology is not topically connected to the Department BME, which implies that it can be difficult to gain support for the research that is conducted at the division. This might be easier if the Division of Engineering Geology would be closer connected to another department, for example, the Department of Building and Environmental Technology. There is already collaboration with several of the divisions within the Department of Building and Environmental Technology, which provides opportunities for co-funding of, e.g. PhD-projects. There is also ongoing collaboration with the Department of Geology, this type of collaboration can be strengthened and developed further in the near future. Access to laboratory facilities is critical and a priority in order to secure further research within the Division. The Department BME has an important role to support the Division regarding laboratory facilities. In order to achieve stable funding, collaborations with other Departments/Divisions are needed and therefore it is essential to continue to plan for developing collaboration, both on short and long term.

## UoA 3: SMAUG – Structural Mechanics, Engineering Acoustics and Geotechnical Engineering

The Division of Structural Mechanics, Engineering Acoustics and Geotechnical Engineering (SMAUG) is a part of the Department of Construction Sciences. This department also includes the Division of Solid Mechanics and LUNARC (The Center for Scientific & Technical Computing at Lund University). The Divisions of SMAUG and Solid Mechanics work within the same scientific framework but with different applications.

## Organization

SMAUG consists of three research areas: (i) Structural Mechanics, (ii) Engineering Acoustics, and (iii) Geotechnical Engineering. It is noted that the research on geo-technology and geology is very fragmented in Lund. Besides the research group devoted to Geotechnical Engineering inside SMAUG, geo-technology and/or geology are also covered by the Div. of Solid Mechanics (inside the same department), the Div. of Engineering Geology (Dept. of Biomedical Engineering) and at the Dept. of Geology (at LU, i.e., outside LTH).

Structural Mechanics and Geotechnical Engineering constitute one cost centre whereas Engineering Acoustics constitutes another one.

SMAUG consists of 5 professors, 1 adjunct professor, 4 associated professors, 1 postdoc, 1 senior researcher and 7-11 PhD students (dependent on how industrial PhD students and part-time PhD students are counted). The research group Engineering Acoustics does not have a full professor, but holds the adjunct professor.

## Economy

The revenue is 25 MSEK, of which 28% are from external sources.

## Research

The Dept. is strong in both theoretical modelling and experimental studies.

Structural Mechanics focuses on FEM, material characterization, testing, and timber structures.

Engineering Acoustics' research is devoted to acoustic laboratory studies and acoustics in timber and other lightweight structures.

Geotechnical Engineering focuses on numerical methods, measurements, clay, rock, and fluid flow.

The research results are mainly published in high ranked peer-reviewed journals and in peer-reviewed conference proceedings. During the five-year period 2014-18, 71 and 52 papers were published in the journals and proceedings, respectively. Additionally, eight PhD theses were published. If the number of supervisors is assumed to be 10 as an average, it means 1.6 PhD thesis annually and 0.16 PhD thesis per supervisor and year or 1 PhD thesis per supervisor every 6.25 year. This seems to be comparably low but can be explained by (i) that at least half of the supervisors are only working part-time at LTH and (ii) that there is a financial problem to start new PhD student projects. This is in turn reflecting the current Swedish funding situation prioritizing short-time innovation projects that do not cover the entire PhD student period.

The journal and conference papers are mainly co-authored by two or more authors. Assuming that every PhD student publishes five papers during her or his studies,  $8 \times 5 = 40$  papers are included in the eight PhD theses. That means that the remaining 83 (= 71 + 52 - 40) papers are likely to have a faculty person or senior researcher as first author (1.6 papers per person and year). This is worth mentioning and a better record than that of an average Swedish civil engineering department.

#### Teaching

The education at SMAUG involves both graduate and postgraduate courses as well as master's dissertations. SMAUG gives a large number of courses (Structural Mechanics 14, (Engineering Acoustics 3, and Geotechnical Engineering 4, totally 21). Considering the fairly small faculty and that several persons only work part-time, the working load on each teacher seems to be high. Since only 30% of the academic staff activities are devoted to teaching (cf. self-evaluation, p. 6), this is even more remarkable.

## Laboratories/Infrastructure

The close cooperation with LUNARC is beneficial for the numerical simulations. At LTH, there is still a suitable laboratory hall for civil engineering purposes, the Construction laboratory facility. The Civil Engineering building at LTH was substantially repaired, reconstructed, and modernized recently. Despite that, it was possible to keep the laboratory that is almost unique in a Swedish perspective. At KTH in Stockholm, e.g., the laboratory facilities have shrunk successively at every department move. A problem, which is highlighted in the self-evaluation, is that the financial support for the experimental facilities are too small. The equipment is expensive to maintain. Finally, it could be mentioned that SMAUG also perform in-situ measurements.

## **Cooperation and Networks**

In the self-evaluation, SMAUG has described its international co-operation and networks. The list covers many famous universities in Austria, Croatia, Denmark, France, Germany, Italy, Slovenia, and Spain in Europe as well as in China and the USA.

The list does not cover Finland, Norway or Sweden. It seems a little bit strange, but might be the result of how the self-evaluation authors interpreted the heading "Academic networks and collaborations outside your unit". In Sweden, there is an academic network called *Sveriges Bygguniversitet* (Swedish Universities of the Built Environment) consisting of researchers and teachers from Chalmers (Göteborg), KTH (Stockholm), LTH (Lund) and LTU (Luleå). It has specific theme groups devoted to structural engineering, geo-technology and building system design & performance, i.e., one theme for all the three research groups at SMAUG.

## **Recruitment and development of staff**

Today, there are five professors at SMAUG. Three of them are retiring in the coming years. There are no immediate plans to replace them. The Division's strategy is to recruit associate senior lecturers (or associate professors) which is a tenure-track position providing the lecturer with possibilities to promotion to professor.

The problem of finding four-year funding for PhD students has been raised above. It is also identified as a threat in the self-evaluation, but any solution to the problem was found neither in the document, nor at the meeting in May 2020. In the autumn 2020, the Swedish Government is anticipated to publish a R&D proposition. Hopefully, it will force the research councils to allocate more research money on long-term research projects suitable for PhD students.

At the meeting on May 6, 2020, it was mentioned that there were on-going processes to recruit one assistant professor in Structural Mechanics, one senior researcher in Engineering Acoustics and one senior researcher in Geotechnical Engineering. The panel has not received any information on the outcome.

#### **Concluding remarks**

SMAUG seems to be a successful department within civil engineering. It has a good balance between research and education but need to recruit new teachers to maintain that balance without jeopardizing the working environment of the academic staff. It has established a modern publication strategy based in international scientific journals and conferences. The department has the benefit of a laboratory and a tight co-operation with the neighboring center for numerical methods (LUNARC). SMAUG is recommended to develop a long-term strategy for recruiting new teachers replacing the three professors retiring. It needs to increase its efforts in finding research money for PhD students since without PhD students the high quality of research will be difficult to maintain. In the long-term, also both teaching and the laboratory will suffer.

The fragmented research and education in the field of geo-technology and geology due to current organization is said to work smoothly. The current good co-operation is likely to be dependent on individual persons at each unit involved. In next re-organization of LTH (universities are always re-organizing), the possibilities of a merge ought to be investigated.

## UoA 4: Water Resources Engineering (TVRL)

The UoA consists of 2 divisions. The Division of Water Resources Engineering (TVRL) and the Division of risk management and societal safety (RISK). Both of the divisions are part of the Department of Building and Environmental Technology.

#### **Division 1: Water Resources Engineering (TVRL)**

#### Organization

The Division consists of 10 Professors (6 full Prof.), 3 emeritus, 6 jr. scientists, 28 PhD students from 12 countries and 3 tech/admins. This is a solid organization with high capacity to develop both teaching and research. The Division of Water Resources Engineering covers various research areas e.g. water resources management, hydrology, wastewater engineering, hydrometeorology, water quality, hydrodynamics and coastal processes. The broad scope of the Division entails a special position within LU with a large number of connections to other research units.

## Economy

The economy is mainly based on external funding which requires development of strategies to secure new funding e.g. by identifying potential partners for joint applications.

The principle in the Division to let all permanent teaching and research staff have a certain percentage of their time covered by direct governmental funding in order to write applications, paper, etc. is excellent to create opportunities for writing high-quality applications within a wide range of research areas.

#### Research

The Division of TVRL has an outstanding and sustained record of publications in leading international journals. This body of work has a significant impact within the discipline. Some of the senior researchers are members of prestigious selective societies (e.g. IVA) and/or leading international societies or committees. In the Division, there is a great engagement with the process of initiating peer-reviewed research funding which is shown in the number of funding sources that are recognized within the discipline to be particularly prestigious and/or competitive (e.g. EU funding, Sida, Formas). The Division can also show outstanding involvement in research collaborations that have delivered strong outcomes and impacts. Furthermore, the Division has a substantial track record of research supervision, particularly of PhDs.

Moreover, the Division has cooperation with some of the University's strategic research areas (SFO) e.g. CMES, MECW, MERGE. The cooperation within CMES, MECW, MERGE includes shared PhD students and according to the self-assessment the SFOs contribute to new opportunities and ideas to TVRL.

How is future research planned within the Division? How are new ideas developed within the Division? In the self-assessment it is stated "An overarching research strategy is under development at TVRL. Among other activities, a national and international advisory board is being established". The advisory board can facilitate the process of developing different research areas and aid in building a centre of excellence. Furthermore, the advisory board can facilitate a transdisciplinary collaboration in order to widen the scope of the applications within the Division. These activities can contribute to a positive impact on the success rate in achieving external funding.

#### Teaching

The Division of Water Resources Engineering offers a wide range of courses for the water sector for example, Coastal Hydraulics, Hydrology & Aquatic Ecology, Fluid Mechanics, Water, Hydromechanics, Environmental Hydraulics, Integrated Water Resources management and Pipe system Engineering and Hydraulics.

According to the self-assessment the international master program, Water Resources Engineering, has in many ways enhanced the educational portfolio of the Division, for example, through broadening international contacts, providing a diversified pool of students and establishing more international cooperation.

#### Laboratories/Infrastructure

According to the self-assessment, the faculty provides resources for innovative facilities such as radar but no additional information about laboratory facility is provided.

#### **Cooperation and Networks**

Excellent national and international networks, which are reflected in the large number of collaborative research projects in the Division.

#### Recruitment and development of staff

According to the self-assessment, a strategy has been setup to continuously work on the succession within the Division. The Division has structured the tenure track for new members of the Division in order to develop their competences and to speed up the process for promotion to full lectures, docents and professors. Furthermore, the self-assessment points out that the recruitment of young researchers has been improved which has altered the age distribution within the Division. These actions are highly relevant in order to further develop research and teaching capacity within the Division. Furthermore, the Division has also managed to achieve a gender balance among the new recruitments (4 female and 3 male researchers).

#### Concluding remarks

The Division of Water Resources Engineering (TVRL) has a solid organization with high capacity to develop both teaching and research. The economy is mainly based on external funding which calls for strategies to increase new funding. According to the self-assessment, an overarching research strategy is under development at TVRL and a national and international advisory board is being established. The advisory board can facilitate the process of developing new research areas; contribute to transdisciplinary collaboration in order to widen the scope of the applications within the Division and aid in building a centre of excellence. These activities can contribute to a positive impact on the success rate in achieving external funding. The Division has an outstanding and sustained record of publications in leading international journals. This body of work has a significant impact within the discipline. Furthermore, the Division can show outstanding involvement in research collaborations that have delivered strong outcomes and impacts. Moreover, the Division has excellent national and international and international networks.

The Division of Water Resources Engineering offers a wide range of courses for the water sector and together with the international master's program; Water Resources Engineering, international contacts and collaborations have increased. A strategy has been setup to continuously work on the succession within the Division. This has resulted in an improved recruitment of young researchers and a structuring of the tenure track for new members of the Division that provides a solid base for the future development of the Division.

## Division 2: Risk management and societal safety (RISK)

The assessment is based on the self-evaluation report and on the PowerPoint presentation given by head of the division, Marcus Abrahamsson, in the meeting with the panel 05-05-2020.

## Organization

The division of Risk management and societal safety (RISK) is a part of the Department of Building and Environmental Technology. The division was established in 2014 after splitting the combined fire safety and risk division into two groups. The division has expanded since 2014 and the scientific staff comprises now 3 professors, 7 senior lecturers, 1 adjunct, 1 senior expert, 3 post docs and 15 PhD candidates.

## Economy

About 50 % of the division's funding is external. The division was originally dependent on funding from the Swedish Civil Contingencies Agency (MSB) but there are more funding sources today. Funding from MSB is still is very important. The number of current research funders are small, which makes the environment vulnerable. One potential threat is a significant reduction in funding from MSB. A general goal for external funding is to broaden the range of potential funding sources.

The division received a grant of 20 MSEK in 2015 establish a research centre focusing on critical infrastructure protection. Additional funding has been secured in that area.

In 2018, they received a grant of 10 MSEK to conduct studies in the area of power relations in Swedish crisis management.

## Research

According to the self-evaluation report, the division RISK has no overarching research strategy. The individual researchers develop strategies and plans for their own research. The unit is working actively to broaden the research, and thereby to be able to apply for funds from a greater variety of funding agencies. The division has a list of approximately 50 international scientific journals in which they recommend their researchers to publish. Out of them, approximately 10 are considered to be at the core of their subject. There are a number of international peer review conferences that they also encourage participation at. The division has routines for quality assurance of each other's work. According to the Excel document with a total overview of publications for TVRL and RISK, there seems to be a substantial number of peer reviewed articles from this divisions between 2014 and 2018.

## Teaching

In the self-assessment, it is stated that all senior personnel are engaged in both research and education. The research is said to be reflected very strongly in the educational portfolio, and all courses build to some degree on research being conducted at the unit.

The unit is now exploring the opportunity of developing courses tailored for professionals working with risk-related issues. The teaching is related to three Master programs, whereof the Master in Risk Management and Safety Engineering is conducted in collaboration with division of Fire Safety Engineering. Various teaching is also conducted in other programs at Lund University.

#### Laboratories/Infrastructure

RISK is not dependent on any specific research infrastructures.

#### **Cooperation and Networks**

Division RISK has a good research collaboration with other divisions within Lund University, and with several international universities.

RISK is part of several academic networks, both national, Nordic and international networks.

The researchers at the unit collaborate extensively with other researchers and professionals in local municipalities, county administrative boards and national authorities. Such collaborations are seen to give rise to ideas for new research applications.

#### Recruitment and development of staff

Division RISK has actively been working to recruit key personnel. The Associate professors and Professors are established researchers, but still relatively young (30-50 years).

The division has a reflected view on encouraging junior scholars, PhD students and young researchers to develop their research and to apply for funding. This support seems as a good procedure in the process of recruiting new personnel. The unit's ambition is to recruit researchers and teachers with various backgrounds and strive for a gender-balance and diversity in terms of scientific background. The number of women in senior positions is, however, low.

#### Concluding remarks

The division RISK seems to represent a relatively young and outward oriented group, and we recommend them to continue on this track.

The efforts to broaden the range research and of potential funding sources should be continued.

The work to increase the senior female scientific employees should be strengthened and should also be reflected in the communication with students and PhD candidates.

We encourage RISK to continue the work with developing courses tailored for professionals working with risk-related issues.

## UoA 5: Lund University School of Aviation (LUSA)

The assessment is based on the self-evaluation report and on the PowerPoint presentation given by head of the Department, Johan Bergström, in the meeting with the panel 06-05-2020. Both the self-evaluation, the PowerPoint presentation and the discussion gave a very good insight in the Department.

## Organization

The Trafikflyghögskolan was founded in 1984 as a commercial flying school, and in 1998 it became part of the Lund University. In the period from 2005-2011 there was a Professor. In 2017 the Department was integrated into the Faculty of Engineering, and research activities were restarted.

## Economy

As stated in the self-assessment report the economy is poor. It is also mention that the current financing of the government supported pilot education is not satisfactory i.e. the overheads, which is necessary are too small. This issue has to be solved; as otherwise, it will drain the research funding.

#### Research

The research has been restarted in 2017, and there have been an increase in research since. There is 3 papers per year in the last 2 years. It is acceptable compared with the number of staff and the initiating phase.

The big challenge in the research is to get the necessary funding. The Department has the goal to attract external funding within the fields

- Unmanned Aerial Systems
- Pilot assessment and training.
- Human factors of aviation, air traffic management and other modes of transport.
- Resilience Engineering.

There might be good opportunities if the applications also were focused on subjects outside air traffic. In a constantly technical more complex world, there is a need for better support of the operators.

## Teaching

The main activities are related to pilot training.

The Department has several activities in order to extend the teaching at the University. There is some interesting issues primarily related to the Unmanned Aerial Systems, UAS. Drones has started to be used in Fire Engineering, inspection on building sites, monitoring the health of structures to mention a few. There will be a need for teaching in flying with drones. For the technical also to choose the right instruments and later interpret the results.

## Laboratories/Infrastructure

The Department has access to pilot training facilities at an airport near Lund. Some of these facilities might also be used in other areas where simulation of human interaction is needed e.g. other forms of transport.

In 2019 LTH decided to fund a jet-engine lab at the airport in collaboration with the Department for Energy Science and the Department for Combustion Physics. We think this is a very good idea, and there will definitely be a demand for this with future new flight fuel. However, it do not seem to be connected to the research at LUSA. The fear could be that this facility might not be financial sustainable.

## **Cooperation and Networks**

The Department seems to be very active and has a good network. As an example can be mentioned that the Department since 2018 is coordinating a Lund University collaboration project on UAS.

## **Recruitment and development of staff**

The Department is very young, and the main problem is to find funding for the staff.

## **Concluding remarks**

The big challenge for the Department is first to get a better economy for the commercial pilot training. The next big challenge is to be more integrated in the Lund University. This process seems to be progressing, and there is no doubt that the head of Department is very active in seeking different directions for the development of the Department.

## **Organization at Lund University**

This section deals with the following issues:

- 1. Organization of the Departments/Divisions in the Building and Construction area.
- 2. The interaction between the University/Faculty and the Departments/Divisions.
- 3. The relations between research and teaching.
- 4. The economy/funding of the teaching/research and Experimental facilities.
- 5. Communication through Web
- 6. Collaborative/interdisciplinary research

The issues are complex, and we do not claim a solution; however, we got the impression that some general problems are not addressed presently.

## **Organization of Divisions and Departments**

The organization of the different Divisions/Departments does not seem logical in all cases. However, during the discussions and reading the self-evaluation we got the impression that in practice it does not prevent cooperation between the different Departments/Divisions. The Departments/Divisions are quite different in their profile due to historical background. We could imagine organizations that are more effective; however, this will need more fundamental changes in the relation to University/Faculty. During the discussions with the Dean, we were informed that he would like larger Departments, which could be more robust both in economy/funding and research/education. At the Department/Division level, the present organization was fine and no suggestions of changes was mentioned. More stability in the economy was wanted.

Many Departments/Divisions have shown very good skills in adapting to new funding sources/new technologies; however, the strategy for most of the Departments is survival. Some Divisions have a more positive development such as Water Resources.

## Teaching

In the discussions with the Dean he told us, that the most important activity at the University is education, teaching. In many other Universities research or research/education would have been the answer. We also got the impression that the Faculty was responsible for all the educations.

The Dean mentioned some general problems

- The responsible for the different educations was not always the most central persons in the Department.
- Changes in the curriculum was a slow and inefficient process.
- Internal fights in the Departments about the curriculum (a lot of historical arguments).
- The payment of the teaching was low i.e. it has to be organized more efficient. Fewer courses more streamlined curriculum.

The Dean also explained that he had the formal rights to change the educations. The Dean also stated that regardless of the nice words about teaching research was the central element in hiring people.

It seems that the cooperation between Faculty/University and Departments/Divisions is not optimal. We do not think that it is a question of finding a guilty, but maybe the roles should be more clear.

## Attracting students

We got the impression that there was no problem in attracting students. This is not the case in all northern European countries. However; it was several times mentioned that it is difficult to recruit doctoral students, especially Swedish-speaking. This seems to be a crosscutting problem. It is recommended that the university should approach the problem in a research-led way, investigating why the PhD places are not attractive to young Swedes.

We think that more effort should be given to the constant development of the curriculum, and maybe defining new teaching activities. Some Universities invest in e-learning/virtual courses, and maybe there should be more cooperation between the Swedish/Scandinavian Universities. The income through teaching is not always sufficient especially for smaller courses/educations.

#### Economy

The problems for the Departments is mainly due to an unstable economy, which typically will lead to short-term optimization (a Danish word states, "it is expensive when you are poor"). Many leaders use a lot of time on this issue, and it is unfortunately not a unique Lund University problem.

As the Departments/Divisions in general are small it easily results in resistance to enter in larger restructuring e.g. in education. It is also very difficult to develop staff, as it is a more long-term investment.

A big issue in almost all the Departments were the financing of Laboratories. We believe that a reduction/rationalizing of the Laboratories is needed. Interesting was that a successful Division, Water Resources, had very small laboratories. It should be possible to cooperate with other Universities in the neighborhood, e.g. DTU in Copenhagen, Chalmers in Gothenburg and Linnaeus University in Växjö in southern Sweden.

#### **Communication through Web**

Concerning the University communication, i.e. the web site, we would suggest that more emphasis is addressed to this. Lund University is by no means an exception; however, this is not an excuse. The logic in the web page is not clear, at least for outsiders. Furthermore, the web pages are in several cases outdated. The web site should be usable for incoming students, students, researchers at Lund University but also outside Lund University. The industry should also benefit both nationally and internationally. The web site is, as in many other universities, built over many years, and at some point, a redesign is needed. In addition, a clear system of accountability and oversight is needed.

## Collaborative/interdisciplinary research

A number of modalities through which interdisciplinary and collaborative research is initiated and funded at Lund: *Starka forskningsmiljöer* (strong research environments), *särskilda forskningssatsningar* (special research investments) in the form of *tematiska samverkansinitiative* (thematic collaboration initiatives) and the think tank LU Futura. Further, the Faculty of Engineering has defined its core areas (climate, digitalization, industry, built environment, life) and coordination in these areas is being enhanced.

The impression emerged that the participation of Departments considered in such collaborative endeavors has been somewhat modest. The current drone initiative (a thematic initiative) was discussed but somewhat unexpectedly, it seems that construction applications are not covered in this very useful and interesting effort. As research funding increasingly is channeled through collaborative/inter-disciplinary programmes, it is recommended that the Departments and Faculty pay increased attention to proactively suggesting and being involved in such initiatives. In addition, we recommend a bottom-up scheme where researchers from different Departments and Faculties could jointly apply for internal funding for preparation and planning of interdisciplinary projects.

#### **Final remarks**

In the discussion, Professor Ton de Kok from Eindhoven questioned the long-term stability of the Faculty. Aging staff, unsecure funding of staff and more attractive positions in industry etc. We agree in this, and unfortunately, it is not breaking news. In many universities, the tendency is the same especially in the technical areas.

Below we have stated the tasks we find most important for the leaders of the Faculty and the Departments:

- 1. Stability in the economy for the Departments
- 2. Creating a better environment for educations
  - a. Constant development of the curriculum.
  - b. Constant development of staff qualifications in teaching.
  - c. Cooperation with the Industry
- 3. Be a facilitator of the inter-departmental cooperation regarding research and teaching at Lund and with other Universities/Research center national and international.
- 4. Encourage and monitor the research activities in the Departments, and discussing with the Departments on the results.
- 5. To improve internal and external communication, especially the website.
- 6. Fighting for the resources at Lund. It seems as the natural science and medicine are given more than their fair share.

## Built Environment

## Panel overview

The panel consist of several applied research areas divided into seven units of assessment, namely: 1) Architecture and Built Environment, 2) Work environment and rehabilitation technology, 3) Innovation, development and design, 4) Packaging logistics, 5) Transport and roads, 6) Real estate science and 7) the International Institute for Industrial Environmental Economics (IIIEE). The first 6 UoAs are situated in three departments at the Faculty of engineering (1 at dept. of Arcitecture, 2,3,4 at dept. of Design sciences, 5,6 at dept. of Technology and society) while IIIEE is situated at USV. Common themes for the UoAs are research related to societal challenges, to the needs of different users and customers, and different aspects of sustainable development. The research is typically applied, and based on empirical data and socio-technical contexts and positioned in the intersection of humanities/social science and engineering. The research arena is global. Financially all the UoAs are very dependent on external funding which drives the researchers to aim for relevant research topics that are provided by the research founders. While there are several common aspects among the UoAs related to methods, theory and empirical contexts, research collaboration between the different UoAs is seldom conducted. Finally, while scientific publications are prioritized by all UoA the type of research carried out is built on and carried out in order to solve problems i.e. the there are many other ways ongoing to disseminate research results besides publications. This involves in-depth involvement and action in close cooperation with externa actors with prototypes, exhibitions, products, patents, concepts etc. as output indicators and quality aspects of research.

## External panel report

Final Report, 1 September 2020 Abdellah Abarkan, BTH Erik Arnold, Technopolis Group (chair) Michael Bourlakis, Cranfield University Marjan Hagenzieker, TU Delft Kathryn Janda, UCL Magnus Svartengren, Uppsala University

## Summary

Our report covers five units of assessment (UoAs) within the Engineering Faculty of Lund University (LTH) and a free-standing institute (IIIEE) that reports directly to the rector. It contains our overall view of the six UoAs and their context at Lund University, followed by a short appendix for each of them.

While the UoAs are at slightly different stages of development, they have many strengths. Their research appears to range from good to excellent. They are committed to teaching as well as research and provide a collegial and supportive environment in which students and academics can develop. They are well networked with external knowledge producers and users, especially in Sweden, and attract significant amounts of external research funding.

Most of the weaknesses we observe seem to have their roots in the fragmented structure and organisation of research at LTH. Research groups tend to be small, making them vulnerable to fluctuations in research income, complicating human resource management and limiting their ability to develop and implement strategies. The governance and deployment of institutional research funding makes it hard to invest in new areas or to set priorities. Lund University's culture militates against the formation of larger research centres or working across organisational and disciplinary boundaries. Most of the UoAs we reviewed are solid but not always among the world's best. The most impressive was IIIEE, which stands outside the university's normal model, as a centre reporting directly to the rector. We also note that CIR-CLE – part of which is within the remit of this panel – earlier built its global reputation when it was a Linnaeus centre, similarly standing outside the normal university structures.

Competition for students and research money is becoming more intense in the university world. Rapid development outside Europe and the USA – not least in China but also in other parts of the world – means that we Europeans have to run faster in order to stand still. The urgent need to address the societal challenges means that universities need to be able to reconfigure themselves rapidly and probably continuously in terms of interdisciplinarity, ability to work with more parts of society, and their internal organisation. Based on the UoAs we reviewed, the university's response to the changing situation needs to include developing more sustainable and proactive research groups able to develop and implement competitive strategies that are allowed to cross organisational boundaries. The university needs to be able to make more strategic use of its institutional research funding and other assets, building scale and excellence where appropriate. This in turn has important implications for university governance, organisation and culture.

204

## Introduction

The Built Environment panel is responsible for six units of assessment (UoAs). These, and their distribution across the organisation of Lund University, are shown in Table 1. All but the IIIEE are in the Faculty of Engineering (Lunds Tekniska Högskola – LTH). Lund's faculties are divided into Departments, and each Department is in turn split into Divisions, which in some cases have fewer than ten faculty members and not always a dedicated professor. This degree of fragmentation – a common problem among universities – is reflected in the make-up of some of the UoAs we consider.

One UoA (IIIEE) and one division (Innovation Studies) are different. IIIEE was set up by Act of Parliament and is partly funded by a foundation (SIIIEE) established for the purpose. The Innovation studies division in the Design Sciences department comprises about one third of the CIRCLE centre for the study of innovation. CIRCLE was established on the basis of a long-term Linnaeus grant as a free-standing centre under the rector. In 2018, its members were absorbed into different faculties, though it carries on as a virtual centre.

Departments	UoAs	Divisions*	
Architecture and Built Environment	Architecture and Built Environment	Architecture Environmental psychology Energy and building design Housing development and management	
Design Sciences	Innovation, Development and Design	Innovation studies (part of CIRCLE) Industrial design Innovation engineering Product development	
Design Sciences	Ergonomics and Aerosol Technology and Rehabilitation Engineering and Design	Ergonomic and aerosol technology Rehabilitation engineering and design	
Design Sciences	Packaging Logistics	Packaging Logistics	
Technology and Society	Transport and Real Estate Science	Transport and roads Real estate science	
Free-standing centre under the rector	International Institute for Industrial Environmental Economics	International and national policy intervention Urban governance and experimentation Business management and practice Consumption governance	

Table 1 Organisational locations of the UoAs

\* As a free-standing research centre under the rector, IIIEE has its own internal structure that does not conform to the general university faculty / department / division model

The UoAs all do rather applied research, involving social and technical dimensions, that relies on both theory and access to users and their problems in order to do high-quality, societally-relevant research. The issues addressed and the corresponding research communities are global, so the UoAs need to be well-connected with both international science and problem-owners.

The topics addressed in the UoAs in scope to the panel are rather disparate. Our approach to the review was to ask panel members with the most relevant thematic or disciplinary knowledge to lead our work with each UoA. We assigned a 'first reporter' for each, based on panel members' own judgements of the relevance of their priori knowledge, and a 'second reporter' from among others in the panel who also had relevant knowledge. The first reporter led the drafting of the individual UoA analyses shown at the Appendix to this document, supported by the second reporter. The entire panel read all six self-assessment reports (SARs). The need to conduct the 'site visits' via Zoom meant that in a small number of cases individual panel members were unable to attend all the sessions, but most members of the panel were present

and were able to contribute to the questioning and discussions<sup>56</sup>. All panel members had an opportunity to read, comment on and approve all the UoA-level analyses as well as this overall panel report. The entire report has subsequently been sent to the UoAs for fact-checking and corrections made, as appropriate.

Table 2 Panel members' lead responsibilities for UoA analyses

UoA	First reporter	Second reporter
Architecture and Built Environment	Abdellah Abarkan	Kathryn Janda
Innovation, Development and Design	Erik Arnold	Abdellah Abarkan
Ergonomics and Aerosol Technology and Rehabilitation Engineering and Design	Magnus Svartengren	Marjan Hagenzieker
Packaging Logistics	Michael Bourlakis	Erik Arnold
Transport and Real Estate Science	Marjan Hagenzieker	Michael Bourlakis
International Institute for Industrial Environmental Economics	Kathryn Janda	Erik Arnold

Exercises such as this one always have limitations. They are done at speed based on limited information. In the context of COVID-19, we have been further limited by the impossibility of doing real site visits, so we have talked to fewer people than was intended (in particular, we have not talked to early-career faculty or doctorands), we have not seen the physical context of the research or the infrastructure available, and the panel has been unable to have the longer and more relaxed discussions that usefully inform such work. We nonetheless believe that we have been able to collect and assimilate enough information to develop a joint external perspective on which we have based some advice to the divisions, departments, and the University. We are immensely grateful to the colleagues in the UoAs at Lund and the RQ20 team for their work and support under difficult circumstances.

#### Leadership

As Table 1 indicates, most of the UoAs considered here do not correspond to single organisational entities. As far as possible, we have tried to consider them in their respective organisational contexts in that they are made up of several different groups.

Strategic ambitions at department level – and indeed at faculty and LU levels – tend to focus on enabling factors such as doing good quality work, nurturing talent, observing principles associated with responsible research and innovation (RRI), and so on. Little is said in the SARs about thematic focus, and where higher-level strategies address thematic questions, they do so at such a high level of abstraction as to forbid little. Rather, the divisions mainly generate their activities organically and bottom-up, which results in fragmentation not only between but even within divisions. Fragmentation – which is a problem in many universities – in turn reduces group sustainability and impedes thematic strategy formulation, investment and deployment. A particular problem is that by fragmenting institutional research funding, fragmentation of research makes it hard to collect sufficient discretionary resources in one place to make strategic investments, for example in new themes, methods or moving beyond the existing state of the art in order to build strength. This mode of organisation, which is the typical pattern at LTH and at many other universities, both in Sweden and outside, contrasts with that of IIIEE, which – as a free-standing institute under the rector – can make institute-wide strategy, manage its overall research portfolio and strategically invest parts of its institutional research funding.

Small group size makes it hard to capture large funding opportunities, such as centre-of-excellence funding or FP coordination roles, so the fragmentation is self-perpetuating. Ironically, while LU's way of managing research and research resources is conventionally described as collegial, its effects are to rein-

<sup>56</sup> In the case of the IIIEE, the site visit was scheduled at a time when Kathryn Janda was unable to participate for time-zone reasons. The second reporter, Erik Arnold, therefore led the discussion and a recording of the visit was made for Kathryn Janda to review.

force competition among individuals rather than to build strong collectives – such as IIIEE and CIRCLE – that can compete outside the organisation.

These issues are becoming increasingly important as funders turn their attention further towards the societal challenges, which demand increasingly inter-disciplinary approaches with larger teams, and the need for socio-technical transitions that require partnerships across academia and beyond.

#### Priority setting, including goals for external research funding

Several of the UoAs considered say that the proportion of institutional funding (about 50%) in the university's total research income is too low. Very applied divisions may have as little as 25%. In international perspective a university average of 50% is towards the lower end of the rich-country range, but it is not abnormal, and some countries have lower levels. A battle to increase the proportion of research income Swedish universities receive as institutional funding has been raging for about 50 years, so this is not an issue we would expect to be resolved any time soon. For the purposes of RQ20, therefore, the question is not whether there is enough institutional funding but how well the UoAs perform, given their funding context, and how they and the university as a whole deal with the current funding system.

While the Design Sciences department broadly prioritises activities that acquire funding, across the UoAs in scope there appear to be no specific targets or strategies for getting funds. Funds-seeking activities seem largely to be reactive. While some divisions are keen to find large grants for long projects or research centres, few seem large (or desperate) enough to place a very high priority on Framework Programme funding.

The SARs do not distinguish in strategic terms between income from foundations and other income. Of course, in many cases it makes no difference whether a project is funded by a state funder or a foundation. However, some foundations – and especially those with deeper pockets –have more freedom to take risks or to act as change agents than state agencies. Especially where the donors are long dead, foundations have a freedom to make mistakes or do unpopular things that is not granted to state agencies, which are liable to face the wrath of the national audit office or the popular press. Here it is worth noting the role of the Bo Rydin Foundation in launching the Packaging Logistics division, as well as the more special case of SIIIEE funding the four professorships that have enabled the restructuring and strengthening of IIIEE.

While the divisions generally seem keen to get industrial collaborative funding, there appears to be no systematic approach to this issue.

#### Recruitment, promotion and succession

The gaps in some of the UoAs at the professorial level are cause for concern. Architecture has two divisions with two professors each and two with no professors. Innovation has three divisions with one each and a fourth division (part of CIRCLE) with two professors and an active emeritus. EAT/Certec has two divisions but only one professor. Packaging Logistics comprises a substantial division with two professors. Transport and real estate has two divisions and one professor. IIIEE has four themes, each led by a professor, and a total of seven professors overall. The smallness of some of the divisions not only means that gaps in the leadership create acute problems but also increases the likelihood that they will occur. We see an urgent need to improve human resource planning and to connect it with better-developed strategies for research and education.

Recruitment at junior level seems relatively unproblematic. There is some sharing of institutional funding to support PhD recruitment. Certain very applied divisions (notably Packaging logistics and Transport) experience tough competition from industry in seeking PhD candidates. This is simply a fact of life.

The UoAs appear to support early-career academics well, via LTH Career Academy, mentoring and a range of other career development tactics. We were told that the university limits post-doc contracts to two years and that this can impede research. Two to three years is the international norm for such con-

tracts – though many universities can renew contracts for a second period. Although we do not have any quantitative data, we were informed that there is a problem of in-breeding in some areas. That means both that the recruitment process needs to be rather open at the lower as well as the higher levels, and also that people should be encouraged to post-doc elsewhere as well – preferably abroad.

The SARs and our interactions with the UoAs tended to focus on the idea that a PhD is an apprenticeship for an academic career. Of course, for many years this has actually been true only for a minority of doctorands. It is therefore important that PhD training takes account of this and of the needs of the university's third mission. This means it should consider commercialisation issues as well as the ability to understand how industry deals with research. PhD graduates from the Swedish competence centres tend to be seen as more 'industry-ready' than those from other parts of the university system, so there could be benefits in deliberately considering lessons from LU's extensive history with competence centres for PhD training in the rather applied UoAs considered here.

#### The balance between activities in research, education and external engagement

In our view, 'balance' implies that divisions should do a mixture of teaching, research and engagement that is appropriate to their subject matter and context. It does not mean that they should do equal amounts of each. There appears to be a wide range of practice. In the Transport and Real Estate UoA, for example, transport does a lot of research, based on a strong research tradition, while real estate is at an early stage of adding research to what is still largely a teaching division. Whether it is reasonable to expect real estate management (which is strongly practice-orientated) ever to do as much research as transport is for us an open question. The Packaging Logistics division has strategies for each of the three university missions, suggesting that it has been able to think through what it wants to do. We note that some of the divisions only do service teaching for others' courses, which can be a precarious strategy, unless the university has a strong interest in interdisciplinary courses. There is dissatisfaction in the Innovation UoA about the wider division of labour around teaching and research in innovation at LU, with the UA arguing that it should take over teaching from some other groups.

More broadly, most of the divisions seem to favour the idea that some teaching should be research-based, where that is possible, and that all faculty members should do at least a little of both teaching and research. Where they have close collaboration with industry and public institutions, they may consider offering further education/long-life learning. One of the divisions involves students in research to a small extent. Again, this is not always possible, but in our view, it can be a valuable addition to degree courses that provides a perspective on research likely both to support career choice and to strengthen graduates' skills in wider society.

#### The overarching research strategy

An active approach is generally better than a reactive one, if one is to establish and exploit competitive advantages, build critical mass and sustain research groups over longer periods. We are currently in a period when the context of research policy is shifting from economic growth to addressing the societal challenges and the SDGs. This further increases the opportunities available to those – especially working in applied areas closely tied to societal needs – who take a proactive, strategic approach to the new social requirements, and increases the risks for those who reactively fail to establish or strengthen new positions.

While the divisions considered here tend to align with the research strategies of their department, LTH or LU, these largely set out ambitions for **how** to do research (at high quality, following RRI principles, etc.) rather than **what** thematic priorities to follow. Where they address thematic issues, they (reasonably enough) do so in the broad terms appropriate when setting directions across substantial and diverse collections of researchers. In most cases, the divisions in the UoA reflected the **how** principles but were not very specific about **what** the thematic foci should be at division level. This is of course a difficult matter

to decide and involves balancing the division's understanding of its opportunities in constantly-changing research landscape and the need to accommodate talent that may not readily sit inside the boundaries of the strategy. The exception was IIIEE, which has a clear, widely-discussed and frequently-refreshed research strategy but which also has a type of funding and governance that is abnormal within LU and that may not be appropriate or attainable for all.

We therefore believe that the divisions considered here should in general take a more proactive approach to developing their themes and funding strategies . They could be clearer about where their intellectual, social capital and network strengths are, how these match with societal needs, demand and the potential for obtaining research funding, and what changes are needed in order strengthen their competitive positions. In some cases, this could be done at division level; in others, at the level of groups of divisions, departments and even across faculties – even though LU's structure and culture tend to militate against such more collective activity. Clearer thematic focus increases divisions' ability to build sustainable scale, become more attractive to research funders and to students by projecting a clearer image in marketing, and put in place coherent human resource strategy in order to support the thematic direction. As IIIEE demonstrates, this is not a one-off activity but one that must be frequently revisited in order to ensure that the themes and strategies remain relevant.

#### **Collegial culture**

#### Opportunities for early-career researchers to develop their originality and independence

The type and extent of support to early-career researchers appears to vary considerably across the UoAs considered. All reported that they provided some form of mentorship and guidance, generally within what they felt to be a rather nurturing and open culture. One of the disadvantages of conducting the 'site visit' to Lund via Zoom was that we could not interact with doctorands and junior faculty to cross-check with their views and experience. While some divisions seemed more structured in their approach than others, the lack of a clear picture supports the idea that the divisions are largely left to their own devices in supporting early-career academics. IIIEE again stood out for its more systematic and more clearly structured approach in this area.

LTH offers some career training, but only some of the divisions seemed to make use of it. Clearly, some – perhaps many – individual junior academics were being well supported, but we saw no systematic use of structures or processes to ensure that all early-career researchers had such support. We miss the scale and systematic support that should be built into a graduate school, as well as the support we would expect to see from a strong human resources department as people progress on from being doctorands. While, clearly, some of the support, guidance and 'on the job' training needed by early-career researchers must be locally provided, equally clearly the divisions are too small to generate the wider infrastructure needed. As with human resource strategy and succession planning (discussed above), LTH needs a stronger support component further up in the hierarchy in order to provide the scale and systems required to be effective. We note that this is a problem typical of many if not all universities: there will never be enough professorial positions to offer to junior scholars, so there is currently an inherent tension in the career development model.

#### Sustainability and renewal of research strengths

Packaging Logistics, the Transport division, and IIIEE all described internal processes through which they consider and may revise their thematic foci, though only in the case of IIIEE did this appear to be part of a larger strategic process. Otherwise, the divisions we looked at appeared to be more ad hoc and perhaps opportunistic in their thematic choices. In several cases, this meant that a small number of people were trying to keep abreast of a broad set of topics. Again, this is a typical problem in knowledge production, expertise development, and the challenge of disciplinary studies in a rapidly expanding world.

Small, fragmented groups – especially when they rely chiefly on external research funding – risk experiencing funding interruptions because they lack the scale needed to smooth the flow of funds. One popular model of stability relies on bigger groups or groups that are more tightly connected around a larger research portfolio and that can 'hunt in packs' for money – and then capitalise on their success by growing and becoming more visible and attractive recipients of funding, including funds for large national projects, international projects such as in the EU Framework Programme, and centres that small groups cannot accommodate. Not every group can become a large pack; the challenge is in thinking about when and how to extend, as well as what a sustainable scale is for each division.

Institutional funding makes up a minority of the UoAs' research income. LU distributes that institutional funding in small amounts across many people, groups and activities, so it is hard to collect together enough of it to make strategic investments. That impedes growth. Neither the SARs nor our discussions with Division and Department managements provided evidence that they were able to make strategic use of the institutional research funding in order to combat the vulnerability of such small groups to even minor fluctuations in external income.

In our view, two approaches are possible, in order to increase the sustainability of the divisions. One is to seek to integrate them better and strategically empower the departments by giving them more control over the way they use institutional research funding. The other is for the Faculty or the University to become more engaged in supporting the Department through shared management of institutional funding.

#### Academic networks and collaborations outside the unit

Most of the divisions considered are well established and have good academic networks, both nationally and internationally. There is a good amount of international collaboration, though there could probably be more if individual units at Lund were larger, stronger and better able to lead international projects. It is normal that academic networks are among people rather than organisations and that they are somewhat diverse and idiosyncratic. However, this does tend to exacerbate the problem of fragmentation at Lund. With the exception of IIIEE, none of the divisions considered seems to have the scale or the organisational unity to play a major role in leading individual international networks, for example as the driving force behind conferences or collaborations. Developing a small number of carefully focused examples of such leadership would significantly strengthen the reputation of Lund and its ability to leverage that reputation into winning and leading more international projects.

We note that the divisions addressed here not only have good academic networks but also many useful national network relations with industry and relevant parts of the state.

#### Diversity, integrity and ethics

The gender dimension appears to be handled well, at least in the sense that it is visible, discussed and monitored. We heard less about diversity. If increased diversity is an objective of LU, then – like gender – it needs to be counted.

Some of the research in scope to this exercise requires ethical approval. Procedures are in place at the university to deal with this. IIIEE was alone in running ethics training and in explicitly addressing the possibility of partners or funders trying to exert undue influence on its research. These dimensions were not much considered in the other UoAs but are also likely to pose less of a risk to the research there.

#### Quality in applications and publications

Writing high-quality funding proposals is naturally a key to success in groups strongly reliant on external research funding. In aggregate, the divisions succeed in raising considerable funding, but do not keep data about success rates or to have a deliberate learning process about how to increase them. Few have a systematic quality-control process for outgoing proposals.

The quality and productivity of publication varies across the divisions but is mostly solid. In line with international trends, there is increasing focus on publishing in peer-reviewed journals listed in the international bibliographic databases (Web of Science, Scopus, etc). We noted that in the Innovation UoA, the shift towards these indexed journals has been accompanied by a decline in conference publications. While we understand the pressures to focus on the indexed journals – both at the organisational level, to look good in international rankings, and at the individual level, in order to be more employable – we stress that these rather applied divisions also need to be communicating with wider audiences beyond those people who work in organisations able to afford scientific journal subscriptions. Such visibility is important in terms of reaching potential funders and collaborators outside academia as well as paying attention to the university's third mission. None of the divisions considered has an explicit publication strategy.

As with other issues highlighted in this report, the informality of quality-assurance processes is completely understandable in the context of relatively small organisational entities. It nonetheless represents a lost opportunity to produce knowledge through synthesis, which would be more feasible if the divisions in practice worked within larger constellations.

## Quality ecosystem

## Research strengths and how these are reflected in the educational portfolio

Except in the case of IIIEE, the SARs were rather unspecific about how research strengths related to education, though there was a general insistence that education should be (at least in part) research-based. Packaging Logistics pointed out that members of staff had written two textbooks recently that were research-informed. Not all the divisions needed the same balance between education and research. For example, parts of architecture and of real-estate management were very practice-based, so there was less need for research. On the other hand, parts of Innovation (CIRCLE) and EAT were very research-based and did not face demand for teaching below post-graduate level.

It would be helpful if the divisions could be more explicit about what their current research strengths (and weaknesses) are – not merely for the purpose of this exercise, but more significantly because that knowledge is crucial for building themes, disciplinary and interdisciplinary networks, and developing funding and educational strategies. These insights could help each division hone its offer to the department and university.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

While all the divisions recognised the great importance of external collaboration to their work overall, none except IIIEE was able to be explicit about how this relates to quality. All have strong external collaboration links except Real Estate Sciences, which is at an early stage of developing them. Architecture's links were chiefly national while IIIEE's were the most global in character. All the divisions need strong collaborations with industry, government and in some cases others such as trades unions and NGOs. These can be sources of funding, but they are also crucial for divisions to be able to identify and address current societal problems, co-develop solutions, and communicate their research results.

## How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The general view from the divisions was that, while LU has rules and regulations regarding integrity and ethics, there was rarely any need to invoke them. The situations in which ethical approval is needed for research are understood and, similarly, raised no issues.

How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere In most cases, the divisions were well served by their own or their departments' research infrastructure and equipment. Innovation (CIRCLE) made use of national databases, while EAT/Certec had links to various platforms at Lund: CASE, eHealth@LU, CHIE, MetaLund. It was not clear whether LU was keeping sufficiently abreast of developments in big data and digitalisation, since these issues are in many cases peripheral to the foci of individual divisions but may, in the aggregate, prove important for the performance of the university as a whole.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

Most of the divisions considered have no links to SFOs. EAT/Certec is linked to the NanoLund and MERGE (combustion) SFOs as well as to the eSSENCE eScience collaboration between Lund, Uppsala and Umeå universities. Packaging Logistics has links to the Centre of Retail Research, which is an internal network at LU, and expects to work with Nanolund as well as the Food and Climate KICs of the European Institute of Technology in future.

Two divisions said they had made use of the Pufendorf Institute at Lund, which supports the start-up of interdisciplinary research projects and was seen by all who referred to it as performing a useful function.

#### **Overall conclusions and recommendations**

#### Governance and culture

Lund University (LU) is among the oldest universities in Europe and has expended greatly since its start as a theological seminary. It now has some 40,000 students across a full range of disciplines, including in the engineering faculty (LTH), within which our panel's focus on the built environment belongs. Its governance follows a relatively traditional 'continental' university model: deans, vice-deans and faculty boards are elected by faculty members. While the university board is now appointed by the government and contains a majority of external members, faculty representatives are elected by an internal electoral college. The rector and vice rector are appointed by the government, on the basis of nominations received from the university board. The University Law says that the faculty and students have to be "heard" by the government when it makes its choice of rector. LU governance is therefore a mixture of continental 'collegial' governance and the more societally-based governance style of many university reforms across Europe in the last couple of decades or more. LU tends to the continental and collegial end of the cultural spectrum rather than the more managerial or Anglo-American culture.

LU is well respected internationally. While we are sceptical of university rankings (because they 'measure' strange things, because they encourage some perverse university behaviours and because differences in rankings can be driven by small changes in behaviour), they do give at least some broad sense of the esteem in which universities are held. LU's global position has tended to fluctuate around 100<sup>th</sup> in both the Times Higher Education (THE) and Shanghai rankings<sup>57</sup>. Among Swedish universities, LU tends to come second only to Karolinska Institutet in these rankings.

#### Strengths

RQ20 is not an assessment of research performance. Nonetheless, we think it is important to note our generally positive impression of the quality of the research done, based on the bibliographic information supplied to us and our discussions with faculty representatives. The Real Estate Science division is still building research capacity, so we would expect its output to become stronger over time. The Architecture UoA has four parts and appears in its publication pattern to be hovering between a traditional humanities strategy and the more journal-orientated practices of many other disciplines. Agreeing an explicit publications strategy might be helpful for the future. The remaining areas' outputs range from 'solid' to 'strong', with IIIEE standing out for its productivity and international reach.

<sup>57</sup> THE rankings: 2010=89<sup>th</sup>, 2015=119<sup>th</sup>, 2020=96<sup>th</sup>. Shanghai rankings: 2005=99<sup>th</sup>, 2010=101-150<sup>th</sup>. 2015=101-150<sup>th</sup>, 2020=136<sup>th</sup>

The divisions appear to make a considerable effort to support the career development of doctorands and junior faculty and in several cases also made use of support from LTH to do so, notably through the LTH Faculty Career Academy. Good support requires both general measures available to all and personal mentorship by nearby colleagues.

In general, the divisions support the idea of research-based teaching and also believe that academics should do both teaching and research. We strongly endorse these ideas, while recognising that the ratios between different activities must vary among divisions and people, based on local circumstances. The divisions tend to be well networked, especially at national but also at international level. Networking with industry and relevant parts of the state is especially important in the kind of applied areas in which the UoAs work and they do this rather well. They try to prioritise achieving a good gender balance, which is not always easy, especially in smaller groups, but seem to pay less attention to diversity.

#### Weaknesses

Most of the weaknesses we observe seem to have their roots in the fragmented structure and organisation of research at LTH. They typically involve failing to do things that are easier if you are many and harder if you are few. There are three primary issues.

- Irrespective of the level at which they sit in the organisational hierarchy of groups, divisions, departments and faculties, many of the *de facto* research groups are small
- LU and disciplinary culture tend to inhibit large scale collective research
- Lack of strategy development means that research groupings do not develop common objectives or the means to support them

We are not in a position to comment on the rest of LU, but these problems are consistent with the slow-motion stagnation in LU's position that we see in the global university rankings. Given the intense competition within and between universities for students and faculty, esteem and (most particularly in applied fields and in university systems heavily reliant on external funding) for research money, the modern university needs a clear sense of strategic purpose and the means to build and sustain competitive advantage.

In the context of a university where roughly half the research income is external, and a faculty where the share of external research funding is closer to 75%, the small *de facto* research group size we observe has negative consequences that reinforce lack of scale. It makes it hard to build a big enough team and funding portfolio to make the group sustainable over time. It makes it hard to scrape together enough strategic resources (or 'organisational slack') to invest in getting ahead of the state of the art. Small group size makes it hard to win or run large grants or centres, making it hard to grow. It means career prospects are poor, so the group is an unattractive workplace for outsiders, easily tends towards in-breeding and is liable to face a succession challenge when a key person leaves or retires. It is too small to afford the time to develop the infrastructure of processes for career development, quality assurance, human resource management, succession planning, network development and maintenance that bolster the position of groups with critical mass and which, in effect, serve as barriers to entry by small and new groups. Nothing is impossible – these disadvantages can sometimes be overcome by inspired academic entrepreneurship – but unless they are, groups will not grow to a size where entrepreneurship can be replaced by management and promise can be translated into sustained performance.

LU's culture has developed over a number of centuries and has many strengths, some of which have become weaknesses as times have changed. Our interactions with the UoAs and the leadership of LTH suggest that the culture tends to resist efforts to build larger alliances across groups, and – to an even greater extent – across faculties, impeding both interdisciplinarity and the building of scale. The high level of collegiate influence over resource allocation means that, as in many traditional universities, resources

tend to be shared 'fairly' and spread thinly like Marmite, making it hard to hold back some of the institutional funding for investment in new areas. For the same reason, it is hard to use performance-based funding as a way to change structure. Finally, the culture appears to be allergic to centres. We find the decision to break up CIRCLE into different faculty-based components inexplicable, especially in the light of CIRCLE having established itself as one of only a handful of centres of excellence in innovation research worldwide. IIIEE is a free-standing centre, answering directly to the rector. Among the UoAs that we consider here, IIIEE's resulting advantages of scale, organisation, strategic investment, process and leadership compared with the other five UoAs go a long way towards explaining its world-class performance. Perhaps there are lessons in institutional stability to be learned from the lifecycle of CIRCLE and the possible lifecycle of IIIEE going forward.

In the current context of strong competition for research funds, themes and strategies are important ingredients of success. At the level of a research group, themes need to explain what strengths the group has and can build, how it relates to 'demand' in the sense of societal need. Strategy defines willingness somewhere in the research funding system to pay, what advantages the group has relative to others in the funding pool, and how it will organise and implement the changes it needs to make in order to do this. To do this, it needs to be able to

- Enable growth, and build scale
- Organise strategic investments
- De-prioritise some activities, while prioritising others
- Develop related strategies for key functions such as human resources and succession, infrastructures, acquiring funding, collaborations and partnerships

All of these aspects of strategy are under-developed in the UoAs that sit within LU's mainstream organisation structure.

#### Recommendations

Our analysis suggests the need for some significant changes, not only in individual groups abut also in how LTH, and possibly LU, goes about its business. LTH could

- Encourage and reward the development of more sustainable research groups, as far as possible on the basis of alliances formed bottom up
- Remove obstacles to this by permitting more organisational variation and creating organisational forms that enable cross-department and cross-faculty group formation
- Use more of LU's institutional funding as a strategic resource for investment in new activities
- Centralise more support functions to appropriate levels. Career development support and training should be tackled at the university level. Provide divisions with suggested processes for quality assurance, mentorship, strategy development and human resource management so that they do not have to reinvent the wheel
- Train and encourage people at the level of groups, divisions and departments in developing strategies for successful competition

Previous experience at Lund shows that none of this will work without making changes to the governance, organisation and culture of the university that are needed to sustain and improve research performance. The current organisation and culture provide insufficient incentives for change and offer incumbents the means to prevent it. For these recommendations to work they need to be supported and rewarded not only at individual group level, but also more widely in the university.

# I

#### What next?

LU's organisation and culture were developed in a period when universities were largely institutionally funded, the rate of disciplinary change was rather slow, and it was felt that the research community should largely control the research agenda. In Sweden, this doctrine began to break down already in 1942, when the government's Malm Commission responded to the technological challenge posed by the USA, UK and Germany, on the one hand, and the demands of the Swedish industrial lobby for a national technological institute on the other, by saying that Sweden could not afford such extravagance: the universities would also have to function as society's research institutes. The growth of 'sector' funders and other research funders not governed by academics since the 1970s, amounts to a long process through which society has further asserted its need for knowledge as a basis for socio-economic progress and demonstrated its willingness to pay for it. The argument about universities' institutional research funding that has raged in Sweden since the 1970s reflects, to a considerable extent, that university organisation and governance have not been ready to adapt to the changed social contract.

Today, we are in the midst of a further change, in which society is trying to shift the focus of research and innovation away from socio-economic growth and towards addressing the 'societal challenges', implying a third generation of social contract between science and society. Key features of this new generation include the need for increased interdisciplinarity, the involvement of more of society in research and innovation policy and a much greater involvement of the knowledge producers in implementation.

This in turn has important implications for university governance, organisation and culture. Universities will need constantly to evolve and reconfigure themselves to address increasingly rapid changes in societal needs. This year's spectacular 'pivot' in the global research community towards COVID-19 is testimony to the community's ability to do this in a (hopefully short-term) emergency. There will need to be even bigger, longer-lasting and probably more radical pivots in areas such as decarbonisation, greening, biodiversity and a range of other areas of societal challenge. These changes cannot solely be 'top down' in the sense of state funding agencies offering a new set of incentives. To be effective they will need to be driven internally in the universities, in part by internal change agents. Universities will need to become strategic actors in their own right. The style of organisation and governance at LU was an anachronism in relation to societal needs in the latter decades of the Twentieth Century and needs to change radically in order to address the current situation. Keywords will include: stronger societal engagement; internationalism; making strategic choices and investments; building alliances; internal as well as external change agency; a high rate of change; and a mixture of temporary and more permanent structures that allow the university to adapt to changing needs and opportunities.

## Reports on individual units of assessment

#### Architecture and built environment

#### Introduction

The unit of assessment consists of four research groups: Architecture (A), Environmental Psychology (EP), Energy and Building Design (EBD) and Housing Development and Management (HDM). In terms of researchers

- A has 2 professors, 8 senior lecturers, 2 assistant senior lecturers, 3 lecturers and one post-doc as well as a number of doctorands
- EP has 2 professors and one researcher
- EBD has 4 senior lecturers and 2 assistant senior lecturers
- HDM has 1 senior lecturer, one postdoc and 1 researcher
The research within the unit is said to share common fields of research (design of the built environment and environmental impact on urban and architectural design) but differs in its theoretical approaches, methodologies, research culture and communicational targets. The self-evaluation report (SER) stresses this difference by describing the four research groups separately. The research groups are also different in size, research and research education capacities and in their respective subject orientations. A and EP form together an economic unit (resultatenhet) and EBD and HDM have a joint research education subject entitled Construction and Architecture (AC).

# Leadership

The SER highlights events and research activities that were led or co-led at both national and international level by researchers from the unit. Both A and EBD have participated as leader or co-leader of important research events or projects at national (A) and international level (EBD). There is no leadership or clear organizational structure at the sub-unit level. It is not clear how the research groups' activities and resource management is related to the leadership at the department level. The four research groups seem to act individually in project-based activities, but not as coherent research environment.

# Priority setting, including goals for external research funding

Faculty funds are used to support supervision of PhD, co-funding research projects, prolongation of PhD studies or individual researches which lack external funds. It seems that the faculty funds are used instantly in short-term actions, and no strategic and long-term action plan is provided for. External funding is mostly granted individual researchers and related research projects. The funding organisations referred in the SER are few and at regional and/or national level. Reduced funding opportunities to few funding agencies and organizations at local and/or national level constitute a threat and hinders the sustainability of research. The SER expresses intentions to engage in networking and dialogue with potential funding organizations (e.g Formas), but exclusively in a national context, and presents no concrete action plan or clear strategy to achieve that purpose. The SER states the need of clear and consequent research organisation and leadership, which may support integrated processes and strategies to achieve funding, cooperation and internationalisation goals.

# Recruitment, promotion and succession

Recruitment and succession are dealt with regularly but still there is need of recruitment of senior researchers and professors, especially to EBD. The department should consider grouping research capacities and competences to fewer research units. This could help to establish stronger research environments, promote fruitful interactions between disciplines, and offer good critical mass for teaching,

# The balance between activities in research, education and external engagement

There is important engagement in teaching which covers 55% of the total budget of the department. For A, which has a heavy teaching volume, teaching and research is described as not balanced, the fact that many teaching staff are not researches makes the divide between research and education problematic. In contrary to A, EP is more research heavy, only 15% of time is allocated to teaching and 10% to collaboration. At EBD the relation between research and teaching is close. It is not clear how responsibilities in education and research are distributed at the sub-division HDM. A and EBD are the sub-units with both research and teaching and can easily strive for efficient integration of research in education and establish interesting, competitive and complete research and teaching environment. EP is more research oriented and belongs to a different disciplinary tradition with a strong base in research.

# The overarching research strategy

There is no strategic plan for research, instead the SER refers to university strategy and to other national and global strategies (eg UN's SDG), to which the units declares its alignment.

# **Collegial culture**

The SER states that the research is still fragmented, and besides some shared responsibilities for supervision of PhDs, collegial culture is missing. Except from EP, which is said to have a stronger collegial culture, there is a clear divide between the sub-units and a lack of clear structure or organization within the respective sub-division.

#### Opportunities for early-career researchers to develop their originality and independence

There is a set of opportunities for PhD students to develop their independence and originality, but it is not clear how these opportunities are set up, organised, managed and followed up. There is also a system for qualification for a position of biträdande lektor. PhD students do participate in conferences and workshops, but there is no common or integrated career development strategy at the department or at the individual research group level. It seems that EP has more developed structure for the promotion of junior researchers in form of network (Swedish Area Group of Environmental Psychology), workshops and courses organised by IAPS.

#### Sustainability and renewal of research strengths

The department is frequently contacted by scholars interesting in visiting the university as visiting scholars, internship or for post-doc periods. the SER stresses the need of development of trans-disciplinary collaboration and specialisation of research at respective individual research group. However, the few components identified as key element to the renewal and strength of research, are inward turned, locally conceived.

#### Academic networks and collaborations outside the unit

There is good representation of research in different scientific committees at main Swedish funding agencies, and participation in boards of different scientific journals, both nationally and internationally, but this representations and participation are kept to an individual level. There is also an important engagement of the department's research groups in networking activities within LU and LTH (Urban Arena. The SER describes network engagement for each of the four groups and shows that EP and EBD have been most successful on both national and international level, while A's network and collaboration opportunities are mostly on national level. The research group at HDM shows only limited collaboration on an international level. It seems that the compartmentalisation within the department hinders interesting synergies and fruitful interactions between the four sub-units, together they cover the area of architectural research from theoretical, professional (practice related), human/social behaviour, energy and construction, environmental expertise, and with capacity to approach these dimensions on both national and international level. The four units share the most fundamental ground to a sound collaboration, they all relate to architecture in its socio-spatial complexity. This should be seen as unifying force instead of dividing one.

#### Diversity, integrity and ethics

At the department level, diversity, integrity and ethics are considered when recruitment, research and collaboration processes are initiated. The department shows therefore awareness towards these dimensions. However, the sub-units show differences on the levels of diversity and gender. A has more male dominated environment, the CA at the sub-units EBD and HDM has larger diversity regarding nationalities disciplinary background. The department should do more for a balanced distribution of gender and diversity.

### Quality in applications and publications

The number of publications har increased since 2008, especially in international peer reviewed journals. The departments and sub-units have no strategic goals regarding the number of publications per year or project. There are also joint publications within the unit. It is however not clear how these publications are reported below.

A is slowly increasing the number of publications to 100 publication under the evaluation period (2014-2018). 70% are peer reviewed publications and as A also publish in journals which are not included in Scopus, the total number of publications should be more than above. EP has a publication record higher than A; the sub-unit is smaller than A but has an effective 118 publication of which 78% are peer reviewed publications. The sub-unit EBD and HDM, as they share the research education subjects Construction and Architecture, are listed as one publication unit with 125 publications of which 70% are peer reviewed publication. Of the three publication units the EP has best achievement due to the research tradition it belongs and the high level of external funded research. The presentation made the representatives of the department at the online interviews showed that the number of publications of HDM was about 18 for the whole evaluation period (2014-2018), which is a low accomplishment. There is no common system and process for the quality assessment of applications. Research proposals and applications are compiled individually and submitted to research funding organisations. The exception is the PhD thesis which follows a quality assessment process based on external reviewers. The SER shows satisfaction regarding external research funds, researchers' diverse participation in research, and publication record. An overarching strategy or procedure for quality assurance and support of both research application and publication is necessary if the department wants to secure quality in applications and publication.

### Quality ecosystem

The SER is disposed as set of short descriptions related to each research group separately. Furthermore, the SER highlights the differences between the sub-units but fails to show commonalities and potentials for joint research and education actions, and which are the most tangible strength the unit should seriously take into consideration.

# Research strengths and how these are reflected in the educational portfolio

The integration of research in education is secured of the sub-units in different courses, but at different extent and different stages of education. Education in A is more practice and artistic oriented and therefore needs important teaching capacities from practice. EP has a strong research profile and belong to a different school tradition, research-based education is a standard.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

The SER describes this issue in more general terms, it lists organizations and institutions which the department has collaboration with but gives no further information or examples of projects and tasks for collaboration. The SER does not discuss the impact on quality of such collaboration. The department appointed a senior lecturer with focus on collaboration but there is no strategic plan for collaboration. It seems that both EBD and EP have important research collaboration and could have contributed with more information on this issue. Existing external research collaboration is to a large extent restricted to local and national funding organisations, while international funding opportunities and collaborations are not addressed.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The department follows LTH policies and regulations

# How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere

Both EBD and EP use laboratory facilities available at the university or locally. The research group at A intends to utilise the upcoming area of computational design in the development of 3D printing and visualisation. It seems that the unit is aware of the infrastructure facilities existing at the university and locally and uses these facilities effectively.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

No such internal alignment is reported however, the SE refers to the national investment in architectural research made by Formas (Architecture in Effect and Making), which was meant to consolidate and promote research co-operation between the four Swedish schools of architecture.

### Recommendations

We recommend the unit and the faculty to act on the following fronts.

Act against fragmentation of research: The unit has its main strength in its multidisciplinary environment, which gathers expertise from broad range of disciplines and professions centred on architecture and its socio-spatial dimension. The compartmentalisation within the unit should be dealt with to allow grouping towards limited number of subjects, with sufficient capacity and critical mass. A good investment should be made in putting the unit's multidisciplinary expertise together and finding ways for joint research applications, joint publications and common strategic recruitment plan.

Build stronger research environment: The four research groups have different sizes, but in general all of them are small ones and can't act as independent research environment. A more balanced organisation of the unit is needed to strengthen both research and education activities. We recommend closer collaboration between A and EBD, which allows for joint research and education activities and shared research education subject. EP should be maintained in its actual organisation, while staff from HDM should join A or EBD.

Promote internationalisation and diversity: Most of the funds and funding organisations and agencies referred to are regional or national. The department has the capacity to engage in large international cooperation for joint research application and publication, promote mobility and exchanges of staff, and open for international recruitment of both junior and senior researchers.

Opt for more unifying approach to research subject: the SER shows that most research is based on individual initiative and when a research projects is granted it is often of short term and limited funds. The department should act for more sustainable research capacity, which requires larger collaboration grouping academics and professions. The department should act for a concentration of research capacities and subjects to few areas in order to counteract the spread and segregation of research

Develop research strategy and leadership: There is a lack of strategic plan to deal with the different issues highlighted in the SER, e. g. faculty funding, sustainability of external funding, succession and maintenance of competences, leadership, etc. The department should use its economic and academic capacities to promote its unique multidisciplinary strength. The department should use a share of its faculty funds as investment in joint research application, internationalisation, and to support mobility and exchange of staff. The leadership at the department level as described in the SER is seemingly administrative. Quality and quality assessment of research and research education need support of an academic expertise and leadership. This is a question which cannot be solved at the unit or department level; the question should be addressed to the leadership of LU and LTH.

### Innovation, development and design

#### Introduction

The Innovation, Development and Design UoA comprises four divisions in the Design Sciences department: Innovation Studies (which comprises about one third of the inter-departmental CIRCLE centre), Industrial Design, Innovation Engineering and Product Development. The latter three have one full professor each. The part of CIRCLE that is in the Innovation Studies division has 6 senior researchers: two professors; one emeritus professor; one docent and two post-docs. Innovation Studies joined the Design Sciences department in 2018. A group in Innovation Engineering joined the department in 2017. The SAR emphasises that the perspectives, theories and methods used in the four divisions are rather different. The end-users of the knowledge generated are also somewhat different. Industrial Design focuses on the design community. Innovation Engineering and Product Development appear to have a fairly homogenous set of customers in product development. Of the six senior people in Innovation Studies, all do policy-relevant work and four address questions relating to innovation in companies.

The UoA is smaller than the centres in Sweden and abroad with which it likes to compare itself. Of the foreign centres, SPRU is clearly similar to CIRCLE (and there are many close links between the two). Massey focuses on industrial design. Research and teaching elsewhere in LU overlap to some degree with the UoA's foci. There is little evidence that the four groups try to act as a collective and it is not clear to us that their respective pattern of specialisation offers a basis for much more than occasional interdisciplinary research cooperation.

LU is said to be planning to create an Innovation Centre, bringing together various groups and facilities for work on innovation projects. The SAR sets out a number of demands for doing so within the Design Sciences department that include coordinating the 4 divisions and their activities and transferring teaching into the Department from elsewhere in LU.

### Leadership

The four divisions deal with different aspects of innovation. They are separately managed and while there is a council of division heads that has developed a Strategic Plan'. This sets out laudable ambitions with respect to cooperation and innovation, communications, knowledge, internationalisation, sustainable development, gender and equality, the working environment and infrastructure. However, they have no common strategy for research and little appears to be done about joint research leadership. Research themes, quality, project acquisition and management are handled at division level. Since it is part of the (now virtual) CIRCLE organisation, Innovation Studies benefits from larger scale, strong international links and an international scientific advisory board.

# Priority setting, including goals for external research funding

The Department says that the proportion of institutional funding (about 50%) in its total research income is too low. In international perspective this is towards the lower end of the rich-country range, but it is not abnormal. For the purposes of RQ20, the question is how well the UoA performs, given its funding context. The department rightly prioritises activities that acquire funding and appears to be successful in this respect, though there appear to be no specific targets or strategies for getting funds.

# Recruitment, promotion and succession

Recruitment at junior researcher level seems not to be a problem. However, we found no evidence of a clear policy to ensure succession, either at University or at Departmental/Divisional level. This is a challenge to both the department and LU/LTH.

# The balance between activities in research, education and external engagement

In our view, 'balance' implies that the UoA should do a mixture of teaching, research and engagement that is appropriate to its subject matter and context. It does not mean that the UoA should do equal amounts of each.

The SR takes pains to explain that Innovation Studies and Innovation Engineering do too little teaching while the other two divisions do too little research. Internationally (eg at SPRU or MIoIR), innovation policy research organisations do little Batchelors teaching, instead focusing on Masters and Doctoral training. This reflects the pattern of demand, and Innovation Studies is not likely to be able to influence that much. All four divisions say they have close relations with industry and government knowledge users, and the importance of conference papers in their publication pattern tends to support this. The SAR says that to improve the overall balance among research, teaching and engagement, the university should give the department more teaching and some facilities in the form of the proposed innovation centre. This may be the case, but in order to pursue it, the Department would need to be more proactive and develop a broader argument for rearranging responsibilities, engaging those from whom it wants to acquire activities and potentially arguing for the creation of a bigger block of innovation-related activity than just the Design Sciences department. Further, as they have close collaboration with industry and public institutions, they may consider offering further education/long-life learning (vidaraeutbildning). The university will of course welcome such initiative.

### The overarching research strategy

The SAR lists a number of themes but does not explain how they hang together or how they and other actions relate to the development of the divisions and department. Research goals are not specified. Nor is there any explanation of how the department's activities relate to the eight goals chosen from LU's overall strategy.

There are probably opportunities to do more joint projects across the four divisions but given the differences among them, the scale of such opportunities should not be exaggerated. There might be virtue in explicitly positioning the divisions at working at different stages of innovation processes. The work of Innovation Studies on innovation management could be a useful component and the ability of the four divisions to tackle a variety of stages in the innovation process could help it differentiate its position in scientific and funding competitions. Making progress on a strategy would require not only an analysis of the Divisions' research competences and strengths but also an analysis of potential demand (sources of funding), competition and the opportunities for them to create a 'unique selling proposition' so that they stand out from the crowd. There may be opportunities to do such an exercise in relation to education, as well as to research and outreach.

### **Collegial culture**

# Opportunities for early-career researchers to develop their originality and independence Junior scholars appear well supported via networks and graduate schools.

### Sustainability and renewal of research strengths

With the partial exception of Innovation Studies (which shares scale with CIRCLE), the Divisions are too small to maintain the kind of robust and thematically interconnected portfolios that would enable them to become the leaders in their fields – not even in Sweden. This is especially true given the need to find half the research funding externally. Neither the SAR nor our discussions with Division and Department management provided evidence that the Department or Divisions are able to make strategic use of the institutional research funding in order to combat the vulnerability of such small groups to even minor fluctuations in external income. The SAR contains no account of how the Divisions think about managing their portfolios and the apparent lack of continuity and reliability in the provision of senior posts does little to suggest that the university is much engaged in these questions. In our view, two approaches are possible, in order to increase the sustainability of the Divisions and the Department. One is to seek to integrate the Divisions better and strategically empower the Department by giving it more control over the way it uses institutional research funding. The other is for the Faculty or the University to become more engaged in supporting the Department through shared management of institutional funding. In both cases, the Department should aim to defragment itself and build scale. Currently, internal management, planning and budget procedures appear to militate against this. The Department is working on establishing a single PhD programme across the three engineering-based Divisions. This is an important beginning of a process of thinking about the opportunities and limits to integration. More thinking appears to be needed about how to develop common themes. It seems likely that these efforts should involve others beyond the boundaries of this UoA<sup>58</sup>.

# Academic networks and collaborations outside the unit

Each of the Divisions is engaged in at least one international networking activity. However, with the possible exception of Innovation Studies, the Divisions do not appear to be big or strong enough to play the central roles in more international networks that would allow them to position themselves among the leaders.

# Diversity, integrity and ethics

These dimensions appear to be handled well.

# Quality in applications and publications

The SAR offers no substantial evidence to demonstrate quality in applications. The UoA lacks processes to quality-assure any but very large proposals. The presence of such processes is essential to the training, development and promotion of junior researchers, irrespective of the UoA's success rates in proposals. Big proposals for research centres or Framework Programme projects stretch the ability of researchers to write high-quality proposals but success significantly increases the sustainability of the research portfolio. Aside from CIRCLE, which was given a 10-year Linnaeus grant as long ago as 2006, the UoA has only one Framework Programme participation during the evaluation period. The lack of scale is likely to be a major impediment to doing this.

The headline publication data shown in Tables 4 and 5 of the SAR are encouraging, with production favourably comparable to other relevant Swedish groups. The UoA emphasises producing peer-reviewed articles in journals, in line with international fashion. It is a little disappointing to see the decline in peer-reviewed conference publications, in response to the wider change in university culture towards preferring scientific journal articles to other forms of scientific communication.

We are grateful to the Department for providing division-by-division publications lists and data, which were not part of the original SAR. These show a respectable publication performance not only in terms of scientific journals but also in the other channels that are crucial to encouraging take-up of research results by business and government.

# Strengths and weaknesses of approaches to quality

The UoA's overall publication performance appears to be good and to cover a range of types of publication, consistent with both the university's research and its engagement missions.

We are, however, concerned at the small size of the Divisions, which makes it hard to maintain a stable research portfolio, and the lack of clarity about a succession policy. It also makes it hard to get large-scale, longer-term external funding and therefore increasing the sustainability of the research and giving the research groups a better platform from which to operate in international networks. The UoA, and especially the more junior researchers' development, could benefit from more explicit quality process. It could be useful to think about how to develop such a process for publications as well as for proposals.

<sup>58</sup> The composition of this UoA was defined for the purpose of assessment. That is perfectly reasonable. But it is likely that the organisational development issues raised here need a wider treatment within the university

# Quality ecosystem

### Research strengths and how these are reflected in the educational portfolio

The SAR contains no information about what the UoA believes its research strengths to be or how these relate to education, simply calling for teaching to be transferred to it from other parts of the university. More explicit consideration of strengths (and weaknesses) would be helpful for developing an explicit research strategy.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

The UoA's cooperation with industry and government is extensive, as it needs to be in the strongly applied areas in which the department researches and teaches.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

Few ethical issues arise in the type of research the Department pursues and it appears that the Department has yet to experience conflicts of interest.

#### How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere

The SAR makes reference to the use of university workshops in design and development and the use of large national databases in Innovation Studies. The engineering-based divisions have their own laboratories and equipment and do not rely on large infrastructures.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

The department is not aligned or cooperating with LU SFOs or centres of excellence.

#### Strengths, weaknesses and alignment with non-research tasks

Overall, the UoA appears to have a good publication performance – which is normally understood as reflecting good research quality – and uses a range of channels beyond the scientific journals to reach audiences beyond the research community.

While Innovation Studies is part of the larger CIRCLE environment, it is small, as are the other Divisions. This constrains their ability to maintain a smooth and predictable income, play strong roles in international networking and to maintain quality and human resource processes that fully support career development and succession. Such more or less single-professor groups are inherently fragile and, outside the humanities, much of the research world has found ways to work in larger and more robust entities. We strongly encourage the Division to do so, too.

### Overall conclusions and recommendations

The composition of this UoA is odd in the sense that it comprises a sub-set of rather disparate divisions within the larger Design Sciences department. While that would not be an issue in a traditional, quality-focused research assessment exercise, the focus of RQ20 on institutional and environmental factors makes it somewhat problematic. We would expect a coherent departmental strategy to cover not only the four divisions considered here but also the others within the department.

One option for positioning the four divisions would be to see them – and communicate about them – as addressing different steps in an innovation value-chain, within which the Packaging Logistics division might also fit.

While the Design Sciences Department has developed a 'strategic plan' setting out its aspirations in general terms, there appears to be no research strategy – either at the level of the Department or the UoA – that considers its strengths, the demand side, and its actual and potential competitive advantages

or uniqueness as a basis for success in science or funding competition. Nor is there evidence of codified quality-assurance and career development processes that would support the development of researchers through their careers. We would normally look to the university level to provide transparent processes of this kind; certainly, the Divisions considered here are the wrong level at which to develop them. The unresolved succession issues represent a joint failure of the Divisions, Department and the University as a whole and open the question whether the Department finds itself in an unhealthy equilibrium, caught between its inadequate empowerment to take strategic decisions on the one side and the university's inability to centralise enough power to make strategic interventions from the centre.

We are nonetheless concerned at an apparent lack of proactivity at Division and Department level. Difficulties are blamed on the overall funding situation or the university's failure to shift resources in favour of the Department. Leadership in this department might well give greater consideration to what it could do for itself.

We are perplexed by the University's decision to dismantle CIRCLE, which had managed to establish itself internationally as a major force in innovation research. The result was a significant diminution in size and reputation, which is only now being restored in CIRCLE's newer, virtual form. We note that people in the UoAs considered here reported persistent difficulties within LU in establishing larger centres that risked disturbing the existing balance among, and authority of, the faculties.

The UoAs considered here tend to reflect the way universities were organised in former times, as large federations of single-professor groups operating fairly autonomously within a collegiate organisation that functioned more as an umbrella than as a support. The result is that these Divisions are sub-scale, at risk from funding lumpiness, unable to tackle succession adequately, unable easily to take significant positions in international network, and are poorly equipped to become leaders in their fields, even with-in Sweden. On the evidence available, they need to be parts of a larger and more meaningful grouping – which may well include people from outside the Department – in order to realise their potential and become more organisationally sustainable. That, in turn, would make it easier for them to win large-scale competitive grants and build the increased funding security for which they yearn.

We therefore recommend that

- Together with relevant others at LU, the divisions within the UoA discussed here should consider modernising into one or more larger entities with a view to building scale and establishing greater advantage in both scientific and funding competitions. Ideally this would involve establishing a new unit or level within the University hierarchy. Quite likely it would need to span Faculty boundaries. A second-best solution would be to create a virtual platform of the same kind and coordinate across the organisational obstacles posed by the University structure
- We do not have the breadth of view that would enable us to make specific structural recommendations. Those should come from the divisions themselves because they understand the local situation and because volunteers have a better incentive to perform well than conscripts. It might make sense to bring the four divisions considered here closer together. It might be better to pull the three engineering divisions more closely together with other parts of the Department and to find a way to reconnect Innovation Studies more firmly with the CIRCLE platform. And there are doubtless also other options
- The new grouping should develop an explicit research strategy with thematic components, based on an understanding of its strengths, likely developments in societal needs and relevant funding opportunities, and decide how to exploit this understanding of supply and demand to construct competitive advantage
- Members of the Department should further develop their proposals for a joint PhD programme, as an important plank in building the larger entity

• The University itself should articulate an organisational strategy that will allow it to build such stronger entities and maintain its international competitiveness in a world where large, and often cross-disciplinary, centres increasingly replace the more fragmented organisational style of universities in the past

# Ergonomics and aerosol technology and Rehabilitation engineering and design

# Introduction

This UoA comprises two divisions within the Department of Design Sciences: EAT n=47 (26 female) and Certec n=13 (10 female).

The UoA has only one full professor (in EAT) among its staff. Between 2015 and 2017, four professors retired. They have yet to be replaced, though Certec has three and EAT has nine associate professors, several of whom could be promoted in the near future.

Staff numbers at EAT have increased from the initial 25 in 2008 to 47 today. Certec went through a major shift in leadership in 2009, when its founder Bodil Jönsson retired, leading to greater emphasis on research and education on inclusive, sustainable societal development based on Universal Design.

The UoA is active in several research areas: aerosol technology, working environment technology, digitalisation, virtual reality, e-health, risk management, indoor environment, visual ergonomics, thermal climate, inclusive and universal design, interaction design (HCI, Usability, UX), design processes (eg. co-design), technology for people with disabilities and older people. It deals with this apparent fragmentation by having people work in an interdisciplinary manner across several of these areas. The UoA believes it can contribute an element that is missing from LTH engineering education, namely how people's conditions and needs affect different technical solutions.

### Leadership

Our impression is that the two divisions have a good culture and overall research performance, though they have developed their own research strategies and priorities separately. We saw no evidence that the overall Design Sciences strategy influences these division.

#### Priority setting, including goals for external research funding

Table 1 summarises information from the UoA about the sources of income respectively for EAT and Certec in 2019. Research funding predominantly comes from external sources.

External research funding for EAT is mainly from private foundations and Swedish government research bodies – Formas, Forte, VR, Vinnova and others. Eight percent of external research funds are from EU ERC. Research, excluding research education, is 75% externally financed. External research funding for Certec 2019 is mainly from Vinnova, Kamprad foundation and Other Swedish Non- profit organisations. Twenty-one percent of external research funds are from EU.

	EAT	% of research funding	% of total funding	Certec	% of research funding	% of total funding
External research funding	24 612	72%	56%	4 203	66%	42%
Institutional research funding	9 800	28%	22%	2 162	34%	22%
Total research funding	34 412	100%	78%	6 365	100%	64%
Institutional education funding	9 500		22%	3 544		36%
Total research and education funding	43 912		100%	9 909		100%

Tabla 1	EVT	and C	ortoc	funding	SOURCOS	2010	(KZEK)
lable I	EAI	anu C	ertec	runuing	sources,	2019	(NJEN)

Institutional research funding is predominantly used for co-funding projects and funding PhD students' fourth year. According to the SAR, institutional funds are shared "in solidarity", which we understand to mean that they are used to fill gaps and maintain continuity. The SAR argues that only about 10% of institutional research funding is available to support senior faculty, leaving them highly dependent on external funds. This implies that little institutional research funding is available for strategic investment and development and implies that there is a need to set priorities at the level of the divisions and the department that support an overall research and teaching strategy. The alternative is that the UoA becomes a kind of 'research hotel', doing whatever it can fund. It is easier to be strategic about teaching, for which resources are allocated more centrally and for which there is also discretionary funding available from LU, for example for improving teaching quality.

According to the SAR, "The current balance is perceived a bit top-heavy, with very limited resources available in both groups (EAT and Certec), e.g., for allocating time for someone to work on larger strategic initiatives. The funding we currently receive only covers our basic administrative functions, and some supervision and administrative work for senior researchers."

Overall, the members of the UoA prefer to work in a rather decentralised way. There do not appear to be strategic priorities – rather, the divisions seek funding in an opportunistic way. The SAR points out their ambition "to ensure that there are enough employees in the various research areas to be sustainable". While they are right to stress that more institutional research funding would give them greater freedom to act in strategic ways, this is not something than can be remedied in the context of RQ20, so our analysis needs to focus on what can be done within the current funding context.

#### Recruitment, promotion and succession

The funding situation limits the employment of PhD students and possibility for high risk projects. Solutions with shared floor funding supporting doctoral student projects are used.

The divisions have high ambitions in recruitment, aiming to hire a diverse but gender-balanced set of rounded individuals and support early career development by using the LTH Career Academy Programme and other training made available by the university. They have a process of regular assessment and allocation of people to appropriate assignments and are explicit about the demands they make of PhD graduates if they are to continue in employment at the university. They encourage people to take post-doc periods abroad. While there is competition for higher-level positions, it may be worth considering whether there should be more competition also at lower levels, in order to combat inbreeding.

Succession appears problematic. One professor is not enough for a UoA this size, and the SAR rightly points out that there should be a longer-term HR strategy and recruitment plan.

#### The balance between activities in research, education and external engagement

The UoA aims to use its research to form part of the basis for its teaching. It offers no complete courses of its own but contributes to those of others as well as serving various audiences outside the university and providing large-scale educational events. The SAR presents no evidence of imbalance.

### The overarching research strategy

The UoA potentially has much to offer LTH, in terms of bringing human-centred design principles to engineering. Its heavy dependence on external research funding and the apparent difficulty of setting aside institutional funding for strategic purposes means it is important to develop a clearer and more focused strategy, combating the thematic fragmentation that results from reacting to funding opportunities. Ultimately, it is important to develop thematic projects that get the UoA ahead of the state of the art, rather than reacting to it. This needs to mesh with a human resources strategy and succession planning, especially at the professorial level.

The UoA aims to focus on strategic initiatives that are key to development, using their inter/multidisciplinary & collaborative signature, which is one of their strengths, even though university organisation and the funding environment make it sometimes difficult to compete with mono-disciplinary teams. While the Design Sciences department's strategy is said to be in line with those of LTH and addresses seven of the SDGs, its priorities are to do with the quality of processes rather than being thematic. It addresses: collaboration and innovation; skills; gender; diversity, communications and visibility; internationalisation; sustainable development; organisational and social environment; and infrastructure. It does not appear to have a thematic dimension, which would be necessary if the UoA is to engage in thinking about issues of focus, scale, competitiveness, and so on. In other words, the strategy talks about how to do things but not about what to do. This seems to us to be an important gap.

### **Collegial culture**

#### Opportunities for early-career researchers to develop their originality and independence

According to the SAR, there is an open climate of collaboration and discussion, but there are no further details.

### Sustainability and renewal of research strengths

The UoA says it has a tradition of open discussion and reflection on performance and how to improve it. The divisions discuss published articles. Division representatives acts as opponents, take part in grading committees' and are invited as speakers and for assessment for doctoral students at mid-term seminars, licentiate, and doctoral dissertations. The divisions also reflect on how funding applications are assessed. The SAR provides a long list of desiderata for the internal culture and is reviewing how to evaluate and improve its own research quality. It identifies needs for development in statistics, project management and increased theoretical and methodological knowledge. It mentions Certec's 2015 strategy to obtain a strong national reputation in disability research, to lead in Universal design and to have a high project application success rate. It also raises the need for EAT to regroup following the end of the MetaLund project and graduate school. But in neither case is it clear what the next steps are.

The UoA believes there is a need to provide support regarding expertise in statistics, project management and increased theoretical and methodological knowledge within next 5 years.

### Academic networks and collaborations outside the unit

Aerosol Technology and Certec are very well known, and exchange of researchers is frequent. The division support sabbatical programs for both junior and senior researchers.

### Diversity, integrity and ethics

The divisions say that they are actively promoting these issues via internal; discussion and hve addressed the on recent department-wide meetings. Many projects require ethical approval, as they involve vulnerable target groups such as children or persons with disabilities. The divisions are also signing agreements, validated by the legal department, in order to deal with Intellectual Property and other sources of conflicts.

### Quality in applications and publications

The UoA quality-assures proposals internally and frequently is both and inviter and an invitee in setting up research collaborations. Research proposals are generally team efforts, rather than having a single author. However, the UoA says it tends to be overly reactive in seeking research money and needs the strategic 'space' to play a bigger part in defining research agendas. It also feels it makes too little use of complementarities within the UoD (and, presumably, the department), in seeking funding.

The publication record is impressive, with 34 full peer reviewed publications,19 full peer reviewed conference papers on average per years and 15 Doctoral theses between 2014 and 2018 on 60 employees.

Citation performance is strong, and the UoA says it focuses on publishing in journals that will bring high citation numbers rather than on high-impact-factor journals *per se*. It has successfully shifted its publication focus away from conferences and towards journals. However, the UoA does not seem to have explicit ideas about what the right balance is and could usefully do a specific exercise to think through a publications and communications strategy that would serve both the need to produce performance indicators to satisfy the administration and meet the scientific needs of the UoA.

# Strengths and weaknesses of approaches to quality

The UoA culture appears supportive and developmental, using mentorships of various kinds in combination with training provided by LU/LTH to develop people at the more junior levels. Good international networking and internal quality-assurance processes support the production of high-quality research. The UoA would benefit from a more clearly stated publications strategy, which explains the balance desired between traditional scientific publishing and the need and usefulness of working through other channels.

# Quality ecosystem

# Research strengths and how these are reflected in the educational portfolio

Almost all teachers are involved in research projects. There is an ongoing discussion of education as well as research, and the UoA also tries to be active and visible within LTH's activities for teachers, publishing at *pedagogica* conferences and other channels as well. EAT has some research areas that involve little undergraduate teaching, but this is partly compensated by research education and postgraduate courses.

The UoA does not have its 'own' engineering programmes but contributes to others' That means there is an opportunity to inject principles of ethical and universal design into engineering education quite widely in LTH.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

Involvement in research platforms such as CASE and eHealth@LU and centres such as CHIE and Meta-Lund. EAT often use reference groups in research projects with participants from industry, municipalities, non-profit organisations, trade unions, employers, authorities, etc. Such collaborations therefore bring not only money but also knowledge and access to problems. Lately, Certec has prioritised industrial PhDs over conventional ones because they are rare but bring a lot of value to the Department. The department believes that staff exchanges with such partners would be very valuable.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

Lund has the normal type of university ethical approvals process.

# How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere

Involvement in research platforms such as CASE and eHealth@LU and centres such as CHIE and Meta-Lund are important to this UoA. It also relies on some modest equipment investments by the university within its own labs. The UoA argues that infrastructural investments are becoming increasingly long term and need to be managed as such. It is concerned that the university is slow in investing in common digital infrastructures.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

The aerosol group is involved in the Nanolund SFO at LU and runs a PhD course about safety for the Nanolund graduate school. It is also involved in the MERGE SFO and has links with the competence centres in combustion engines and combustion physics. The virtual reality group has links with eS-

SENCE. The UoA more broadly has used the Pufendorf Institute to initiate a number of interdisciplinary research cooperations within the university.

#### Strengths, weaknesses and alignment with non-research tasks

The links between research and education appear good; the UoA values and uses links with industry, making good use of physical infrastructures and research platforms at the university.

# Overall conclusions and recommendations

The performance of this UoA is in important respects strong. It is well published and successful in seeking external funding for its research. This is no doubt due in part to its good and nurturing culture, which is a basis for supporting postgraduates and younger academics via training and developing their careers, while paying attention to the need for gender equality, diversity and having a basis in responsible research and innovation. It appears to be well networked in academia, both nationally and internationally, and to have good industrial links, as would befit an applied research group.

Since the UoA comprises only two divisions of the Design Sciences department, the SAR gives only a partial picture of the UoA's context. The two divisions have commonalities driven by their location in the same department, but have differences in thematic focus and orientation, as would be expected. Their strategies pay homage to those of LTH and the department, which tend to focus on process: how to do things well. We miss thematic strategies both at the divisional and the departmental level that would define the foci of work at these two levels, explain how the department level benefits from divisional synergies and sets priorities for research and funding, as well as teaching. Rather, the divisions' high degree of self-organisation seems to lead to fragmentation.

While the divisions make a considerable effort to federate across the fragments to generate project-based coalitions and produce interesting interdisciplinary work, fragmentation in turn undermines sustainability because small groups have small funding portfolios that easily suffer from interruptions and lack the strategic resources to invest or take risks. At small scale, it is difficult to set agendas, so funding applications tend to be reactive. We therefore recommend that the UoA – and indeed other parts of the Design Sciences department, working together – develop a thematic strategy that defines areas of actual an intended strength and focus, based on an understanding of, on the one hand, where research needs and opportunities lie and, on the other, where the capabilities at Lund and the competitive context offer opportunities for the department to be distinctive and succeed in competition. The strategy should consider how to use the limited institutional funding available in a strategic manner, for example to develop or strengthen new foci. Sub-strategies need to deal with human resource development and succession – especially at the professorial level; a single professor in a UoA of over 60 people is a long way from being sufficient. There is also an opportunity to improve the relevance and impact of the UoA via a more explicit publication strategy, taking account not only the need to perform in publication metrics but also the responsibility of the university to engage in knowledge exchange with wider society.

# **Packaging logistics**

### Introduction

The Packaging Logistics Group started in 1994 with the aim to examine the interconnected links related to Packaging Logistics and to support further sustainable development and innovations related to these scientific areas. The Group commands nowadays 9 senior faculty members including 2 Professors, 3 Associate Professors, 3 Assistant Professors and 1 Post-Doctoral researcher. In addition, there is one Research Coordinator and 13 PhD students.

# Leadership

There is a strong leadership in the Group evidenced by its growth over the years. Also, many senior faculty members enjoy leadership roles with the University and the Faculty highlighting the ambitious and energetic nature of the Group. This may create challenges in the future as the Group needs to grow further and to capitalise on future research opportunities and this may not be easy if the senior team continues to be overburdened with these senior roles. Also, it is very positive to see the high success rate with national funding applications, the high quality of journal papers being published, the ongoing and progressive collaboration with industry partners and the contemporary and continuously evolving multidisciplinary research expertise the Group commands. Again, this is a testament of the strong and dynamic leadership within the Group.

# Priority setting, including goals for external research funding

The Group was initially established following a donation from Bo Rydin foundation and it has modelled itself on a Group at Michigan State University with which it has since maintained cooperation with as one of a rich number of international research networking activities. The Group has been very successful in relation to industrial collaboration and has attracted a plethora of projects which are relevant and have involved industrial and public organisations. Financial goals for external research funding are not explicit but the Group aims to get longer-term external funding from various funding bodies and to capitalise on its unique research expertise in the area of Packaging Logistics in general and sustainable development, freight transport, city logistics, packaging design and retail management in particular. The Group claims to have a high success rate in national competition and its international /other funding is said to be low.

# Recruitment, promotion and succession

The hierarchical balance of the group is rather conventional and traditional, with two Professors, various Associate and Assistant Professors and a good number of PhD students. More importantly, as the Group has grown over the years, subsequently, the Group staff members have been promoted too and with some sufficient career progression planning being evident for various academic levels ranging from PhD to senior faculty level. It is also evident that another, major key challenge is that it can be hard to recruit people to the PhD programme because industry offers better incentives than the university. This is not surprising considering the applied nature of both Packaging Logistics but it can be a long-term concern too.

# The balance between activities in research, education and external engagement

Research, education and the third mission are all explicitly considered in separate strategies which were provided. All these strategies emphasise four specific elements including cross-boundary collaboration, internationalisation, quality enhancement, leader, teacher and employee excellence. These strategies appear to be well discussed and agreed within the Group and they are integrated and interlinked with each other. Specific examples were noted which provide evidence for the above integration. Education is also expected to be delivered by every faculty member pending on other responsibilities and workload as well as PhD students.

# The overarching research strategy

As noted in the previous paragraph, three strategies have been developed including one strategy related to research. This research strategy seems to be quite detailed and comprehensive and it has a clear, multidisciplinary and applied nature focusing on several United Nations Global Sustainable Development Goals. More importantly, this strategy seems to work successfully for the Group considering its growth and success.

# Collegial culture

The collegial culture seems to be very strong fostering an open and informal research culture. Team members contribute towards various aspects and processes and have input under a clear and inclusive manner. Frequent meetings and discussions take place within the Group too as well as within the rest of the Faculty and the University.

# Opportunities for early-career researchers to develop their originality and independence

The Group has developed relevant processes to support junior scholars in their path to academic independence and academic career progression. Various junior scholars have been appointed and supported accordingly towards specific research areas which were also complementary or supportive of the current research expertise of the Group.

# Sustainability and renewal of research strengths

There is a great deal of discussion about how the Group is ensuring that it commands contemporary and up-to-date research strengths in light of continuous changes within the scientific and business environment. It is clear that this adaptation is largely driven and in response to national policy trends and to the United Nations Global Sustainable Development Goals. An important issue which becomes apparent here relates to the relatively large number of these research strengths including sustainable development, freight transport, city logistics, packaging design, omni channel and retail management. These research strengths are rather a lot for a relatively small Group as it is also evidenced by their publications too. All the above begs the question whether the effort is spread too thinly. It may be useful to think strategically which research areas can be prioritised for the future where relevant resources can be allocated accordingly.

# Academic networks and collaborations outside the unit

Academic networking outside the unit is strong despite the small number of senior faculty members in the Group. There is also networking at both national and international levels. At project and research funding level, there is also a strong level of cooperation and collaboration with industry, as would be expected in such an applied field.

# Diversity, integrity and ethics

The Group has grown over the years and, subsequently, both faculty appointments and PhD students have been recruited commanding more diverse background in terms of gender, educational background, level of experience and age. The report also suggests that sufficient care is taken in respect of integrity and ethics largely driven by university processes too.

# Quality in applications and publications

The Group claims a high success rate at the national level although it seems to have limited success with international research funding. The latter presents a large opportunity for the Group considering its unique research expertise and its strong network with industry partners. The Group has also published on high-impact journals related to both logistics and packaging journals and publications by Group members have generated a fairly high number of citations per article. This is impressive given the small Group size.

# Strengths and weaknesses of approaches to quality

The Packaging Logistics Group aims to make an impact on society and industry considering the applied nature of its expertise. This is largely achieved as evidenced by the large number of industry collaborations and the successful, high quality publications which also relate to industrial setting and business challenges.

# Quality ecosystem

# Research strengths and how these are reflected in the educational portfolio

Teaching is research-based and relevant courses are provided which relate directly to the core research expertise commanded by the Group. The Group has also published two textbooks in its field suggesting it has a successful good all-round grasp of the area needed to deliver good teaching. There may be an opportunity as well to possibly consider an MSc in Packaging Logistics Management taking into account the unique research strength of the Group in that scientific domain.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

The Packaging Logistics Group has established strong collaborations with industry and public sector bodies. These collaborations result in the genesis of new knowledge which, in turn, influences the high research quality of the project involved. Additionally, these collaborations foster the recruitment of high quality PhD students too.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

There seems to be no conflicts of interest during these collaborations whilst integrity and ethics issues seems to be handled and managed successfully.

# How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere

The Packaging Logistics Group does not seem to depend on using the large university research infrastructure whilst the Group seems to collaborate with other Groups for any infrastructure needed.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

The Group notes that it is not connected to any of Lund's SFOs. However, it is an active participant in external networks as well as the Centre of Retail Research at Lund. It also considers specific areas and activities (e.g. packaging material science, EIT Food KIC, Climate KIC, NanoLund SFO) as being good opportunities for the future growth of the Group.

# Strengths, weaknesses and alignment with non-research tasks

The Group has developed important research strengths over the years. Its unique expertise could be the platform to diversify its educational portfolio by possibly offering a new MSc in Packaging Logistics Management. This MSc will need to be supported successfully by new faculty appointments otherwise this will not be possible considering the significant managerial activities undertaken by senior faculty members. This could also provide an opportunity for further growth within the Group.

# Overall conclusions and recommendations

This a very successful Group commanding a unique research expertise which is extremely relevant to various stakeholders including, inter alia, research and industry partners. This Group has the opportunity to grow further by collaborating successfully with other University Groups considering the overarching and holistic role of logistics and packaging in modern businesses and societies. The multidisciplinary and applied research ethos of the Group supports this suggestion too.

The Group should consider the following recommendations.

- Develop a long-term resource plan for how to overcome challenges in recruitment especially when most senior faculty members are overburdened with major administrative roles and other relevant responsibilities.
- Develop a research funding strategy considering its current overreliance on national funding.

- Develop a stakeholder plan where the major opportunities and areas will link better with internal (e.g. university / SFOs / relevant Groups) and external stakeholders including industry members and other NGOs.
- Develop an Advisory Board where senior managers from the local / regional Packaging Logistics industry will participate. These meetings will strengthen your collaborative relationships and will help to refine and improve your research agenda.
- Only with appropriate university support to appoint new faculty members and resource it accordingly, a new MSc in Packaging Logistics Management can be a good opportunity to grow further.

# **Transport and Real estate science**

### Introduction

The Group (UoA) is formed by the Transport & Roads and Real Estate divisions. The Transport and Roads division comprises a total of ca. 30 full-time equivalents, of which 1 professor, 6 senior lecturers/ docents, 3 other lecturers, 14 PhD researchers, 3 post-doctoral fellows and 3 researchers. Real Estate, a relatively new group, is much smaller, and has ca 12 fte's, of which 6 senior lecturers/docents, 3 adjunct lecturers, 3 PhD researchers and 1 post-doctoral fellow.

### Leadership

Both divisions have recently got new management with ambitions and prospects to grow. In Transport and Roads new research areas have developed since RQ08, stemming from increasing societal needs and increased funding: Traffic safety and behaviour, Mobility management, Railway management and Road construction. The research is organised in small interdisciplinary teams with young recently appointed team leaders. While Transport and roads have an established research tradition on focus areas, the research areas at Real Estate division are still forming. Until recently Real Estate division's primary activities were in education and in RQ08 the research in Real Estate was virtually non-existent. The divisions have taken gradual steps towards closer collaboration in e.g. joint research projects and applications.

### Priority setting, including goals for external research funding

The Group appears to perform well in terms of research funding. Recent successful applications have resulted in additional 3 PhD and 2 postdoc researchers starting in 2020. The group has been successful in terms of various grants especially working with external stakeholders and other academic institutions. The Transport & Roads Division of the Group is stronger in terms of funding whilst the Real Estate Science is now trying to catch up in terms of research and research funding. Currently external funding accounts for more than 70% of the research budget of Transport and Roads and 25% of Real Estate. They have no financial goals for external research funding and, therefore, these are not stated under an explicit manner. This needs to be prioritised to ensure the future sustainability of the Group.

#### Recruitment, promotion and succession

The Group is managing to recruit staff members and PhD students albeit the challenges it faces. Senior staff members are leading the Transport & Roads Division but there is a seniority challenge since a number of senior staff has left recently and is difficult to replace, while in the Real Estate Science division there is no Professor. Overall, the structure seems to be imbalanced between the two Divisions and there is no evidence of a clear succession plan. It is also difficult to recruit PhD graduates as they prefer to move to industry. The Group publishes both in journals and reports aiming to connect better with its stakeholders.

# The balance between activities in research, education and external engagement

Research, education and public engagement are recognised in the Group and it is evident that there is a clear challenge in terms of reductions of education-related funding. There are no details of education and public engagement strategies although a communications strategy is currently developed. The SAR mentions an overall mismatch between research and teaching in the Group. Transport and Roads has a large share of research activities while the Real Estate division primarily does education. The Transport and Roads division provides Master and PhD courses focused around their key research areas. Since the Real Estate division has only recently started building a research portfolio, there is no strong connection between research and education.

# The overarching research strategy

There are no overall overarching research strategies. The fact that both divisions are rather small, very different, and very dependent on external funding complicates the development of a broad research strategy.

# **Collegial culture**

The SAR describes an open and informal research culture based on teamwork, in both divisions. Frequent interactions with a wide variety of international researchers, research institutes and stakeholders are evident in Transport & Roads, at Real Estate interactions are mostly with researchers at other universities.

# Opportunities for early-career researchers to develop their originality and independence

It is clear that the Group has some processes to support the careers of its PhD researchers but there is no explicit evidence for this and how many have progressed to academic positions. There was no clear evidence of formal mentoring support (and processes) given to faculty but there is a strong collegiate and collaborative culture.

# Sustainability and renewal of research strengths

The Group is organised around a few research themes in the Transport & Roads Division whilst there are no clear research themes reported for the Real Estate Science division. Opportunities in research on land use and housing shortage are mentioned. Although there is strong societal interest in the current themes in Transport and Roads (except for traffic safety, which – following the improvements achieved by the Swedish Transport Administration's 'zero vision' – is no longer high on the Swedish societal agenda), is the overall sustainability of these research themes uncertain as they seem to be largely supported by research projects. On a positive note, the Transport and Road division has a long-standing track record in the area of traffic safety both on a more theoretical level and (applied) research, and they have identified possible future research areas where they seem to be developing currently expertise (e.g., transport planning).

### Academic networks and collaborations outside the unit

Academic networking seems to be strong at both national and international level. The Group is well-connected with both academic and industry partners / other stakeholders whilst good discussion is provided for diversity, integrity and ethics supported by specific data.

### Diversity, integrity and ethics

The working climate appears to be supportive, open and informal, but a formal structure seems to be lacking. Diversity at Transport and Roads is illustrated by its composition by gender (60-40%), age (23-71), origin (staff members are born in variety of countries). Current senior staff at Real Estate is among the youngest at the department.

# Quality in applications and publications

The Transport and Roads division appears to be very successful with research funding applications both on the national and the international level (many EU projects, as partner as well as consortium leader), while the Real Estate Science Division has as yet few research projects and its success rate is not reported. The Group has a range of publications in various outlets including in leading journals primarily from the Transport & Roads Division and far fewer from the Real Estate Science Division. However, there is no evidence of a publishing strategy.

### Strengths and weaknesses of approaches to quality

The Group, in particular Transport and Roads manages to acquire competitive international research projects. Their work is published in leading journals in their field and is cited frequently, despite the Group's small size, without formal structures or research strategy in place.

# Quality ecosystem

# Research strengths and how these are reflected in the educational portfolio

Teaching is research-related for the Transport and Roads division, but this relation is weak and under development for the Real Estate Science division. The Transport and Roads division has developed relevant MSc programmes plus similar courses for practitioners. Again, there is an imbalanced perspective between the two divisions.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

The Transport and Roads division has strong collaborations with various stakeholders whilst this is weak in the Real Estate Science division. The large majority of the research funds at Transport and Roads is for projects in collaboration with other partners, mainly from academia but also from public and private sectors. Both divisions also have a variety of collaborations within LU (e.g. medicine, social sciences, economics, law) and LTH (e.g. mathematical sciences, architecture, structural engineering, construction sciences).

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

Currently, there is no real challenge about conflicts of interest but specific processes will need to be developed. Likewise, ethical issues are seldom experienced and handled successfully if they emerge.

### How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere

The Group does not rely on large research infrastructure but on some soft infrastructure (e.g. systems) from the university which require improvement to support the Group adequately.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

The Group is not aligned with any of Lund's SFOs but it is an active participant in various university projects and activities.

### Strengths, weaknesses and alignment with non-research tasks

The Group's quality ecosystem is difficult to assess and seems different for the two divisions. While Transport and Roads demonstrates research-based teaching and collaborates with a variety of research partners and stakeholders, this is as yet not the case in Real Estate where the research portfolio is under development.

# Overall conclusions and recommendations

The divisions are very different both in terms of size, composition, research and educational activities and balance, as well as their topical areas and expertise. The Group as a whole is rather small with an academic staff covering a wide range of different subjects, hardly reaching critical mass. The working climate is informal, open and supportive. Formal processes and strategies are generally lacking. The Group is hardly self-sustainable due to a lack of basic funding for education and is very dependent on external projects.

Recommendations:

- Develop research and publication strategies, including targets
- Develop funding strategy (basic vs external)
- Balance composition of group
- Develop succession plan with special attention to senior staff, professors and sustainability of the Group (critical mass)

#### International Institute for Industrial Environmental Economics

#### Introduction

The International Institute for Industrial Environmental Economics was set up at LU in 1994, based on a government directive. At the same time, the government set up a small foundation (SIIIEE), as one of the smaller research foundations established using money from the Wage-Earner Funds, whose sole aim is to support research and education with an international focus at IIIEE. The government's overall aim was to inject economic thinking into environmental issues, with the intention that the knowledge generated would generate benefits to business<sup>59</sup>. It is governed by a board comprising a mixture of academic and societal representatives, appointed jointly by the Royal Swedish Academies of Science and Engineering. IIIEE stands outside the faculty structure at Lund and reports directly to the rector.

SIIIEE's initial endowment was MSEK 200, which it was expected to disburse over ten years. Good fund management and strong stick market growth through the 1990s meant that SIIIEE has been able to provide MSEK 350 in funding to the Institute over the years, with MSEK 70 in capital still remaining.

IIIEE has four research themes, set up under its strategy for 2016-2019. New professors were recruited by 2017 to coordinate each theme. SIIIEE provided start-up funding for the four new chairs.

- International and national policy intervention
- Urban governance and experimentation
- Business management and practice
- Consumption governance

The total research staff comprises 39 people, of whom 7 are professors, 8 are senior lecturers, 5 lecturers, 1 associate lecturer, 6 post-docs and 11 doctorands. The institute is nonetheless smaller than similar organisations to which it compares itself: Stockholm Environment Institute; Stockholm Resilience Centre; and the Copernicus Institute of Sustainable Development at the University of Utrecht. It is, however, larger than some similar academic groups which have been operating for a similar length of time and in many of the same topic areas (e.g., the Lower Carbon Futures Group at the University of Oxford (est. 1992), TEMA-T at Linkoping University, and about the same size as NTNU's Centre for Technology and Society (est. 1988). The director, Per Mickwitz, took over from Lena Neij at the start of 2019, so the institute is in effect 'under new management'.

<sup>59</sup> KVA and IVA, Granskning av Stiftelsen för Internationella institutet for industriell miljöekonomi i Lund (SIIIEE), Stockholm 2013

# Leadership

Adding to the body of professors at IIIEE and setting up a new thematic structure to reduce fragmentation since RQ14 appears to have paid off, in the form of institute growth, increased research income (including two ERC grants) and an increased output of high-quality research.

### Priority setting, including goals for external research funding

The institute has not tried to target particular amounts of growth within the themes. The SAR complains that IIIEE's institutional finding via the University for research has fallen slightly over a period when external funding has increased considerably. As a result, IIIEE says it is using all its institutional research grant (fakultetsmedel) to co-fund externally-funded research. In practice, SIIIEE funding functions as a second source of institutional funds for research and education. IIIEE's total research income in 2018 was MSEK 31.4. Of this, MSEK 3.9 came as institutional funding from LU and a further MSEK 3.9 was requisitioned by the institute from SIIIEE on the basis of project plans drawn up by IIIEE. In effect, therefore, institutional funding in 2018 was MSEK 7.8, or 25% of total income.

The Institute credits the four new professors with leveraging their start-up funding by obtaining large amounts of external funds for research, increasing the its sustainability. IIIEE has in the last few years successfully increased the proportion of its external income coming from large multi-year grants, in part in order to make it possible to engage doctorands on the four-year contracts needed to complete a PhD.

### Recruitment, promotion and succession

IIIEE has been very successful in recruiting and strengthening its staff, generally with intense competition among applicants. In addition to recruiting new professors, the institute has succeeded in promoting four senior researchers to docent level. While, as elsewhere, there is no room to promote many of its PhD graduates within the Institute, this does indicate that there is a career path.

IIIEE argues that LU's policy of limiting post-doc positions to 2 years puts it and its post-docs at a disadvantage by forcing them to move on elsewhere.

### The balance between activities in research, education and external engagement

In addition to its 11 doctorands, IIIEE teaches about 75 MSc students. Given that IIIEE <u>has a dual mis</u>sion on research and education, this appears to us to be a good level of education and IIIEE takes pains to try to ensure that all staff do at least a little teaching. Many of the topics taught at MSc level originate in the institute's four themes.

The SAR argues that all teaching and research are linked to external engagement and points out that stakeholders are involved in various roles in projects. In the context of IIIEE's mission, it is refreshing to see that industry is collaborating in a number of its projects but a little disappointing that its direct industrial income is close to nil though there is industrial co-funding in some projects, notably those funded by Vinnova. The Institute aims to increase direct industrial income through contract teaching. IIIEE does wider outreach through publications, conferences and five MOOCs.

### The overarching research strategy

According to the strategic plan for 2016-19, "The mission of the IIIEE is to advance strategies for sustainable solutions pursued by public authorities and businesses – internationally, nationally and locally." This to be achieved by focusing on four themes – business management and practice, consumption governance, urban transformation, and policy interventions – working in three strategic areas

- High quality innovative education
- Excellence and renewal in interdisciplinary research
- Effective communication and strong partnerships

The new strategy (2020-2014) reflects the change of leadership and is more focused on 'actionable' results. It is based on a SWOT analysis and its vision is to generate "A future in which the IIIEE has accelerated the transitions to climate-neutral and resource-efficient economies." Its realisation through the four new thematic foci together with an explicit concern for understanding pathways to impact is a significant advance on the earlier strategy. This is a change in intention from 'doing high-quality things' to 'making a difference in the world'. It will be interesting to see how this new strategy is being deployed.

# **Collegial culture**

The SAR describes an open, democratic research culture based on teamwork, interactions among groups and disciplines and frequent interactions with international research and stakeholders.

# Opportunities for early-career researchers to develop their originality and independence

The 'PhD article incubator', frequent interactions within the research themes and a well-structured process for doctorands to expose and discuss their work with external as well as internal colleagues provides a strong system of support and development for junior researchers.

# Sustainability and renewal of research strengths

IIIEE has been able to evolve its research agenda over time, broadening out from its original focus on clean production into related areas. It works in a rapidly-growing field, so the decision to focus on 4 themes not only increases the opportunities for its research to have societal impact but also responds to increased competition and a finer division of labour among research groups. It is easy to maintain a broad position in a young field; but as the field grows it become impossible to continue to lead in all parts of it and increased specialisation is necessary. Focus also supports the institute's aim to secure longer, longer grants in order to support PhD training and to reduce the 'lumpiness' of external funding.

# Academic networks and collaborations outside the unit

IIIEE's SAR illustrates its impressive array of research partnerships, both inside and outside Lund. The institute is a member of two open international researcher networks (SCORI and STRN).

# Diversity, integrity and ethics

IIIEE is exemplary in terms of diversity and gender. It runs training in research ethics and the SAR says, "we take measures to ensure that our research is protected against undue influence when we collaborate with others.".

# Quality in applications and publications

While the SAR offers no success-rate statistics, IIIEE has projects funded by difficult-to-impress funders, including the ERC and other parts of the EU Framework Programme. In bibliometric terms, its publication performance is strong and has improved significantly since the four professors were appointed, with high citation rates, strong presence in the most highly cited 1% and 10% of articles in their fields and most of the journals in which it publishes have high impact factors. All the available information suggests strong quality in both applications and publications.

# Strengths and weaknesses of approaches to quality

IIIEE's approach to quality is very strong. It has well-developed processes for developing researcher careers and clear thematic strategy, each led by a professor, that enable it to be competitive and win big grants in focused areas. That means it tends to have critical mass in these areas and sustain PhD education based on external funding. It is well-connected to other researchers through collaborative projects and exhibits high quality in both project applications and publications.

# Quality ecosystem

### Research strengths and how these are reflected in the educational portfolio

The SAR contains no information about what the institute believes its research strengths to be or how these relate to education. At a general level, it emphasises that much of the teaching is based on project research carried out by the institute and underlines the importance of teaching as a way to disseminate knowledge to wider society.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

IIIEE cooperates extensively with authorities at different governance levels, from the local through the national and up to the IPCC. This provides important opportunities to test ideas and experiment in the field as well as to communicate research results.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

IIIEE has explicit rules and processes as well as training dealing with most of these issues. It follows the rules and procedures of Lund University and LTH regarding conflict-of-interest procedures. Such issues most frequently arise in relation to appointing opponents and committee members for PhD-defences, when putting together recruitment groups and when researchers report conflicts of interests in their publications.

# How the unit uses and capitalises on available research infrastructure, in Lund and elsewhere

The nature of IIIEE's work means that it makes little use of infrastructure in the form of equipment. It anticipates that it will need to become more IT-intensive in its methods in future.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

The department is not aligned or cooperating with LU SFOs or centres of excellence.

### Strengths, weaknesses and alignment with non-research tasks

IIIEE has a strong quality ecosystem. It does research-based teaching and links that research to problem-owning and knowledge-using partners in government and industry. It would be interesting to see evidence about the effectiveness of these links and the institute's reflections on its impacts. Useful experience about exploiting such links can be found inter alia at the Overseas Development Institute in London, which has for many years run a series of projects called RAPID<sup>60</sup> to understand and improve its own links.

# Overall conclusions and recommendations

The IIIEE is an impressive organisation that is making rapid progress through a strengthened organisation and more focused strategy. With more professors than before and a structure that allows it to specialise and develop critical mass to a greater extent, the institute should be both professionally and financially more robust and competitive. It has a strong collegial culture, developing and supporting young researchers and maintain good working networks both with other researchers and government (though perhaps to a lesser degree with industry. Standing outside the faculty structures, it is a very unusual kind of organisation within Lund University that demonstrates the potential power of organising in such an interdisciplinary but thematically focused group.

IIIEE's overall aim has shifted from 'doing good work' to 'making a difference in society'. At this early stage, there is little evidence available to us that this desired impact is occurring. This provides an opportunity to treat projects as 'impact experiments' and to generate lessons about how to improve impact that can be fed back into future project designs.

<sup>60</sup> See, for example, the RAPID toolkit at https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8854.pdf



# 4. Faculty of Fine and Performing Arts (K)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 1	TOTAL NO UoAs: 4
SUBJECT PANEL NAME	UoA NAME
Art	Music Education
	Fine Art
	Music
	Theatre

# Foreword by the faculty leadership

For the Faculty of Fine and Performing Arts, the constitution of the faculty panel and the constituent Units of Assessment was simple and quick to agree on. Due to its size, the faculty was assigned one (1) panel. The faculty has four (relatively) clearly defined research subjects: Music, Music Education, Theatre and Fine Art. Based on a clear operational, organizational and subject logic, these four subjects each constitute a Unit of Assessment.

# External panel reports

Art

# Panel overview

'Artistic research' (*konstnärlig forskning*) is a young discipline in Sweden. The 'Degree of Doctor in the fine, applied and performing arts' was introduced in the Higher Education Ordinance in 2009. The term 'artistic development work' (*konstnärligt utvecklingsarbete*), which has been in use since 1977, is both a precursor to artistic research and an activity of its own, still in use in a number of institutions, and in Malmö as the official term for the artistic work a teacher does within the framework of his or her teaching position. It should be noted that in the Higher Education Ordinance chapter 4, which deals with the qualifications of higher education teachers, 'artistic expertise' is equaled with 'scientific expertise', and that the absence of a doctorate – and not only in artistic disciplines - can be compensated by 'some other professional expertise that is of value in view of the subject matter of the post and the duties that it will involve'. It should also be observed that Music Education is a scientific, not an artistic, research discipline.

**Music Education** has existed as a research discipline at MAM since 1996. To date, 19 PhD dissertations and 8 licentiate dissertations have been successfully defended. The research unit is small, and presently involves four PhD students. During its lifespan, the unit has developed a profile that underlines the entwined nature of education and research combined with engagement in global concerns to enhance music education for all. Due to a long and established tradition of national and international networks, Music Education has a strong international voice.

The doctoral programme in Fine Arts in Visual Arts started in 2002 with three candidates. It was at the time the first PhD program in Visual Art in Sweden. Since 2003 professor Sarat Maharaj has been full-

time research professor, which has given a unique stability and excellence to the program. The candidates defended their dissertations in 2006, a very well attend event in Lund City Hall. In 2007, six candidates were accepted, in 2013 four, and in 2018 another two. All in all, 11 doctors have defended their research in a wide range of subjects, all seen through the lens of visual art.

The first three PhDs in Music at Lund University graduated in 2008. After this, the Faculty of Fine and Performing Arts headed The National Artistic Research School 2010-2015, where seven PhD candidates in Music were appointed at Malmö Academy of Music (MAM). The MAM unit of artistic research in Music is small but has been productive and received international attention since the start. The research community at MAM consists of PhD candidates and senior researchers from Music and Music Education.

The research in **Theatre** aims to create and explore new artistic expressions within theatre, and to formulate the knowledge that arises when artists solve artistic problems. The main objective at Malmö Theatre Academy has so far been to establish a sustainable research environment. We are welcoming all feedback we receive, as we are in a period of dynamic development: the department now has two senior researchers (docent level) and from 2020 will have five doctoral students, a visiting professor and a professor in artistic research in theatre.

# External panel report

# **Executive summary**

Our review panel acknowledge from the outset that while the excellence we have seen in the work of individual academies is the result of outstanding vision and effort in each case, there are common issues that need to be addressed through the structures, dynamics and resources within which the Faculty of Fine and Performing Arts operates. In particular, the limited numbers of researchers and the lack of a unifying strategy, fully implemented, inhibit the full realising of the substantial research potential that these academies represent. That unifying strategy should arise dialogically from and be regularly refined democratically by a group of research voices from all academies rather than voicing a single managerial viewpoint.

The above comments summarize our impression that the Faculty has the potential to rise to an international level of excellence and global leadership during the next decade and that its reputation could equal that of other leading centres of research in the fine and performing arts internationally. Our recommendations aim to assist the Faculty to achieve this goal.

# Preliminary observations

The panel understands research activities and output in the humanities, arts, sciences, and in artistic fields all as relevant for this review of research potential based on the self-evaluations by the Units of Assessment. We note however, that artistic research is a term coined and institutionalised in and since the late 20th century for inquiries by means of artistic practice and reflection (with varying degrees of systematisation and rigour) around which a new research paradigm is forming. In recent years, the term has become established across many European countries as the umbrella term for research activities that centrally involve artistic practice as part of their methodology, such as practice as research in the arts, artistic performance as research, artistic practice-led research, practice-based research in the arts, arts based research, research creation.

While there is debate over the concept, consensus is that not all artistic practice is artistic research; the latter is marked by a search for, finding, and communicating of knowledge and understanding beyond the enhancement of personal practice. Art academies feature a variety of research activities and outputs,

with a particular emphasis on artistic research, which has its own discourse that an evaluation must recognise, and a strong potential to contribute to inter- and even transdisciplinary research methodologies. It was our task to identify the whole spectrum of research strengths within the Faculty, and to recognise the particular potential for artistic research, and research more broadly, on a high international level that the academies offer.

Our questions, analyses, and conclusions were drawn with the quality of the self-evaluations in mind throughout, even where this is not referred to explicitly. While we take both international standards and our collective expertise as points of reference for our acknowledgements, judgements and recommendations, our conclusions aim to inform future self-evaluations on all structural levels, next to giving leadership concrete statements that, in our combined view, require careful attention and action. We are very impressed by the existing research culture and see excellent potential to fulfil the University research goals with the help of ongoing clarification processes related to the points noted.

# Introduction

In late 2019, a panel of independent experts was appointed to review the research environments at the Faculty of Fine and Performing Arts (FFPA), Lund University. The review was undertaken in conjunction with (and as part of) the University's large research assessment. Lund University (LU) is undertaking an ongoing quality evaluation of research, named RQ20, Research Evaluation for Development. It is expected to be complete by the end of autumn 2020. The aim of RQ20 is to "provide a picture of how competitive the research of Lund University is in an international context" and the evaluation should "produce advisory documentation for the future, based on an analysis of the conditions within the University's different research environments".

The panel for FFPA included six members:

- Ingrid Elam, Professor and former Dean, Faculty of Fine, Applied and Performing Arts University of Gothenburg (chair)
- Jonathan Impett, Director of Research, Orpheus Institute, Ghent
- Gary McPherson, Ormond Professor of Music, University of Melbourne
- Deniz Peters, Professor for Artistic Research in Music, Kunstuniversität Graz
- Ville Sandqvist, Vice Dean Teaterhögskolan, Konstuniversitetet Helsingfors
- Lucy Steeds, Reader in Art Theory and Exhibition Histories, University of the Arts London

From January 31 the panel had access to self-evaluations and bibliometrics from the four Units of Assessment (UoAs), namely Music, Music Education, Theatre and Fine Art. In the week of the interviews the panel requested and gained access to additional documents, such as the organisation structure and the student staff ratio at the Faculty, as well as the "Strategic plan for research and research studies at the Faculty of Fine and Performing Arts, Lund University, 2019–2022".

The panel had Zoom meetings on March 5, April 15 and May 4. Due to the Covid-19 pandemic, the scheduled interviews with representatives from the units of assessment, the two deans and staff from the IAC, were also conducted on Zoom, from May 5 to May 8. The panel had an extensive number of highly productive Zoom meetings dedicated to the discussion and editing of the report.

The panel's final report is thus based on the self-evaluations undertaken by the UoAs, the bibliometrics and the above-mentioned documents, as well as interviews with the following people:

*Music*: Ann-Charlotte Carlén (Rector), Professor Karin Johansson, Professor Michael Edgerton, Hałla Steinunn Stefánsdóttir (doctoral student)

*Music Education*: Ann-Charlotte Carlén (Rector), Professor Eva Sæther, Senior Lecturer Anna Houmann, Lina Van Dooren, David Johnson, Adriana Di Lorenzo Tillborg (doctoral students)

*Fine Art*: Professor Gertrud Sandqvist (rector), Professor Sarat Maharaj, Professor Joachim Koester, Professor Matts Leiderstam (post doc), Pia Rönicke (doctoral student)

*Theatre:* Professor Esa Kirkkopelto, Jörgen Dahlqvist, Kent Sjöström, Sven Bjerstedt and Camilla Eeg-Tverbakk, John Hanse and Charlotte Østergaard (doctoral students)

*Inter Arts Centre:* Christian Skovbjerg Jensen (Director of IAC), Kent Olofsson (Manager of Studios) *Faculty of Fine and Performing Arts:* Anna Lyrevik (Dean), Staffan Storm (Pro-Dean), Annika Michelsen (Administration)

# A. Overarching observations

# A.1. Strengths

- Individual academies (UoAs) have managed to build a good local foundation for (postgraduate) research qualifications, independent of the closure of the National Artistic Research School in 2015.
- There is evidence of many initiatives towards third party funding (though often unsuccessful when formal applications to awarding bodies are made).
- Established reputation of individual academies, especially for teaching and doctoral education.
- Some examples of innovation and best practice in research education and doctoral training.
- Many instances of excellence in research output.
- There is a wide range of views of artistic research, of modes of research and of kinds of output. This is a strength, precisely because there is no narrow normative narrative since artistic research itself is a complex developing field of practices.
- The Faculty is well positioned to take on a leadership role in research within their region, and internationally.
- High international reputation for specific projects.
- The initiative behind the Inter Arts Centre (IAC) was both vital and productive, and it continues to be supported by the Faculty. Recommendations regarding its evolving relationship with the academies will be covered below.

### A.2. Weaknesses

- Insufficient critical research quantum (numbers of staff or outputs) or mass (environmental richness) in each academy.
- Whilst enriching the art fields, there is a lack of academic career progression (e.g. post-doctoral positions), restricting the development of both individual researchers and the research body within the University.
- While a plurality of views as to the nature of artistic research is to be celebrated, the necessary balance of unifying ethos on a general level is absent. This is reflected in uncoordinated sometimes inconsistent, even riskily unstrategic approaches to research and recruitment of both staff and doctoral students. For instance, there seems to have been an undue emphasis on fractional staff appointments. The Faculty as a whole therefore does not seem to fulfil its potential as a focused presence on the international stage.
- Research activity is largely restricted to those self-identifying as researchers, rather than informing the ethos of the academies as a whole.

- There is lack of clarity as to what might constitute research output.
- Inefficient relationship between the time and effort expended writing research grant applications and the reward obtained.
- Much research activity appears to be little visible to the wider University. This is partly a function of lack of appropriate granularity in LUCRIS with respect to how artistic research output is submitted and categorized.
- For various reasons (scheduling, equipping, physical distance) the IAC is under-exploited in terms of its potential contribution to research.

# A.3. Opportunities

- The lively discourses within each academy provide ample scope for increased collaboration within the Faculty.
- It should be possible to maintain the individuality, diversity and excellence of individual projects while identifying and amplifying resonances across the academies of topic, of methodology, of kinds of question or output.
- The breadth of interests within the academies and inter-disciplinary nature of artistic research suggest great potential for collaboration with faculties of sciences, humanities and education.
- There is an untapped body of research potential among the existing teaching staff.
- The development of research education within first and particularly second cycle provision.
- The IAC can become the focal point for research and collaboration across the academies, with other faculties and with other institutions. It can thus become a central window onto the work of the academies.

# A.4. Threats

- Fragmentation of research groups and isolation of researchers.
- Competing restrictive understandings of the nature of artistic research.
- Lack of visibility across the wider University community.
- Losing touch institutionally with the wider development of discourse.
- Lack of a coherent Faculty strategy for succession planning.
- loss of IAC to artistic production and education events, diluting its role as the central site of research and research discourse

More practically, we should rather speak of factors that inhibit the realisation of research potential within and among the academies:

- The lack of a coherent and cohesive research strategy.
- Failure to make a continuously growing and cohesive international impact.

# A.5. Proposed aspirations

- A pluralistic understanding of artistic research that provides common direction while accommodating the range of approaches reflected in the academies.
- A clear research strategy and roadmap at Faculty level, plus clear structures and patterns of work for collaboration between the academies, supported by consensus at academy level and resource at Faculty level.
- Robust structures and necessary means for career progression.
- An integrated, dialogical research vision including the IAC.

#### A.6. Faculty leadership

Neither the Faculty, nor the IAC are units of assessment, and have thus not presented self-evaluations. We note that while doctoral education is not stressed by Lund University for RQ2020, research is typically carried out by doctoral students at least as much as by senior staff within the FFPA. In a small research environment such as the FFPA, both the Faculty level and infrastructure like the IAC should play an integral role in developing and supporting research. We found that the power of the Faculty to influence and direct research activity is under-exploited.

In the self-evaluations from the UoAs as well as during interviews, a desire has been expressed for clear research leadership at Faculty level. Currently, the Dean is chairing a number of sub committees at the Faculty level and is also deeply involved in the time-consuming planning of the co-location of the Faculty in a new building. While the Pro-Dean is responsible for education, there is no position at the Faculty level with artistic research expertise and research leadership experience.

The strategic plan for research and research education at the Faculty states that, "by 2022, research and research studies at the Faculty of Fine and Performing Arts shall have a distinctive focus and visibility nationally and internationally, clearly feed back into first- and second-cycle studies, and have clearly improved financially." In addition, the strategy plan mentions the need for interdisciplinary collaboration, coordination of research and research studies, creation of a funding strategy and a framework for research ethics, and development of research infrastructure such as Inter Arts Centre. All these are relevant goals; however, the strategy not being linked to action plans for recruitment and funding, and not articulating separate goals for the Faculty, the separate institutions, the staff, and the doctoral students, it is not driving action, but rather asking for more strategy documents.

The new building project presents a unique opportunity for generating collaboration and a sense of common cause among the academies. However, it is critically important that this project should not a) become the promised but deferred future solution to every issue that arises, and b) reduce the attention, resources and imagination that Faculty and University gives to research in the academies in the meantime.

# B. Observations of the Units of Assessment and the Inter Arts Centre

#### **B.1. Music**

The Music Academy has a fine reputation for its excellence in teaching and the performing profiles of its staff. Over recent years it has produced some excellent research – projects that are innovative, collaborative and have international reach. The high number of applications for Doctoral positions along with its established international research partnerships reflects the Academy's research reputation. The staff with whom we have talked are clearly committed to consolidating and developing research at the Academy. It must be noted that in the context of a large professional school - with all of the practical complexities of providing high quality music education - the nurturing of research from being a relatively minor activity to becoming an integral component of the institutional self-image is a non-trivial challenge. There are promising signs of individual commitment to this challenge, but it requires support on all structural levels, and of the University as a whole.

We were very impressed with the doctoral candidate we were privileged to interview. However, the lack of critical mass in terms of research environment is clearly an issue. More attention could be paid to forming community among Doctoral researchers across the academies; Doctoral research fellows must surely have much in common. The impetus gathered by the prior Professor for Artistic Research should be cared for and raised further. Not only the number of Doctoral positions requires attention, but their careful scheduling to maintain a research community. The lack of opportunities for career progression is dispiriting and, in our opinion, needs to be rectified. If academy funding for regular post-doctoral positions is out of the question, two possibilities remain: either central University funding, or post-doc positions included as a priority in external funding applications; an ideal solution appears to be the combination.

The list of declared research outputs provided displays a wide range of types, and of likely impact. Some are international peer-reviewed outputs, others appear to be participation in an otherwise non-research-oriented performance. Approaches range from artistic research – through systematic musicology, performance studies and performance practice – to performances *per se*. A common strategy aimed at maximising impact is important.

The Music Academy boasts an extensive roster of internationally-recognised artists among its staff. Together they constitute a major source of research potential, and the cultivation of a thriving and inclusive research culture across the academy must be a priority. This is not only a good idea in and of itself – it also represents the best prospect for research growth, given the difficulty in obtaining funding for additional full-time research positions. To that end, a worthwhile and cost-effective intervention would be for the University to fund events and training (Continuous Professional Development) to encourage the emergence of research ideas. Academy practice and structures should then allow for the organic development and fostering of research projects. Recent developments in incorporating research training in cycles 1 and 2 are to be encouraged, and will contribute to the evolving sense of an academy-wide research ethos.

To date, much of the research output at the highest level has been instigated by the now-departed professor. This work included a high degree of collaboration across disciplines and between institutions. It is important that this activity be maintained and strengthened. The Academy is to be congratulated on the recent appointment of Professor Edgerton, but it is important for the Faculty to reflect on why the vacancy came about. The appointment of a new professor is an exciting opportunity for new focus and momentum. To maintain the international status, any emerging understanding of artistic research must not be narrow and normative but broader, in order to give voice and encouragement to the wide range of approaches and potential represented at the Academy and the Faculty, and to generate a sense of common purpose and open-mindedness.

A Music Academy research committee – in addition to the research education committee – should be instigated that includes the Vice Dean (Research), who we recommend be appointed (details below), and another member from outside the music academy. This additional member would have an important voice in terms of strategy, impact, and relationship and compatibility with other academies and faculties. It should also consider research potential within the Academy as a whole, prospects for collaboration, funding applications and when to devote resource to their preparation, and the appropriate documenting and reporting of research activity.

The intense expertise and learning processes of a music academy – in many respects a conservatory – naturally generate a particular discourse. This can potentially become a form of exclusivity when thinking about collaboration. Greater consideration should be given to the vast range of possible partners, of intellectual exchange that Lund University presents (e.g. sciences, medicine, social sciences, the humanities or philosophy) as well as to possible collaborations with the other arts within the faculty. The colocation project and further integration of the IAC will doubtless encourage such movement, but it is essential that these collaboration initiatives should not be postponed pending these changes.

#### **B.2. Music Education**

The international landscape in the field of music education research has changed significantly across the past couple of decades. At the Malmö Academy of Music, the development of the music education research program has attracted interest, enthusiasm and recognition from colleagues internationally and has shown a steady, continuing development since the earliest days of the doctoral program in the late 1990s.

Among the most visible strengths of the music education program are its close ties with the teacher education program, and connections with colleagues in Gothenburg and other Swedish institutions offering music education. Staff are clearly passionate about their research and that of their doctoral students. They have been able to carve out a distinctive style of research that connects admirably with teacher education and local and national schools as well as community music education teaching practice. Particularly noteworthy is their emphasis on research that focuses on aspects of folk music pedagogy, intercultural pedagogic competence and creativity, cultural diversity, inclusivity, intercultural education, social sustainability, and creativities. This emphasis is evident in various productive collaborations between music education and the teacher education programs but also between the music education and music research units within the Malmö Academy of Music. Interviews we undertook during our review process provided the impression that Music Education works closely with Music and that there is a sense of cohesiveness across both Music Education and Music. In various ways, the research environment is built on mutual respect and support for differences and similarities in ways that now distinguish the Malmö Academy of Music as quite different from other European music schools that undertake research in music education.

Music Education research outputs include a small number of published books, journal articles, and conference publications. These traditional outputs are complimented by other forms of research dissemination such as organizing international conferences and regional symposia. Members of staff achieve quite a lot given the size of their discipline. There is also an appropriate balance between their international outlook and focus on research that will improve Swedish music education both within the community and within the local school systems.

Importantly also, music education researchers have been able to build connections with their colleagues in artistic research, and more broadly between the Academy and the University. Research topics extend productively beyond the conventional boundaries for music education typical of other institutions. Innovative examples include Senior Lecturer Anna Houmann's work in educational sciences focused on micro moments in music teaching, pedagogical creativities and participatory formats, and involvement in international research projects such as *Creativities – Transcending Boundaries in Higher Music Education*. She is actively involved in the European Association for Music in School (EAS) and in the SIDA project Linneaus Palme that aims to build a Music Education Department at the Vietnam National Academy of Music in Hanoi. Anna Houmann is also an initiator of a U21 project concerned with *Innovation in Education* that involves teacher training programs at the University of Hong Kong, University of Auckland, University of Johannesburg and Malmö Academy of Music at Lund University who cooperate with the purpose of enhancing international perspectives at each university. Professor Eva Saether has undertaken pioneering research on interculturality in musical learning, and other forms of folk music, as well as research concerned with social sustainability and collaborative learning. She continues to be an active member of international societies with close connections with other Swedish institutions including collaborative supervision of students in Helsinki and elsewhere. Dr Ylva Hofvander Trulsson has undertaken valuable work in the area of migration and holds an impressive list of postdoctoral awards and membership of research projects within Sweden and internationally.

Exemplary research is also undertaken by Professor Karin Johansson through her involvement in the Swedish-Norwegian-German research project *Discourses of Professionalisation and Academisation in High-*

*er Music Education* (DAPHME), funded by Riksbankens Jubileumsfond. She has also helped with organizing the international choral research network *Choir in Focus* 2009–2012 and the transdisciplinary Pufendorf project *Artistic Vocal and Choral Orders* (AVaCO) 2014–2015, and participates as a member of the Lund University academic think tank LU Futura. Professors Håkan Lundström and Göran Folkestad remain connected with the music education program despite having retired from the institution.

Whilst most of the research undertaken within the Faculty focuses on artistic research in the fine and performing arts, research within the music education unit plays an important part in broadening this base to include methodologies drawn from the social sciences. Their work deserves to be recognized within the Faculty and also the University. Consequently, we see enormous potential for research in music education to becomes even more visible through efforts by the Faculty to showcase their work to the local community and within the University, but also through more proactive efforts by the music education researchers to collaborate with researchers in other parts of the University with successful track-records in funding in order to maximise their potential for drawing on wider sources for support and financing. Appropriate disciplinary framing is crucial for funding applications for such innovative research to be successful.

Because of its size, the review committee sensed a fragility of the Music Education program and the need for it to be constantly replenished through careful recruitment of doctoral students and strategic staff appointments who can further the reputation of music education research. In this regard, future staffing needs are not clear, with no real sense of what the academic profile might look like in 5 to 10 years from now. We were particularly concerned about what would happen when a professor or senior member of staff moves or retires. Would the person be replaced with someone at the same level? This is a particularly pertinent given that two of the staff seem to take on much of the supervision and research work, with one of the staff (a professor) moving to a part-time and planning for her retirement at some point in the future.

The Music Education doctoral program attracts high quality candidates who appear to be capable of continuing on with their research beyond the doctoral level. Traditional pathways to research through undergraduate music education and teacher education degrees seem appropriate.

Staff and doctoral students are highly active internationally within the profession, with doctoral students attending and participating in international forums and conferences right from their earliest weeks in the doctoral program. The Malmö Academy of Music organised the 2019 EAS conference which was a huge success and further developed their reputation in music education research. A book has been produced from this conference. Emphasis on publications seems to be appropriately linked to practice in Swedish schools and improving music education within Sweden. Their researchers have a distinctive 'voice' within the music education community and peers in other institutions know about and understand what Malmö represents through its music education program.

Doctoral students need to be continually encouraged to publish their doctoral work beyond their thesis, such as by publishing more than one journal article from their dissertation. Such an emphasis needs to be thought through from the beginning of the doctoral journey. We were impressed however, to learn that doctoral students receive a broad education from a number of differing research perspectives even though the two senior researchers are highly focused on their own research philosophies and topics.

Current staff are, for good reason, devoted to their own strategy but this also needs to be balanced with a commitment to continually evaluate this strategy and how it can be fully enacted. Staff expressed the desire to help create a shared vision of research within the Faculty but were unclear how this might be achieved. The Faculty should therefore aim to foster more active involvement with the various research environments within the Academies in order to develop strategies for promoting each discipline's research at the University level.

#### **B.3. Fine Arts**

A broad yet particular understanding of artistic research has been rigorously developed over the past two decades by Gertrud Sandqvist and Sarat Maharaj for the Academy of Fine Arts. This is powerfully shared between them and generously encompasses the work of their fine arts/visual arts colleagues. The 'expanded' research field envisaged (as articulated in the self-assessment) does not essentialise academic, i.e. doctoral/postdoctoral, practice but is more widely responsive to and inclusive of that demonstrated at large in art museums, galleries and konsthalls internationally, where external funding has been reliably secured by research-active staff to date. At the same time, it is notable that the hailed breadth of understanding or expanded field is limited to the fine arts/visual arts, without extending to modes and models of artistic research recognisable in other academies within the wider Faculty. Also, while we understand that the research of staff and students is flourishing within this environment, their contributions have not been articulated beyond individual artistic concerns, in institutional and academic terms that might be strategic internally and encourage external grant funding. Into the future, both the University and the Academy would profit from greater integration of the radical knowledge-producing potential of research in Fine Arts into the broader fabric and ethos of LU.

The current staff who are notably research-active – Professor Joachim Koester, Professor Matts Leiderstam, Professor Fredrik Værsleve, Professor Emily Wardill and Senior Lecturer Maj Hasager – are internationally established, as are the doctoral students, who all have high-profile practices (with the two most recent candidates selected from a remarkable 275 applicants). Leiderstam, an alumnus of the doctoral program, holds a post-doc position brought to the Academy with Swedish Research Council funding (the second post-doc he has held at the institution). Hasager is an alumna of the MFA program. The stable and attractive research culture at the institution is a tribute Sandqvist and Maharaj, who – it might be noted – have supervised all doctoral candidates to date between themselves. Both the members of this longstanding leadership team on artistic research are likely to retire within the next few years and subsequent appointments need to be based on careful attention to research practice and strategic development.

Extensive entries into the LUCRIS system demonstrate peer esteem (within the art field) rather than peer review (in a conventional academic sense). Yet peer review, in the form of group critiques or seminars among the doctoral cohort, is productively core to the doctoral training program, which typically runs concurrent with ongoing exhibition ('publication') commitments – on the part of the students – to galleries, museums, konsthalls and so forth. Publications on 'Nytt vetande från konstnärens perspektiv' (2015) and 'Några reflektioner kring konstnärlig forskning' (2017) are notable by Professor Gertrud Sandqvist and more along these lines, in other languages for international dissemination, and from Professor Sarat Maharaj, would secure the highly acclaimed word-of-mouth reputation of the Academy in this domain.

International engagement in the research of the department is clear in the public exhibitions logged in LUCRIS and more in the way of local audience development, as worthy of commendation, is described in the self-evaluation and was reported in Academy interviews. The teaching commitments by research-active staff span first and second-cycle education, with a new MFA specialised in artistic research (and associated addition to the staff team) thoroughly welcome as a strategic move. It is conspicuous that the doctoral students, who are practice-based, are exclusively supervised and examined by theorists/academics and a forum that connects them additionally to exemplary individuals who straddle this divide at the University – e.g. Esa Kirkkopelto as the new professor of artistic research in the Theatre Academy – could prove enriching.

The new MFA currently under development will productively nurture original and independent research at the second cycle of education. The newly appointed leader of this program might well bridge the practice-based teaching staff within the Academy and the doctoral community. All the doctoral candidates are already highly experienced researchers in the art field – and the current postdoc position is held by a senior researcher – yet all are drawn to the Academy for the opportunity to elaborate and hone their work. The absence of a conventional doctoral-training program – with sessions on (e.g.) methodology, ethics, concepts of artistic research and academic writing – is noticeable and ways of opening up work in this area offered by other academies within the Faculty, without disrupting the unique structure conjoining the fine/visual arts students (i.e. a limited number of effective dialogic seminars in Malmö per year) might prove promising. Likewise, a forum that opens the distinguished work of the doctoral community to their peers in music and theatre – and to students at first and second cycle within fine/ visual arts – (while observing the articulated importance of *not* making conventional teaching demands) could enrich the collegiate culture simultaneously at Academy and Faculty level.

The Fine Arts Academy mostly makes use of the Faculty's Inter Arts Centre to host teaching, although the doctoral students additionally use the video-editing studios and on occasion, for examination, exhibition spaces. As such it provides only a minimal basis for research and this lack should prompt critical reflection as the major development of a Faculty campus is underway.

A relatively long and deeply established research culture at the Academy – and concomitant international respect – might now be renewed, within the Malmö Faculty and Lund University, also reciprocally with external institutions across Europe, to nurture (and keep diverse) the still young but now blossoming field of artistic research.

#### **B.4.** Theatre

As stated in the self-evaluation, the research unit in the Theatre Academy at Malmö Faculty of Fine and Performing Arts is young. The first doctoral student was appointed some twenty years ago and graduated in 2007. The doctoral program started in close relationship with the research unit at the Helsinki Theatre Academy. Helsinki, among others, is still mentioned as one key partners. All together five doctorates have been awarded from the program since it commenced. Currently, there are five students enrolled in the doctorate. The progress and growth of the program has been slow, and the relative smallness makes the research environment vulnerable. This is acknowledged in the self-evaluation. A slim critical mass of staff and students is reflected in the relatively small amount of peer reviewed publications.

Despite being small, the research environment at the Theatre Academy is vibrant, striving to develop research both within the performing arts and jointly with the entire field of artistic research. Consistent with other Theatre Academies, staff actively collaborate, which, with the newly appointed professor, appears to be a strengthening priority. Unified strategic planning, implementation, and activity in artistic research between the academies, is a core vehicle to highlight, increase and improve the status of artistic research within the University. In addition, collaborative action requests strategic leadership with an open and constructive dialogue with all parties. However, there is evidence that the Faculty lacks an overarching research community with a unified identity, even though diversity and different strands of research are essential and need to be maintained.

Our impression is that the staff and the doctoral students at the Academy are highly motivated and committed. The teaching and the studies are designed in a functional and individual way. The course appears to us to be demanding and rewarding for the students. The self-evaluation mentions, as a very positive factor, a strength, that "all teachers in postgraduate education and all doctoral students are teaching or will be teaching within undergraduate education". This situation, though, is contradictory. To have the opportunity to teach and work in practice with students and topics concerning one's research question, or at least tangentially related, is beneficial. Yet, a complication is that there is no MA-program that can act as a pathway into the program from the undergraduate program, and as a possible teaching environment for active researchers. The relatively heavy workload in teaching is, to some extent, apparently pointless in relation to research. This is also disproportionate when compared with the other research units at the Faculty.
The self-evaluation emphasizes collaboration with the established theatre field in research projects and that this collaboration is the main source of external funding for practice theatre research. The self-evaluation states that "there is no contradiction between these two", i.e. research practice and established theatre. This co-operation, while certainly valuable and beneficial, provokes some reflection. Even though the research undertaken at the Academy has influence in a wider context, it seems that the core co-operation happens in quite a narrow professional theatre environment. This can, in addition to being enriching, narrow down and prescribe the research content of the program. Further means to develop, when appropriate, the external partners and funding, should be investigated. The claim that "there is no contradiction" between the established theatre field and research, is not convincing and seems to work against the aims of the research program. The concept of the "established theatre" is indefinite and excessively wide. When this refers to mainstream theatre, research should perhaps have a questioning, proposing and even opposing stand, instead of claiming "no contradiction". In this sense, every collaboration with the extensive professional, applied, and interdisciplinary performing arts field is to be encouraged.

Theatre research inevitably requires post-doctoral research positions and funding to further develop artistic research as such, and interdisciplinary research within the University. There are substantial possibilities within the multi- and transdisciplinary research environment of Lund University; theatre, as a common gatherer of assemblies of different forms, is an appropriate platform for this. Collaborative projects offer an important opportunity for funding links with external organisations. The discourse and practices of artistic research tend to differ from those in scientific settings, and there is a growing interest within both the humanities and the natural sciences to find joint platforms for fruitful and encouraging discoveries and outcomes. The IAC could be used for managing a wider spectrum of research topics, and as a forum for discussion, experimentation and post-doctoral research projects.

National and international collaboration is probably at its peak in relation to the capacity of the program. "The main objective so far has been to establish a sustainable research environment at the Academy", as is stated in the self-evaluation. Collaboration takes place within the Nordic sphere and with some partners across Europe. The Theatre Academy aspires to increase its size and status. Nationally the Theatre Academy at Malmö is valued and influential. It is also important to mention the Academy's participation, along with other researchers in the Faculty, in Agenda 2030. This is one instance of collaboration between art and science, and questions of ecology and environment are truly of common interest and not solved solely by artistic or scientific means.

#### **B.5. Inter Arts Centre**

The IAC can become the focal point for research and collaboration across the academies, with other faculties and with other institutions. Currently, however, its role and purpose are unclear, as is the role of the research expertise attached to the centre (a mere 25% "technician" position). The IAC's policies, priorities and strategies seem to be unclear, not only to Faculty staff, but also to staff employed at the IAC.

There is, within the IAC, a desire to identify strong areas and then concentrate on these, thus giving more space to research projects. While the IAC staff would like to see the centre as a meeting place for artists and researchers, they acknowledge that it is today mainly used by external artists who apply through open calls and come with their own funding. We also understood that doctoral students are hardly present at the centre, while the Theatre Academy, physically close to the IAC, uses it for interdisciplinary activities, and other departments find the technical equipment too outdated for their needs.

The IAC staff expressed a frustration at the lack of a strategy specifying roles, purposes and resourcing of the IAC. There are great hopes for the future colocation in a new building, potentially developing the IAC from a facility mainly used for education and art projects into a centre for interdisciplinary research and research discussion. On the other hand, the colocation risks deferring necessary actions to a distant future.

## C. Recommendations

From the outset, we emphasize two points:

#### Faculty

Within the structures and hierarchies of the University, the potential of the Faculty to serve as an overarching structure and circle of experts in dialogue to influence and direct research activity is under-exploited. It should be more proactive and supportive in establishing strategy and priorities, constantly searching for potential and guiding in terms of funding and applications. An appropriately funded Vice Dean (Research) will be important in addressing this issue, but active and engaged support from the Faculty as a whole is vital if the academies' research potential is to be realised.

## Colocation

The new building project presents a unique opportunity for generating collaboration and a sense of common cause among the academies. However, it is important that this project should not a) become the promised but deferred future solution to every issue that arises, and b) reduce the attention, resources and imagination that Faculty and University gives to research in the academies in the meantime.

In finer detail, our recommendations are as follows.

#### C.1. Research leadership

A continuing position with at least a 0.5 workload should be created at the Faculty level for a Vice Dean (Research) or other appropriately designated title. The duties of the Vice Dean (Research) would be to take responsibility for the oversight of the Faculty's research direction and implementation by work with colleagues to develop policies on research and research education, to identify and set the strategic direction for all research that is undertaken across the Faculty on University forums and discussions regarding research. The incumbent would also prepare budget submissions for approval by the Dean and might be delegated with the authority to oversee research expenditure across the Faculty's academies. The incumbent should possess managerial and administrative experience and be an established, active researcher whose mindset is sympathetic to the plurality of research undertaken across the Faculty. See Appendix for recommended responsibilities of the Vice Dean.

We strongly advise the University, in partnership with the Faculty, to make it a priority to invest in a full-time research professor who possesses interdisciplinary expertise. Alongside pursuing their research, this appointee would fulfil the role of Vice Dean (Research) and work with research professors in each of the academies. The role of Vice Dean (Research) should go proactively well beyond coordinating and into creating a collaborative research environment and culture.

#### C.2. Research environment and culture

The Faculty should encourage the academies to arrive at a consensus regarding artistic research – one that accommodates their current plurality while allowing them to present a unified strategy and negotiate common collaborative projects. This must develop alongside continued encouragement and support for all other modes of research that are prominent within the Faculty.

With such an agreed self-image in place, the Faculty should support the development of the wider role of the academies in the University as an epistemological avant-garde, in exploring kinds of knowledge and modes of knowledge production in conversation with other disciplines (beginning, perhaps, with philosophy of science and cultural anthropology). An inter-academy platform for unorthodox/practice-based research should be developed that encourages researchers to articulate their work to each other, perhaps expanding an existing model – the practicum, for example. It should be financially well-supported by the University and the Faculty (shared responsibility: academies get *extra* funding *if* they participate in this). An internal, pan-academy peer-review process should be initiated, both to encourage quality of work and to facilitate an evolving sense of common values, parameters and goals.

The Faculty must take responsibility for clear communication to the University as a whole, not only of particular research projects and outcomes, but of the aggregate value, impact, potential and implications of work across the academies.

#### C.3. Research funding

The Faculty should reconsider the process for distributing the research budget across the academies, to ensure that the model in the near future is visibly equitable, fair and transparent, while allowing for strategic funding of commonly agreed initiatives in research. Upcoming retirements and other dynamism currently in play offer opportunities for revision.

A funding mechanism must be found to address the professional vacuum between doctoral researchers and professors. This is vital to offer career progression, to build the base of skill and experience, to develop research capacity and to increase the number of realistic applications for external funding. Next to funding rotating postdoctoral positions, a proven tool is seed money for grant-application writing by externals with doctoral degrees towards generating their own Government funded postdoctoral projects hosted by the academies.

To promote interaction with other faculties – with both the sciences and humanities - and the emergence of new multi-disciplinary initiatives, resource should be allocated to seed initial research and enable the preparation of new funding applications.

#### C.4. Research output (metrics)

LUCRIS should be further adapted to suit the needs of the Faculty and ownership of the system should be promoted among staff, in order to capture more appropriately the full range of research carried out in the academies. This should be an integral part of the Faculty research strategy.

The Faculty might consider benchmarking with other Fine and Performing Arts Faculties elsewhere, to ensure that research active staff can use the most appropriate categories and indicators when they input their research outputs into the LUCRIS system.

#### C.5. Enhancing research potential among academy staff

Given the large number of comments made to the review committee about workloads and insufficient time to carry out research, the Faculty might consider evolving its current model so that it more adequately takes into account the full range of activities of its staff. Research time as a percentage of workload needs to be calculated, documented, specified in contractual arrangements and ring-fenced to ensure future output of new knowledge, creative work, publications and the fostering of local, national and international research activity.

Policies should be formulated to develop the research potential across the widest range of staff within the Faculty. Elements might include:

- initiatives aimed at enabling early career researchers to receive support from the Faculty and mentoring from more established research active staff within the Faculty;
- guidelines for reviewing the research activity of all staff who undertake research, as built on transparent and agreed parameters for yearly professional development reports;

- models for defining staff workloads in research, and for rewarding highly active research staff and exemplary research initiatives;
- encouragement to see research as an integral, normal and generative part of teaching at an academy and to reflect on personal practice to explore its potential;
- a clear structure of Continuing Professional Development in research skills and topics for all academic staff.

### C.6. Research infrastructure

The IAC has proved an excellent initiative as a research resource, for documentation and performance, and in encouraging and facilitating collaboration. It could be an important agent in the search for common purpose among the four areas. Each research area is highly appreciative of the IAC, yet expresses different frustrations, to which we respond:

- The existing Centre should be renamed to highlight the role of research (e.g. CIAR Centre for Inter Arts Research, or ARC Arts Research Centre).
- Given that the Centre is funded from research budgets, its priorities should be strategically aligned with research across the Faculty, with its head reporting to the Vice Dean (Research).
- Responding to researchers at the academies, their research projects must be prioritised above artistin-residence programmes. Proposed artist-in-residence projects should therefore be evaluated in terms of their contribution to arts research in the academies.
- A scheduling mechanism needs to be designed to allow for the long-term planning necessary for major events, festivals or teaching, together with a flexibility that creates the necessary responsiveness to research needs as they arise.
- The need to update equipment is, of course, constant; however, if artistic researchers at Lund University are to position themselves at the cutting-edge, there must be a way of addressing this. As particular requirements emerge with strong inter-academy consensus, this should justify access to special University funds beyond the annual budget.
- The design of the new building project provides an opportunity to ensure that there is infrastructure that will allow the Centre to realise its potential as a productive hub, enabling the flowering of the most exciting and important developments in artistic research.

## Appendix

#### Key responsibilities for the Vice Dean (Research)

Some or all of the following:

- 1. Maintain active research status and profile within the Faculty.
- 2. Chair the Faculty Research Committee.
- 3. Oversee the strategic remodelling of the IAC.
- 4. Evaluate research activity and focus resources towards consolidating strengths and supporting emerging areas.
- 5. Provide high-level analysis of the external environment and identify new opportunities for research development and funding.
- 6. Articulate the vision, establishing a rolling five-year agenda for research within the Faculty and developing strategies to achieve these goals.

- 7. Through focused selection, phasing and mentoring of doctoral students, continue building a quality graduate research cohort.
- 8. Together with other relevant colleagues, co-ordinate the development and implementation of the Faculty's strategic plan for research and research education, with a focus on improving the quantity and quality of research outputs including presentations, publications, products and services.
- 9. Develop and implement a strategy for securing funding for scholarships, teaching assistantships and internships to enhance graduate research accessibility and outcomes.
- 10. Benchmark with other Fine and Performing Arts institutions in order to continually refine how the Faculty's research can be input into LUCRIS and other reporting systems, in ways that are appropriate for the discipline and that adequately detail individual and collaborative research outputs.
- 11. Monitor and report research achievements in terms of inputs, outputs and citations, as well as public events.
- 12. Develop strategies for creating a nexus between research and teaching.
- 13. Coordinate programs for early-career researchers, including doctoral students.
- 14. Facilitate the development of a research environment that fosters high achievement, collaboration and continuous improvement.
- 15. Work with relevant colleagues within the University to ensure, through available systems and support, that research training is properly conducted, grant applicants are sufficiently guided and ethics matters handled appropriately.
- 16. Engage with relevant industries and translate research for the public to broaden and enrich understanding.
- 17. Develop relationships with government, research and educational organizations in Sweden and overseas to explore opportunities and secure funding to support research related to the Faculty's priority research themes.
- 18. Liaise with the appropriate University staff, committees and processes to ensure consistency with legislative and University requirements, and synchronicity between Faculty and University goals.
- 19. Develop strategic alliances with appropriate organizations to plan collaborative research programs.
- 20. Provide strategic advice and guidance regarding University and Faculty policies and procedures with respect to areas under portfolio.
- 21. Develop and maintain effective relationships with Faculty and wider University staff to achieve Faculty strategic imperatives and ensure communication on matters related to this role.

# 5. Faculty of Law (J)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 1	TOTAL NO UoAs: 1
SUBJECT PANEL NAME	UoA NAME
Faculty of Law	Faculty of Law

# Foreword by the faculty leadership

The Faculty of Law was awarded one Panel within RQ20. The Faculty chose (after discussion within the Faculty management and the RQ20-working group at the Faculty) to constitute only one Unit of Assessment within the Panel. This choice was based both on the size of the Faculty, and on its organisation. The Faculty of Law comprises one Department, and the Faculty is led by a Faculty management group, and an integrated Faculty and Departmental Board. The main research strategy is set by the Faculty Strategic Plan 2018–2026 and a number of action plans – all adopted by the Faculty Board. The Faculty of Law – and not the different research environments – is the main organisational unit, which sets and operationalises the research strategy, secures the intertwining of research and education, and internationalisation and interdisciplinarity, allocates direct government research funding, manages external research funding and recruits academic staff. The research at the Faculty is carried out in multiple research environments, reflecting dynamics and adaptability in relation to the changing character of law and legal disciplines and the role of legal science in social transformation and a global society. Some research environments are more closely related to traditional legal disciplines, while others are more thematic and characterised by legal-interdisciplinary and interdisciplinary approaches. Researchers are frequently involved in many different research environments at the Faculty of Law and elsewhere.

# External panel reports

## Faculty of Law

## Panel overview

The Faculty of Law comprises one Department, and the Faculty is led by a Faculty management group and a Faculty Board. The Faculty is characterised by internationalisation, the intertwining of education and research, interdisciplinarity, as well as boundary-crossing external engagement.

The research strategy at faculty level is set by the Faculty Strategic Plan 2018–2026 and a number of action plans. The Faculty of Law (integrating the Department of Law) is the main organisational unit, which sets and operationalises the research strategy, allocates direct government research funding, manages external research funding and recruits academic staff.

In the context of RQ20, the Faculty of Law constitutes one research environment, one unit of assessment and one panel, and it submits one self-evaluation report. A working group at the Faculty has been tasked with the implementation of RQ20.



The research at the Faculty is organised and carried out in multiple *research environments*. The notion of a research environment serves as an 'umbrella concept'. It reflects the Faculty's deliberate choice of promoting an open and flexible research organisation, in which research activities are largely organised 'bottom-up', and on the basis of academic freedom, creativity and innovation, and dynamics and ad-aptability in relation to the changing character of law and legal disciplines and the role of legal science in social transformation and a global society. Some research environments are more closely related to traditional legal disciplines, while others are more thematic and characterised by legal-interdisciplinary and interdisciplinary approaches. Sometimes research collaboration is organised in articulated research groups, and at other times in research networks or clusters, or in relation to specific externally-funded research projects. Researchers are frequently involved in many different research environments at the Faculty and elsewhere, which reflects the dynamic cross-fertilisation between legal disciplines and between legal science and other disciplines.

The Faculty's research is characterised by both generalisation and specialisation. Research is carried out in all core legal disciplines in order to guarantee research-based education within the professional law degree programme and supervision within the doctoral education programme. At the same time, strong research environments are being promoted and are flourishing and new strategic, often thematic, research areas are being developed and supported. Legal-dogmatic research of high quality and rigour is of crucial importance for both the development of legal science as a discipline and for the development of the legal system.

## External panel report

#### Panel

Kimmo Nuotio (Chair), Monica Claes, Helle Krunke, Vanessa Mak, Joellen Riley Munton, Jan Wouters

#### Executive summary

The Faculty of Law has set itself the goal of reaching the highest level in research, and it has indicated that it has selected its benchmarks internationally rather nationally. The current RQ20 is its third research assessment exercise, albeit one taking a novel approach. The Faculty has developed its activities over a longer time period, and the two previous research assessment rounds have fed into that process. We see that the activities of the Faculty are impressive and have progressed considerably. However, certain challenges remain to be addressed to ensure further development.

The Faculty has a motivated staff and enjoys a high level of collegiality. This is a great asset and should be preserved. The Faculty is in the middle of a transition period as the processes of internationalisation and increased interdisciplinarity have reached a new phase and an integrated approach has been adopted. A tenure track model has been adopted and recruitment policies are more open than before. This has made recruitment more competitive and means that career planning has become a particular concern, especially for many of the junior staff. Fair recruitment and promotion procedures are vital to the longterm success of the Faculty, as well as being important for the well-being of staff.

The Panel found that the Faculty is dealing well with these challenges. The self-evaluation report indicates that the Faculty leadership is conscious of most of the relevant issues. Having said that, we detected a certain cautiousness in the management, and suggest that a more determined approach may be needed to manage the development of the Faculty's research profile, and to tackle some issues. Our report aims to assist in this process.

In our report we deal with issues such as the institutional structure of research activities within the Faculty; the desirability of seeking to attract more European research funding; issues related to researcher

career development; integrating internationalisation into research; and how the system of providing salaried research leave might be revived. The Faculty's research profile is emerging clearly, and it deserves to be well-communicated, given its success in societal outreach both nationally and internationally.

## Introduction

The Panel effectively began its work a few weeks before the planned site visit to Lund. However, due to the travel restrictions imposed by the COVID-19 pandemic the site visit was replaced by six e-meetings dedicated to interviewing Lund staff on the topics relevant to the report. This change required an adjustment to the way the Panel organised its work. The Panel held three internal e-meetings before the week of interviews, and it worked simultaneously on a draft joint document which enabled the Panel to prepare questions and preliminary insights to put to the interviewees. The Panel was also given the opportunity to send written questions to the Faculty. These questions were answered in due course and they were a helpful addition to the information we consulted in drafting this report. The report reflects the views of the entire Panel.

The main source of information has been the self-evaluation report prepared by the Faculty which also provided information about sources of external funding during the years 2014-2019. A detailed list of individual research publications has also been provided. The Panel has acquainted itself with the Strategic plan 2018-2026 of the Faculty, the Faculty's action plan for research and third cycle education 2019-2021 as well as Faculty's plan for internationalisation 2019-2021. The results of the two previous research assessments (RQ08, 2008-2009 and RQ14, 2014) have also been at our disposal.

The aim of RQ20 is to provide a picture of the competitiveness of the research at Lund University in an international context. RQ20 has a different scope compared to its predecessors: it is primarily oriented towards assessing (and giving advice on) the preconditions for high-quality research as they are expressed in procedures, strategies, resource allocation and networks.

The self-evaluation report contains reflections on the development and achievements of the Faculty during the years 2014-2018, and this picture has been enriched by the answers given by the Faculty in interviews and follow-up questions. Our report also provides a perspective on the Faculty's future, since our brief is also to provide helpful guidance and feedback for the Faculty as it plans its future. The aim has not been to make an assessment of research outcomes themselves, but rather to look at the circumstances and the contexts in which research is being carried out. The ultimate aim is to assist the Faculty in aspiring to the highest possible research achievements. The Faculty is also the Unit of Assessment for this exercise, so the Panel is able to submit a single report addressing all the relevant issues.

## Observations

#### **Overall research strategy**

The documents presented to us and the meetings with the staff indicate that the Faculty of Law has been continuously developing its activities over a long period of time. During the time of the first comprehensive research evaluation, RQ08 (2007-2008), the Faculty had set itself the goal of 'being the best in Sweden and one of the foremost legal centres of legal research in Europe'. The evaluation RQ08 confirmed that in some areas of law the Faculty had already reached that goal and that some of its research was internationally recognised.

The RQ08 Panel noted that doctoral training in law was well-developed, but that the small number of doctoral students was alarming. This was regarded a risk, especially if reliance on the closed promotion sys-

tem was to be continued. The Panel recommended that greater emphasis should be given to personnel planning. The RQ08 Panel also observed that the teaching load of some of the senior teaching staff amounted to 80% of their total working time with the practical consequence that they did not have time for meaningful research unless they managed to buy themselves out by means of externally funded projects.

The next research evaluation was carried out in 2014 (RQ14). In their report the Critical Friends noticed that there had been a positive development after the previous evaluation and that many of the recommendations of the RQ08 Panel had been implemented. The Critical Friends made a number of recommendations. As the Panel of the RQ20 we will, however, give our independent view on the progress and quality of the research at the Faculty rather than comment in detail on developments following the last evaluation. For us, the self-evaluation report has been the starting point.

The self-evaluation report summarises the key developments since RQ08 and RQ14 in the following way: there have been increases in legal-interdisciplinary research approaches and collaboration, in interdisciplinary research approaches and collaboration, and in internationalisation, resulting in *integrated* internationalisation; there has been overall growth in research; increase in research seminar series etc; development of new research environments; and strengthening of academic leadership and 'entrepreneurship'. It is evident to us that the Faculty has not been just drifting, but that has strategically addressed the relevant issues and aims to make the best out of these developments.

We also see that the Faculty is still very much in the middle of a transition period. Internationalisation has indeed reached the next level. A long-term investment in doctoral education has produced a strong generation of early career researchers. The closed recruitment policy has been abandoned and the Faculty now recruits actively also from the outside, from other Swedish law faculties and also from abroad. The publishing profiles of the early career researchers are today more international than those of their more senior colleagues.

The Faculty has also identified as a risk the fact that the university is competing for staff with a private labour market. Flexible and open recruitment channels diminish the risks of a lack of competitiveness inherent in reliance only on internal recruitment. It is of utmost importance for the Faculty that academic research careers continue to be attractive to the most promising and talented doctoral students and early career researchers. Inevitably some top recruits may leave to take up good positions elsewhere. This is to be expected in a competitive academic job market. The Faculty needs to develop its own approach to making positions attractive, and be aware of its position in this market. The Faculty's reputation for its collegial and supportive academic working culture is a highly valuable asset in this regard and it may assist in recruitment and retention of staff, even in an increasingly competitive market.

Of course, the Faculty cannot provide careers for all of its doctoral graduates. They will nevertheless remain valuable connections for the Faculty in their new roles in business, government and industry.

The University's new policies for recruitment have had and can be expected to continue to have an impact on the research environment as the tenure track system will become the main tool for the Faculty in managing research careers. Recruitment policies are crucial to research development strategies both in the short term and even more so in the long-term. This change is timely since it combines a competitive element with a long-term commitment to career development. It will be most crucial for the success of the Faculty that personnel planning is managed carefully and with the research strategy in mind since recruitment will shape the Faculty's research profile in a profound way.

The Panel observed that the Faculty is reaching a decisive moment in its transition period. The Faculty is serious and determined in "striving for the highest quality". Its benchmarks are now clearly some leading law faculties in Europe, which speaks of the level of the Faculty's ambition. The Faculty has prepared a set of planning documents to work towards this aspiration. Excellence in legal research may mean many things. Publishing in the best law journals may be one indication, but research published in the Nordic languages may also be of top quality. Every leading law faculty in Europe needs to contribute research at various levels, local, national and global.

As we see, the Faculty has built itself a strong profile in doctoral education and has invested substantially in salaried doctoral positions for a long time. Leading law schools tend to be strong in doctoral education. Together with a more open recruitment policy and increased mobility, both of which enhance internationalisation, it might be advisable to slightly reduce the resources expended on doctoral education, and rather aim at enrolling very high-quality candidates. The additional resources might be directed to recruiting at postdoctoral level. Strong performance at the postdoc level is the crucial measure of merit for selecting candidates for tenured positions with clear career prospects. A balanced allocation of resources between these levels is central in developing a good staff recruitment plan, since it is the most central tool for strategic development of a faculty. Such a plan needs to enable strategic change, but at the same time it needs to guarantee certain foreseeability and fairness for the candidates themselves.

Reaching the highest European level is a realistic goal, but several challenges remain to be tackled. The Faculty's potential lies in its strengths and in building further on them. The staff resources of the Faculty are relatively small, and there are still staff members who do not have much time for research. There may be also constraints limiting the Faculty's options when designing its policies and strategies. The constraints imposed by the operational environment of the Faculty can be difficult for an international review Panel to see, and this makes it difficult to suggest optimal ways of dealing with particular problems and challenges. We know from our own experience that the solutions will always need to be tailored to the local context. We have attempted to dig into these issues as deeply as we can, but we are aware of our limitations.

Integrated internationalisation, for example, will require that internationally recruited scholars can teach in their research areas, and that they are on an equal footing with the recruits coming from the inside of the system. Degree programs may have to be adjusted in order to enable that, or new programs may need to be introduced. In legal education this can be difficult because degrees accredited for practice usually mandate a number of compulsory subjects in the curriculum. Elective components may be set in a more flexible manner. It is most important that the majority of the staff should be able to carry out in depth research in their relevant field and base their teaching activities on their research. The best European law faculties in research tend to be very strong in teaching as well.

The system of inviting top international visiting researchers deserves a special positive mention. The Faculty can build its efforts for increased internationalisation on impressive international networks. The Faculty has produced an action plan for internationalisation, which contains highly useful measures for that purpose. According to our view, a law faculty with a global approach needs to reach out beyond Europe, and we see the Faculty's clear ambition in this regard. Internationalisation is tied in with global responsibility. Internationalisation also includes sharing knowledge and helping other societies develop, be it by means of research or by means of transfer of knowledge or even direct involvement. We see that the Faculty is highlighting the relevance of societal responsibility and reacting to global challenges, many of which are national challenges as well.

Tenure track systems are found in a variety of forms, and one would need to look beyond the surface to be able to judge how its introduction changes the career models. Is it attractive enough, if tenure only leads to a lecturer level position especially if that continues to involve a heavy teaching load? Is there a clear way forward? How do you allocate teaching duties and responsibilities fairly? Could you have lecturer positions with different profiles, some more research-oriented, some more teaching-oriented?

Introducing changes in the recruitment policies has the potential to cause tensions among staff since some will enjoy better opportunities than others. Heavy teaching loads create incentives for staff members to buy themselves out from teaching duties with the help of external research funding. The Faculty derives most of its funding from teaching which means that research activities are heavily dependent on external funding. Luckily, the Swedish funding opportunities seem to be well-developed in international comparison. We have learned, however, that national competition for research funding is increasing. In fact, the figures for external research funding show a slight decline compared to the government funding which has remained stable. For a small Faculty stability of funding is crucial. In many European countries the universities have faced cuts in government funding. A stable source of government funding gives the Faculty a competitive advantage in European comparison.

Dependence on external funding creates a complex setting in which external funders support the basic activities of the Faculty, and at the same time also exercise some strategic influence. This complex relationship increases the necessity for the Faculty to articulate a clear research strategy, especially when external partners are funding permanent staff positions. It is important that the Faculty uses its own research funding to fill in the gaps and to foster the success of the Faculty as a whole. Close personal contacts with the main collaborative partners becomes crucial.

So far the Faculty's researchers have not been very active in applying for competitive research funding from Europe. This situation may be changing. In the longer term it will be important to be competitive in research funding from the EU. When aiming for the highest level of international recognition, competitiveness in international research funding is significant, even though it is not the only thing that matters.

The Faculty has an impressive history in fostering interdisciplinarity, especially in some of its research environments. Also interdisciplinarity is challenging traditional ways of carrying out legal scholarship. It requires a methodological rethinking, learning and renewal, but it also promises more collaboration with researchers coming from different academic backgrounds. For decades, the non-doctrinal areas of legal studies, such as legal history, legal theory, sociology of law, law and economics, have provided avenues of interdisciplinary influences on legal research; such influences are now becoming even more important. Environmental studies, for instance, are multidisciplinary in nature. Several trends in science point towards a need for legal scholars to play a part in teams of scholars with different academic backgrounds. Increased interdisciplinarity may also assist in understanding the role and the merits of specifically legal approaches to research questions. Teams will often be needed where scholars from different disciplines join forces.

In the coming years the Faculty needs to continue navigating through these challenges by using the toolkit it has at its disposal. We believe that the Faculty's flexible bottom-up approach to strategic development of research may continue to serve the Faculty well for the years to come, but that it might also be advisable to strengthen the role of the leadership in strategic planning. The Faculty's recruitment and promotions policies will continue to shape its future. These policies will influence the substantive research strategy so they need to be carefully handled. Even though a long-term perspective is needed, a certain flexibility is required, since new challenges and new topics for research may arise in the coming years. The pace of change will not be slowing down. During times of change, collaboration between the different generations of researchers particularly needs to be fostered.

The Faculty has identified well its strengths, weaknesses, opportunities and threats. Our findings confirm the relevance of the factors pointed out in the self-evaluation.

The world is changing rapidly, and some of the changes - such as Brexit and stricter US immigration control - may even increase the attractiveness of Lund as a site of research in the global setting. Swedish and Nordic law and legal culture may themselves be sources of attraction.

Making the research profile of the Faculty well known and communicating it clearly will be helpful. A good collegial culture, emphasis on gender equality and non-discrimination as well as an emphasis on ethics and integrity may be attractions as well. The younger generation is not afraid of competition but expects the

Faculty to provide fair opportunities for a career. An open and predictable recruitment policy is needed to satisfy their aspirations for viable academic careers. Below we consider some of the key issues more in detail.

## **Organisation and leadership**

The Faculty is the main organizational unit, which sets and operationalizes the research strategy, allocates direct government research funding, manages external research funding and recruits academic staff. The basic principle when it comes to management and steering at Lund University including the Faculty is academic collegiality. The main rules for appointment of the Dean and Vice-Dean are set at university-level.

The research environments are not part of the line management structure. They are organized on the basis of 'academic freedom, creativity and adaptability in relation to the changing character of law and legal disciplines in social transformation and a global society'. The notion of a research environment serves as an 'umbrella concept'. Sometimes research collaboration is organised in articulated research groups, and at other times in research networks or clusters, or in relation to specific externally-funded research projects. The research environments vary in theme, size, structure and form of cooperation. Some are more closely related to traditional legal disciplines, while others are more thematic and characterised by legal-interdisciplinary and interdisciplinary approaches.

The research organization at the Faculty is bottom-up and non-hierarchical. This was reflected in the interviews with staff. For instance a member of the staff said that she follows the strategy of the Faculty 'because she agrees with it'. Not all research environments have a group leader. Apparently group leaders are not appointed by the Faculty management, they are not considered part of the management and they are not responsible to the management for the research 'results' of the research environment or for implementing the Faculty strategy in the group. The Dean explained this partly by referring to the collegial management form and partly to the freedom of research. The Dean has staff development interviews with all the professors at the Faculty every year but not with the group leaders (though there is some overlap). Since the research environments are not considered part of line management they are not considered financial units either and have no separate budget.

The Panel notes that the principles of organization and leadership at the Faculty to some extent differ from principles of organization and leadership at many other Nordic and European Law Faculties. Here we often find a more hierarchical structure with more formalized research centres led by Heads of Research Centres who are responsible for implementing the strategies of the Faculty. The Heads of Centres normally refer to the Dean/Pro Dean of Research and sometimes they are even part of the management team and have direct ownership of the Faculty strategy. The Dean and Pro Dean at those faculties have more steering instruments at hand than is the case in Lund. This form of organization and leadership is usually not considered to violate freedom of research or bottom-up processes of research ideas at these other Nordic and European universities.

In the RQ14 evaluation of the Faculty the lack of a more formal structure of the research environments was also identified. According to the Faculty management 'It has been a deliberate decision to keep this basic structure of research organization, and not to create research centres as part of the line management structure. At the same time, the recommendation to organize research around research environments with a sustainable size has guided Faculty strategy and decisions in relation to talent management, recruitment and research support. In recent years, for example, substantial support through recruitment, co-funding and stimulation of research collaboration across legal disciplines have been put in place to strengthen and expand a number of research environments...'.

The Panel appreciates the Faculty's reflections and actions based on the 2014 report. Nevertheless we invite the Faculty to revisit the topic of organization and leadership. While the Panel understands and appreciates the special Swedish context with much focus on collegial management, trust, bottom-up

processes and freedom of research, we invite the Faculty to reflect on how best to accommodate and support the following goals: Excellent research, working together for a common good, community building, more critical mass in research environments, visibility towards the outside world, international competitiveness, successful applications for external funding, hosting large (externally funded) research projects, ambitious research environments which motivate and develop young promising researchers and attract excellent international and national research staff. We recommend that the Faculty considers whether some adjustments in the current organization and leadership model would better support the accomplishment of such goals while still upholding values such as freedom of research, trust, bottom-up generation of research ideas, and a good collegial culture.

#### Commendations:

- 1. The Dean and Vice-Dean are well-liked and trusted among the academic staff.
- 2. There is a good collegial research, teaching and work environment at the Faculty.
- 3. Creativity and bottom-up processes of research ideas are valued.
- 4. Freedom of research and freedom of methodology are core values at the Faculty.
- 5. Some research environments are professionally driven international research units.

#### **Recommendations:**

- 1. We invite the Faculty to reflect on the organizational structure in light of how to best support and accommodate the following goals: Excellent research, working together for a common good, community building, more critical mass in research environments, visibility towards the outside world, international competitiveness, successful applications for external funding, hosting large (externally funded) research projects, ambitious research environments which motivate and develop young promising researchers and attract excellent international and national research staff.
- 2. We invite the Faculty to reflect on how to best raise awareness and fulfilment of the Faculty strategies among staff members at all levels.

## Academic culture

The Faculty is, as we have learned, dedicated to the ideas of openness and flexibility, academic freedom and bottom-up initiatives, as well as non-hierarchy and collegiality. This is reflected in the organisation of research at the Faculty in research environments. The name chosen for the research units is telling for the underlying philosophy of the Faculty as expressed in the Self-evaluation report and confirmed during the interviews conducted in the site visit. The research environments are not thought of as fixed centres or institutes with set programmes, but rather as natural or organic groups of like-minded individual researchers finding each other around a common theme or field. Environments seem to be intended to be fluid, and to leave the initiative to the individual researchers.

There is much to be said for such organisation, as it leaves much space for creativity and freedom. This is evidenced by the research output of the Faculty as a whole, and the capacity of the Faculty to be an agenda setter in emerging areas of law. However, it may also have a number of downsides in terms of coherence, agenda setting, and quality control. It is not always very clear who sets the research agenda in the environments, what the research programmes are and how the quality of research is assessed. Agenda setting often seems to be left largely to individual initiative.

The research environments also differ greatly from one another. Some of them are projects (usually limited in time), while others are fairly fixed teams of researchers working in a field of law or on a particular theme. Some function as veritable research centres with (a) clear research leader(s) and a lively seminar schedule, while others are rather small and seem to be much less active. Some are more successful than others in terms of attracting funding, setting the agenda and generating impact. The sheer number of research environments is remarkable for as small a faculty as Lund. Moreover, some work on themes that are closely related to the problematic of other research environments, while there is also a partial overlap in membership. One may wonder whether mergers may not be called for here and there, in order to create the critical mass needed to create a vibrant community of researchers and to increase visibility to the outside world.

The substantive academic debate takes place mainly in the research environments where seminars and research meetings are organised. Again, individual initiative is stimulated. Much of the initiative seems to be left to the young generation, who are at a crucial stage in their careers and are competing (or feel that they are competing) for the same permanent positions.

Collaboration with other legal researchers in Sweden, with other disciplines and groups in Lund University and internationally is encouraged. Yet, there seems to be less attention for collaboration between the various research environments in the Faculty. Seminars and events are open to researchers from other environments, but collaboration and academic debate across the various environments could be more actively encouraged.

Nevertheless, the sense of collegiality is strong. Decisions on strategy and policy are taken on the basis of consensus. The process by which the self-evaluation was drafted provides evidence of that. Major decisions on the strategy of the Faculty and policy choices seem to be prepared in Faculty-wide discussions. The daily *fika* and the informal debate taking place there plays an important role in community building. The Faculty seems to have all the characteristics of the Swedish way of working. The downside of this approach may be a culture of 'live and let live', where hard choices are ultimately being avoided. This is reflected for instance in the sheer number of research groups.

A generational shift is taking place at the Faculty, with the advent of a group of talented and successful young scholars. Many of them have had their PhD and post-PhD projects published with excellent publishing houses (including OUP, CUP, Hart, Springer, Edward Elgar and Routledge), are active in the international debate and collaborate with peers in other countries. While this is very helpful in achieving the aim of internationalisation that the Faculty set for itself, it may result in other challenges. One clear challenge, acknowledged in the report, is the difficult balance between catering for the Swedish (academic and professional) legal debate and the international debate (conducted mainly in English). The other debate that is still on-going concerns the attractiveness and appropriateness of European funding.

In both cases, the one does not exclude the other, but both require working in teams where the Swedish and the more international staff collaborate. Most importantly, the influx of a group of talented international scholars creates uncertainty for them, and puts a huge burden on their shoulders: while they personify the intended internationalisation of the Faculty, they need to integrate into the Swedish academic culture and learn the language if they wish to pursue a career at Lund. In the meantime, they also seem to carry much of the weight of taking initiatives in organising seminars and attracting funding.

The Faculty has made clear choices in the past years, for instance by attracting promising young scholars in order to contribute to the internationalisation of the Faculty. It has been successful in transforming the Faculty in this respect. Yet, there seems to be no clear strategy on how to proceed from here. This contributes to increasing uncertainty for individual researchers about their academic future at Lund. It is also reflected in the lingering debates on the usefulness and appropriateness of European funding, and the tendency to assume that all functions associated with legal scholarship in modern times need to be taken up by each individual member of the faculty: participate in national and international debates in all existing and emerging fields of law and contribute to fundamental research as well as cater for professional audiences and produce societal impact. This is however only feasible in teams of researchers which share those roles and complement each other. Collaboration and cooperation between scholars – 'team science' – is vital to achieve this.

Law faculties need to fulfil many different kinds of expectations. Even the audiences of legal research are multiple. One way to think of the life of the Faculty under such conditions is simply to communicate the expectations and see that different scholars may contribute differently to the overall performance of the Faculty. Once again, a good collaboration between the staff members is of utmost importance. Different profiles of individuals can be seen as worthy and well-respected as there are 'varieties of goodness'. With this in mind, internationalisation and developing an internationally renowned profile with some scholars as the portal figures can be realised as part of a commonly supported research strategy.

#### Commendations:

- 1. There is lively seminar culture in the Faculty, in which PhD researchers and visiting scholars also take part.
- 2. The Faculty offers an attractive research milieu, based on academic freedom based on a strong sense of collegiality.
- 3. Researchers have been successful in setting the agenda in emerging fields and collaborate both nationally and internationally, with legal scholars and experts from other disciplines.

## **Recommendations:**

- 1. The Faculty is advised to rethink the current organisation of the Faculty in order to achieve sustainable groups with critical mass, sometimes merging research units, making the units more visible and fostering vibrant and active communities of scholars.
- 2. Academic debate *across* research units should be actively encouraged, and team science should be more explicitly fostered.
- 3. Due attention should be given to the (both Swedish and international) younger generation by providing mentoring and clarity of career perspectives.
- 4. The strategy of integrated internationalisation needs to be well communicated and discussed since an increased internationalisation or interdisciplinarity does not mean that the more nationally oriented or less interdisciplinary research would have lost significance. Scholars may contribute in different ways to the research output as well as other performance of the Faculty.

## **Recruitment and talent management**

As part of its strategic agenda towards growth and internationalization, the Faculty has placed particular focus on recruitment and talent management. Its strategy is set out in the Faculty of Law's strategic plan 2018-2026, and further developed in the Faculty of Law's talent management plan 2020-2022. Cornerstones of the Faculty's strategy are: a sustainable and transparent plan for the Faculty's talent management; recruitment that satisfies the strategic needs of operations; and, efficient and flexible use of the Faculty's resources.

In our evaluation the Faculty has succeeded in implementing a successful recruitment strategy in the years since RQ14, evidenced by the significant increase in early career researchers. In the designated career development positions – associate senior lecturers and postdocs – the Faculty now includes five associate senior lecturers and 10 postdoctoral researchers. Career development is also pursued through large investments in doctoral training and the Faculty currently hosts 34 doctoral candidates. In a relatively small faculty, these are significant numbers.

The attention to recruitment and career development has paid off in terms of increasing Lund's visibility as an internationally oriented law school. From the self-evaluation we see that early career scholars are responsible for high-quality publications, such as monographs in English published with leading international publishing houses. This impressive output is noteworthy, as the Faculty's recruitment choices are constrained by legal regulation (as listed in para. 3.3 of the self-evaluation) and by its teaching needs.

We encourage the continued focus on career development and note that Lund has implemented a number of policies that are clearly to the benefit of early career researchers, and that could even set an example to other universities making a transition to a more international profile. Researchers on tenure track positions (associate senior lecturers) receive training and support with regard to grant proposal writing, development of educational skills, and language (Swedish). This training does not only benefit them in terms of general support for the pursuit of an academic career, but it prepares them for a long-term career within the Faculty. Doctoral students also benefit from a well-developed training programme, which includes two mandatory courses in jurisprudence, methodological training, pedagogical training, and career development.

The position of postdoctoral researchers is more precarious. We note that these researchers can benefit from support with grant writing (e.g. by a panel of senior researchers). At the same time, the short duration of these fellowships imposed by regulation (max. two years) puts pressure on researchers to focus on job applications, often without knowing whether they will be able to stay in Lund or will have to look elsewhere for an academic position. It is also a fact that if turning a good doctoral thesis into an internationally published monograph may take a year, this causes a natural delay concerning the progress in postdoctoral research.

Although this situation is not particular to Lund, and some causes are structural, we would encourage the Faculty to consider whether it can improve the position of postdoctoral researchers. The management has indicated that it is already moving towards a recruitment policy focused on associate senior lecturers, which would indeed be preferable as these positions can be between four and six years. In addition, we suggest that external funding could be directed towards the doctoral programme rather than focused on postdoctoral positions, where funding conditions allow.

#### Commendations:

- 1. The Faculty has a well-developed strategy towards recruitment and talent management, which supports its ambition of establishing Lund as an internationally oriented law school with high quality research.
- 2. The Faculty's training and support of early career researchers, in particular associate senior lecturers, is outstanding.
- 3. The doctoral programme offers candidates a comprehensive training package for research and methodological skills, pedagogic training, and career development.

#### **Recommendations:**

 The position of postdoctoral researchers should be improved. Faculty management and senior leadership may wish to consider the long-term recruitment strategy with regard to early career researchers in the light of career development (e.g. for postdoctoral researchers) and the investment of Faculty resources. The Faculty might consider reallocating some of its research funding resources by diminishing the funding used for salaried doctoral positions and increasing its funding on the postdoctoral levels.

#### Research funding

Obtaining research funding for conducting research projects has increasingly become a core task of professors at faculties of law. At national, but especially at European and international levels, this has become an ever more competitive process which takes up a lot of time, energy and resources. It often requires substantial investments, with a team of people, in developing research proposals without a guarantee that these will be eventually funded. We understand that Sweden and the Faculty of Law of Lund are in a special position in this respect. First, in the national context obtaining research funding has proven to be relatively straightforward because of the existence of generous foundations. Such favourable national conditions are lacking in most other European States. However, the relative ease of tapping into funds from national foundations may have as a drawback that scholars tend to prioritize these more straightforward sources of funding rather than participating in highly competitive European processes.

Secondly, we understand that the Faculty spends 50 per cent of direct government research funding on the doctoral programme. While we support the choice to invest in such a programme, we think the Faculty should encourage professors to apply for external research funding for doctoral positions, as seems to be the case in the action plan for research and doctoral education.

While the investment in the doctoral program can support the Faculty's strategic agenda towards talent management and internationalisation, the Faculty should from time to time assess the situation in terms of whether some reallocation is warranted. We feel that a certain shift towards the post-doctoral levels is advisable. In this evaluation, account will need to be taken of the stability of government funding, the limitations to the Faculty's financial reserves, and policies aimed at increasing the acquisition of external funding. The Faculty of Law's talent management plan 2020-2022 acknowledges this (p. 7-8).

This brings us to external research funding. In today's European academic environment, it has become indispensable for universities and faculties to participate in highly competitive European research funding schemes, in particular the European Research Council (ERC) and the EU's collaborative programmes, in particular Horizon 2020 and its successor.

While we read in the Faculty's reports that applications have been submitted for ERC grants, as far as we could tell no Faculty member has yet received ERC funding. The overall participation of Faculty members in Horizon 2020 projects seems to be limited as well. During the site visit, some senior academics openly expressed skepticism about EU funding mechanisms, considering them not fully compatible with their freedom of research.

We would like to invite the Faculty to reconsider its policies in this respect, in terms of (i) providing stronger incentives to both junior and senior academics to initiate, or participate in, internationally and EU funded research programmes; (ii) structurally supporting draft applications (we note, however, that there are services available also at the university-level for preparing funding applications at the EU level. It would be very important that all such services – be they on the level of the Faculty or on the university level – would be actively used as this would accelerate the access to such funds by way of benefiting from the experiences collected by other applicants and the relevant experts of research funding); and (iii) taking into account the participation in such programmes for the permanent evaluation of academic staff, in particular for promotions and for requests to be (partially) exempted from teaching duties.

Third, we think that, if the above recommendations are to be implemented, the Faculty may want to revisit its current policy and practices regarding research environments. While at first view attractive because of the academic freedom and flexibility they offer, in the long term it appears to us – in line with the recommendations of the Report of the Critical Friends appended to the RQ14 Report (Appendix 9) – that it would be advisable for the Faculty to incentivize the creation of more structured research centres of a critical mass, oriented towards international and interdisciplinary research. This would not only (i) reinforce the Faculty's eligibility for participating in European and international research consortia and networks, but also (ii) offer many more additional funding possibilities for future doctoral and postdoctoral researchers, and (iii) incentivize the Faculty's academic staff at all levels to engage with critical European and international research topics in close cooperation with peers from all over Europe and the world.

Last but not least, we have learned that the Faculty has had a policy of offering the staff members the opportunity to apply for a funded research sabbatical. That system has, however, been put on hold due to low interest. This surprised the Panel since a funded opportunity for a period of research leave sounds like an excellent initiative, and only in very generously funded world class universities do we find such systems. We would invite the Faculty to maintain this policy and to develop it so that it would also encourage international mobility. We understood from the Dean's response to questions about this that there may be concerns that those with family duties or the like might may be unable to benefit from such arrangements. Such concerns might be met by providing increased subsidies (for example for child care) when needed to enable a deserving scholar to take advantage of the scheme. The Faculty is part of very good international networks, such as the LERU Law Schools network, and funding by the Faculty could, for example, be used to promote research visits in other top law faculties. The newly recruited staff members who also have an international background might especially appreciate such opportunities, and also the scholars with a more traditional and more national law background might be encouraged to make use of such opportunities, so long as the incentives are well directed and the Faculty has a system for replacing teaching staff so that a person on a research leave is relieved of teaching duties during that time.

#### Commendations:

- 1. The Faculty has already given some thought to the need for a more articulated research policy in its Faculty Strategic Plan, Faculty Action Plan for Research and Doctoral Education and Faculty Action Plan for Internationalization.
- 2. The younger generation of Faculty members seems to be strongly aware of the need to apply for external research funding at national, European and international levels.

#### **Recommendations:**

- The Faculty may wish to reconsider and render more comprehensive its current policy on research and research funding. Its strategy could focus on: (i) providing stronger incentives to both junior and senior academics to initiate, or participate in, internationally and EU funded research programmes; (ii) structurally supporting draft applications; and (iii) when appropriate, taking into account the participation in such programmes for the permanent evaluation of academic staff, in particular for requests to be exempted from teaching duties.
- 2. The Faculty should look at the allocation of the research funding and see whether the own funding should be used more on the post-doctoral level than for funding of the salaried doctoral student positions. We would recommend a slight shift in the emphasis, not a total change of policy.
- 3. The Faculty may want to revisit its current policy and practices regarding research environments and investigate the creation of more structured research environments of a critical mass, oriented towards international and interdisciplinary research.
- 4. The Faculty is encouraged to revitalise its program for funded research leave for the researchers. This excellent initiative could be directed to serve the interests of international mobility and networking in order to strengthen the Faculty's international networks. This would also be in line with the Faculty's action plan for internationalisation.

#### Quality ecosystem

The Faculty is small, with little over 50 tenured or tenure track staff plus a cohort of doctoral students and postdoctoral scholars undertaking a wide range of activities that scholars undertake. Being small is also an advantage since people get to know each other, and a shared scholarly background creates good opportunities for common discussions. Law is also one of those fields in which the links with the professional community, be they lawyers in the private or public sector, tend to be strong. The Faculty should increasingly be seen as an ecosystem, or a part of an ecosystem, to which it makes unique contributions. A strong research profile is the foundation for quality in all the key operations of the Faculty. It makes the Faculty a desired partner both locally, nationally and internationally. We see that the Faculty has been very successful in developing its activities when seen from the ecosystem perspective, in holistic terms.

We do observe however that in order to raise the Faculty's international profile further, it may be necessary to emphasise some aspects of this ecosystem more than others. Investment in international collaboration may need to be given a higher priority, and this may suggest some redirection of the Faculty's own funds. On the other hand, a strong and well-communicated research profile may lead to new partnerships and even new funding opportunities. We would encourage the Faculty see and define its role increasingly in the global setting and emphasising greater global outreach.

At the same time, we recognised the importance of teaching in this ecosystem. Teaching into the professional law degree program and the masters programs requires a considerable commitment of time. We understand, from the Faculty's self-evaluation report and from interviews with staff at all levels, that this is achieved by a high level of cooperation and mutual support among colleagues, who share resources and cover each other's commitments to allow colleagues to attend to research and engagement activities such as conferences.

Nevertheless, notwithstanding a stoically cheerful acceptance of the heavy teaching loads it is clear that the required commitment to teaching creates a significant workload burden on many staff, and for some this creates challenges for their capacity to find adequate time to meet their own research goals. Perhaps this is most apparent for the staff who teach into the Swedish language courses in the professional law program as well as into specialist research fields. Teaching burden may explain the limited take-up of the now-discontinued research leave scheme, if the staff have prioritised meeting curriculum needs ahead of their own research aspirations.

The Panel identified no concerns among the staff about unfairness in the allocation of teaching loads or other duties. This re-emphasised the high level of collegial loyalty among staff. High teaching burdens were blamed on the necessity of meeting the requirements of workload allocation dictated by a collective bargain, outside of the control of the Faculty.

Given those constraints, which the leadership team confirmed were immutable, the Panel makes no recommendations about the allocation of workloads or related issues. We note only that the necessary relationship between teaching burden and research time means that quarantining sufficient time for quality research will remain a challenge in this environment, also taking into account the significant processes that the Faculty is undergoing at the moment.

One way of managing this challenge is to ensure that scholars can teach in subjects related to their research fields. It is clear that, particularly at the specialist masters level, scholars are able to find synergies between their research programs, their curriculum development and teaching, and their engagement with professional communities and other stakeholders, and this is highly commendable. This was particularly clear in the field of Business Law, and in the research clusters such as Norma Elder Law Group. In this respect the ecosystem manifested in the Faculty is strong: research feeds curriculum development and teaching, and teaching activities build a strong alumni community, who in turn contribute to the activities of the Faculty. The doctoral training program, and post-doctoral research program contribute to the teaching activities of the Faculty, so there is a clear integration between research, research training, teaching and outreach. The doctoral students hold salaried positions and they are regarded as being part of the staff. Involving the doctoral students with the different activities of the Faculty including teaching is a very progressive idea and we regard it as a virtue, so long as candidates are able to dedicate sufficient quality time to their own research leading to timely completion of their doctoral dissertation.

#### Commendations

- 1. The Faculty is commended on its supportive collegial culture that allows staff to manage heavy teaching loads without complaint.
- 2. The Faculty is commended on the way it integrates the doctoral students into the activities of the Faculty.

#### Recommendations

- 1. Faculty leadership should continue to monitor the allocation of teaching duties to ensure that all staff are able to maximise their research and engagement time, notwithstanding heavy teaching burdens.
- 2. The Faculty leadership might rethink at some point the division of labour between teaching and research, but not in any manner that would penalise those already bearing the greatest teaching burden.

#### **Research ethics and research integrity**

The Faculty stresses the role of ethics in its activities. We endorse the relevance of this commitment. A designated working group operates on this area under the leadership of the vice-dean for research. The self-evaluation report includes details of the general developments and discussions in Sweden around these issues.

We would like to encourage the Faculty to undertake further work on these issues. Ethical aspects and ethical concerns are increasingly part of legal regulations as the borderline between law and ethics becomes blurred. Legal scholars need to have expertise and be engaged in ethical debates. Issues such as AI (artificial intelligence) and law, medical law and medical ethics, biotechnology and law, and sustainable development more generally bring such debates to the fore.

Grand challenges of our societies generally force us to see law in a context of ethical sensitivities, and the current COVID-19 pandemic is no exception. We note that the Faculty has provided an input into these debates in Sweden. The Faculty's long-term interest in gender balance issues deserves a special mention and can be seen in this context as well. The work on elder law also deserves credit.

Procedures for ethical reviews of research proposals are being created for social sciences and humanities, and increased interdisciplinarity as well as data protection concerns in legal research raise the relevance of such reviews also for legal research. As the self-evaluation report states (at p. 24), a requirement for an ethical review before the start of a research project has been introduced in Sweden. The Swedish Act on Ethical Review is linked to the EU General Data Protection Directive.

The Faculty has monitored developments within this area and several of its researchers have been involved in the work of the Swedish Ethical Review Authority. The Faculty has also adopted guidelines on the review process. Thus, the Faculty of Law is actively developing both its policy on ethical review of research and support for researchers in this area. In addition, a number of the academic staff members of the Faculty are contributing to the legal and interdisciplinary scholarship on ethical review of research, both in the national and international context.

Open access publishing could be seen in an ethical context as well, since it increases transparency and accessibility of legal knowledge, both matters of increasing importance in a globalising world. This is worth highlighting.

We would have expected the Faculty to elaborate on the difference between research ethics and research integrity, since the expression 'research integrity' refers to a somewhat deeper commitment to honesty and trust than a mere absence of breaches of good scientific practice.

We recommend that the Faculty consult the DORA principles of responsible research assessment. As we understand it, the University of Lund and the Faculty of Law already take into account the core values behind the DORA principles, especially in limiting the role of bibliometrics in recruitment and stressing substantive qualitative criteria instead.

We also notice in general a healthy resistance on the part of the Faculty to performance management which has to some extent spread internationally. In the international discussions the concept of responsible science is winning more ground. It might be advisable for the Faculty to elaborate somewhat more nuanced views on ethics and integrity as well as to document the Faculty's existing engagement with such topics. It appears that the Faculty could further strengthen its profile in these areas and make it part of its profile and an asset contributing to its international reputation.

#### Commendations:

1. Ethical issues and expertise in ethics-sensitive areas stand out in the research profile of the Faculty.

#### **Recommendations:**

- 1. The ethics perspective could be highlighted further as a particular strength of the Faculty, and this would also be one avenue to further increase the interdisciplinarity and the links to larger interdisciplinary research settings within Lund University and other sites.
- 2. We recommend that the Faculty as well as Lund University more generally should consult the DORA principles and also continue efforts in Open Access publishing. The wider concept of responsible science could be introduced.

#### Publications

Publications data reflect the 'outputs' of productive research, so patterns of publication can confirm observations about a faculty's research strengths, and its research strategy. In this assessment it has not been possible for the review Panel to undertake the kind of in-depth analysis of publications data that was provided in the RQ14 exercise. (Appendix 1 to the RQ14 Report titled *RQ14: Bibliometric report, Faculty of Law, Lund University, Research Areas* provided a detailed, 46 page analysis of publication patterns over the several key research areas of the faculty.) The following observations are considerably more general, and are based on the information provided in the Self-evaluation report, and the XCEL file of raw Publications Outputs data provided.

From the Self-evaluation report we can see a strong overall performance, in terms of volume of publications for a faculty of this size (726 publications, from a faculty of a little over 50 tenured or tenure track staff, 10 postdocs and 34 doctoral candidates, in a period of five years from 2014 till 2018). A rising proportion of outputs are in English compared with the previous RQ14 collection, reflecting the Faculty's deliberate strategy to recruit internationally and to encourage engagement with international audiences, notwithstanding the persistent need, particularly in some fields, to continue to publish for Swedish audiences. The EXCEL file indicates an even greater volume of publications than are mentioned in the Self-evaluation report: a total of 1019 entries in this period. The disparity in numbers is perhaps accounted for by the inclusion of news media commentary and report submissions in the longer EXCEL collection.

A review of the most recent year's raw data (2018) confirms the high volume of outputs (and hence high average productivity of staff), but also indicates that a relatively low percentage of those publications are peer-reviewed publications. There are 220 items listed in the EXCEL file as 2018 publications. On close review, it appears that some 44 of those publications (20%) are noted as being peer-reviewed (either chapters in scholarly books or journal articles). The remaining publications (apart from five books, three

of which appear to be monographs arising from doctoral theses) comprise many non-peer reviewed contributions to specialist professional publications, encyclopaedia entries, news media entries, submissions to enquiries and reports. These publications evidence the vibrant engagement with professional audiences and the community at large that interviewed staff mentioned in explaining the faculty's approach to external engagement. Researchers are publishing not only in scholarly peer-reviewed journals and anthologies, but also in journals and other media that disseminate research observations to a wide range of audiences. This complements the Faculty's claim to engagement in impactful research.

It is nevertheless an unfortunate feature of the systems of international university rankings that peer-reviewed research outputs tend to be more highly valued and attract greatest credit. While many members of Faculty are contributing peer-reviewed publications to the collection (we counted about 30 different staff names among the authorship of 2018 peer-reviewed publications, some with multiple peer reviewed journal articles published in a single year), there may be scope for researchers who are presently writing mainly for non-peer reviewed journals and anthologies to consider whether some of their research would be appropriate for submission to peer-reviewed outlets. If the Faculty leadership does aspire to improve international rankings by increasing the proportion of peer-reviewed work in the collection, it may be worthwhile conducting an evaluation of the different research clusters, similar to that undertaken in 2014, to see where there may be capacity for directing research productivity into peer-reviewed outlets. While the Panel respects the great benefit of the Faculty's 'bottom-up' approach to determining where research energies are expended, there may be scope for some overall improvement in collective performance by encouraging researchers to target peer-reviewed journals for more of their research work.

The increased number of doctoral theses published overall compared with the RQ2014 assessment (27 compared with 16), and the significant increase in the number published in English (20 compared with 7) demonstrates not only the Faculty's success in attracting excellent international candidates, but its great achievement in supervising those projects to successful completion.

#### Commendations:

- 1. The Faculty staff are clearly productive researchers, who disseminate their work regularly to a wide range of audiences, appropriate to their sub-disciplines
- 2. Publication patterns evidence an increase in engagement with international audiences over the period since the RQ14 evaluation.
- 3. A significant increase in the publication of doctoral monographs since the RQ14 assessment confirms the success of the faculty's strategy in attracting high quality international candidates.

#### **Recommendations:**

1. Faculty leadership and senior research leaders may wish to reflect on whether there is scope (given the aspirations for increasing internationalisation and rising rankings) to encourage those staff who are presently more focused on non-peer reviewed publications to redirect some of their research efforts into publication in peer-reviewed outlets.

#### Recommendations

In the above sections, the Panel has discussed the research at the Faculty from a variety of perspectives, with the aim of formulating commendations and recommendations on a variety of aspects. We will not repeat all of that discussion here, but will instead highlight the most central findings and recommendations.

The Panel considers that the high-level of collegiality which seems to be a central characterising feature of the Faculty is a huge asset for all of the activities of the Faculty, including the research, and that this

collegiality deserves to be actively preserved and promoted. Collegiality provides for flexible collaboration opportunities, which are often needed when new areas for research arise.

The Panel observes that the Faculty is in a period of transition where the processes of internationalisation and increased interdisciplinarity have reached a new stage. The recruitment policies of the Faculty and the University have recently been revised, and the former policy of recruiting mostly from the inside has been abandoned. Introducing the tenure track model will further increase the attractiveness of Lund University in the eyes of potential international recruits.

The Faculty and the University should stress the importance of ensuring the competitiveness of a career as a researcher in law. We have observed that in some fields, such as Business Law, the job opportunities available in the private sector may make academic careers relatively less attractive to strong candidates. Such structural challenges are common across the sector. Universities cannot always pay salaries comparable with those in the private sector, but must compete on other terms. The Faculty should provide support and a conducive environment for individual growth for the staff. Strong collegiality has already been mentioned as an asset. The prospect for doing important and influential work in the world is the real incentive for many young and also senior staff. The research of legal scholars creates knowledge that is instrumental in solving societal issues and problems. It is a strength of Lund that staff believe the values of the Faculty and University are worth sharing. Having said that, career prospects are of utmost importance especially for not-yet-tenured staff.

We would advise the Faculty to continue working on the staff recruitment plan and the personnel matters from this point of view. As indicated above, the number of doctoral student vacancies might be slightly reduced, in order to free up resources to be allocated at the postdoctoral levels. The position of the postdoctoral researchers seems particularly vulnerable for reasons we have stated earlier. The Faculty and the University should prioritise investigation of this issue.

The newly introduced tenure track model is a welcomed reform. It will have long term effects, hopefully positive, but it should be closely monitored. We see it as a slight structural problem that the end point of the tenure track is a senior lecturer position, and one which continues to carry a heavy teaching load. Can such a model be competitive in an international comparison? Is there a risk that the best tenured senior lecturers might leave, to take up offers from other universities where they will be afforded more time to pursue research?

We see it also as a structural problem that the teaching staff need to buy themselves out of teaching by securing external research funding. It is of course a great advantage if the researchers are competitive in securing domestic research funding, but currently this dependence creates a clear risk for the Faculty. Collaboration with the funding institutions is very important, since this also helps align their strategies with the those of the Faculty.

We understand that the researchers are used to applying for domestic research funding and feel that this strategy is optimal for them. Being competitive in obtaining European research funding, especially the programs of the European Research Council, will be very important in the European and international setting. This is a point which should not be stressed too far, nevertheless attracting research funding from Europe is likely to grow in importance, and in order to maintain its position in the top tier, the Faculty needs to fight for a place in the sun.

The Faculty should continue its program of for supporting research leave, and it might be advisable to link this scheme with funding of research visits abroad. The program of international top visiting professors is excellent. We believe that it is brings international visibility to the Faculty, and that it assists Faculty staff in providing international benchmarks for high quality scholarship.

The Faculty has trusted a bottom-up approach in its research strategy. As a result, different kinds of research environments have emerged. In the context of the RQ14 the Critical Friends had urged the Faculty to formalise its institutional research structure by introducing research centres.

The Panel discussed this issue at length, and opinions varied within the Panel to some extent, so we express our views cautiously on this matter, recognising that there are pros and cons to establishing research centres. Nevertheless, we invite the Faculty to look at the issue of appropriate research organisation once again. In deciding whether a research environment will benefit from a more institutional structure, it will be necessary to consider its present strength, and whether there are ample resources, and sufficient scholars with competence in the field, to warrant the status of a centre. Research environments should be clearly distinct from temporary research projects or research by individual scholars.

The reason why we advise consideration of more formalised research environments is that Law Faculties in world class universities need to host a few research centres – or research environments, if one prefers that name – which are prominent in the Faculty's research profile. It is important, for international profile, to have a reputation as a site of high-level research in certain fields. Such a profile is helpful in building subject-specific research networks internationally, and it is especially helpful in terms of securing external funding from European and international sources. These centres or environments may also be hubs of doctoral education.

The Faculty management should see itself as a benevolent gardener who monitors the life of the research environments. In terms of staff planning, the management needs to see that the Faculty's own resources are allocated in a way that provides incentives to promote the flourishing of the best research environments.

A faculty cannot provide monitoring, funding and attention to too many research environments. The obvious down-side of letting all the flowers flourish and not setting any priorities may be that the full potential of the best research environments will not be realised. A strong sense of collegiality risks favouring weak management of the development of the research structures. Our view is that somewhat more active 'gardening' of the research structures on an institutional level would be beneficial for the Faculty. A bottom up approach to research should be complemented by some top down supervision. The implementation of a research strategy should ideally be a flexible process in which the demands of the situation are constantly taken into account. The Faculty should, however, be ready to make hard decisions when needed. A commitment to collegiality should not mean that unpleasant but necessary decisions are permanently postponed.

Over the coming years, the Faculty can expect to play an even more active role in its international networks, because international collaboration is more natural to the new generation of recruits than to those whose research has been more national in focus. We recommend that the Faculty make the best of opportunities to develop international networks, and should incentivise new staff to engage internationally. The Faculty has much to gain from but also to contribute to global collaborative networks. For several reasons, including Brexit, the mobile international 'market' of researchers may be in flux at the moment. Changes in the operative environment may increase the attractiveness of the Faculty and create new opportunities which should be actively pursued.

Internationally strong law faculties tend to take on a variety of serious responsibilities. Educating lawyers is a major responsibility, and in both research and education Swedish law and Swedish legal culture will always remain an important focus for Lund. Also, as the role of lawyers in society undergoes change, legal education needs updating. We welcome the open-minded approach of the Faculty to the incorporation of novel topics in its curriculum, and encourage the Faculty build further on that innovation. The Faculty is developing its own unique research profile. High level research will enable the development of high-level study programs. It is important that the Faculty offer specialised programs, beyond the professional degree programs. It is important to build the educational profile on the research strengths of the Faculty, and indeed to ensure that all education-programs are underpinned by excellent research. The Faculty's outreach activities also need to be based on its research strengths. Law Faculties tend to be strong in societal outreach: a strong research profile and strong societal interaction are not mutually exclusive, but interdependent.

The Panel notes that the Faculty could and should develop a more comprehensive view of ethical issues. Law and ethics are closely connected, so that ethical sensitivities deserve attention as part of research objects. Bringing in an ethics perspective could be part of the research profile of the Faculty. We recommend that the Faculty continue working on issues of research ethics and research integrity, and we suggest that the concept of responsible science be introduced. The DORA principles should be consulted and open access publishing should be promoted. We recommend that the University consider these, but the Faculty may be a consultant and a forerunner in these areas.



# 6. Faculty of Medicine (M)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 9	TOTAL NO UoAs: 53
SUBJECT PANEL NAME	UoA NAME
Neuroscience	Neurobiology and Cell Therapy
	Neurophysiology and Neuronanomedicine
	Basal Ganglia Disease Models
	Neurodegeneration, Epilepsy, Experimental Therapeutics
	Dementia Research
	Neurology and Clinical Neurogenetics
Cancer, Basic	Clinical Genetics
	Hematology and Transfusion Medicine
	Translational Cancer Research I
	Translational Cancer Research II
Cancer, Clinical	Cancer Research - Clinical, basic
	Cancer Research - Experimental
	Tumour Pathology
	Cancer Research - Abdominal, Urological
Regenerative Medicine	Molecular Medicine and Gene Therapy
	Molecular Haematology
Blood, and Infectious Diseases and Immunology	Clinical/Molecular Infection Medicine
	Immunology
	Transfusion and Haemostasis
	Clinical and Experimental Autoimmunity
	Clinical Chemistry
	Virology
	Clinical and Experimental Microbiology
	Protein Chemistry
Metabolic and Cardiovascular Research	Diabetes and Insulin Action
	Cardiovascular Research
	Diabetes and Defect Islet Function
	Diabetes Genetics and Epidemiology
	Type 1 Diabetes
Sustainable Health	Occupational and Environmental Medicine
	Global Health
	Older People, Ageing and Health
	EpiHealth, Registers, Epidemiology
	Community Medicine
	Rehabilitation Medicine, Physiotherapy, Sports Science, Health Promotion
	Activity, Participation, Mental Health
	Emergency and High-technological Environments
Tissue, Cell and Molecular Biology and Medical Techniques	Airway Biology
	Vascular Physiology
	Pharmacology and Structure Biology
	Cell and Molecular Biology
Highly Specialised Clinical Science	Gastrointestinal Research
	Heart-Lung Research
	Orthopedics and Hand Surgery
	Audiology, Speech-language Pathology, Phoniatrics, ENT
	Psychiatry, Medical Ethics, Medical History
	Surgery
	Medical Imaging, Physiology and Radiation Physics
	Pediatrics, Reproduction, Gynaecology and Obstetrics
	Eve and Ear-nose-throat Research
	Dermatology and Venereology
	Medical Radiation Physics

Note: Due to name changes over time, panel names in the overview above may vary from the names given in the foreword and in the panel descriptions below.

# Foreword by the faculty leadership

The instructions for constructing Panels and Units of Assessment were clear as to that the guiding principle should be based on funding to research. The Faculty of Medicine was allocated 8-9 panels. This made it clear from the start that it would not be possible to follow the departmental structure, as the Faculty of Medicine has six departments that vary considerably in size and that each possess a great variety of in terms of research directions.

The Faculty of Medicine instead explored the possibility to make the division into panels based on research themes. For this, research communities with an established common profile were analyzed, which allowed a straightforward formation of panels 1-6 (Neuroscience, Cancer basic and translational research, Cancer clinical research, Stem cells and regenerative medicine, Blood and defence, and Metabolic and cardiovascular research) which all turned out to combine a near ideal financial size with a clear research profile. Panel 7 Medical sustainability brought together clusters of research groups that may not have immediately felt comfortable with this label, but nevertheless exhibited shared characteristics in terms of research orientation relevant to the area. Panel 8 gathered experimental research and Panel 9 clinical research that did not adhere to any of the themes of panels 1-7. Researchers were able to request transfer between panels, but surprisingly few exercised this option.

Within the Panels, a high degree of freedom was granted during the formation of Units of Assessments, to allow researchers to form clusters with clear research identities. As a result, these vary dramatically in size across the panels.

The fact that panels were based upon research themes appeared contrived to some colleagues but worked excellently for the absolute majority of the faculty. Overall, this guiding principle provides a much better possibility for using the RQ20 assessment as ground for improvement.

# External panel reports

## Neuroscience

## Panel overview

Panel 1 includes over 300 researchers whose main focus of activity falls within the disciplines, neuroscience and neurology. These are traditionally strong areas for Lund University and have collectively attracted substantial government funding\* for establishing research centres of excellence (\*calls announced by the Swedish Research Council in 2005-2009). Thanks to this competitive funding, the following environments were created:

- Neurofortis: strong research on brain diseases (Strong Research Environment, 2005-2010).
- Neuronanoscience Research Centre (NRC) (Linnaeus environment, 2006-2016).
- Basal Ganglia Disorders Linnaeus Consortium (BAGADILICO) (Linnaeus environment, 2008-2018).
- Multipark: multidisciplinary research on Parkinson and neurodegenerative diseases (Strategic Research Area, 2009-ongoing).
- StemTherapy: stemcell research (Strategic Research Area, 2009-ongoing). Moreover, several researchers in panel 1 are members of additional trans-faculty environments, such as:
- Thinking in Time: Cognition, Communication and Learning (CCL) (Linnaeus Environment, 2008-2018).

- Nanotechnology (Strategic Research Area, 2009-ongoing).
- eSSENCE: the e-Science Collaboration (Strategic Research Area, 2009-ongoing).

Researchers in Neuroscience at Lund University have also been very successful in attracting internationally competitive grants, including grants from the European Research Council (ERC). Most of our research group leaders have extensive international collaborations and/or commissions of trust with prestigious research organisations. Some of our researchers are true international leaders within their field. The neuroscience area has published papers in the highest-tier journals, including *JAMA* (IF 53) and *Nature* (IF 43). Moreover, many research findings have had a major impact on the development of basic research or clinical practice.

For the sake of the RQ20 evaluation, researchers in panel 1 have been allocated to six Units of Assessment (UoAs), comprising 8-14 research groups each. These units have been named based on their most common research topics and approaches.

UoA 1A: Neurobiology and cell therapy

Chairperson: Malin Parmar UoA 1B: Neurophysiology and neuronanomedicine Chairperson: Jens Schouenborg

UoA 1C: Basal ganglia disease & models Chairperson: Angela Cenci Nilsson

UoA 1D: Neurodegeneration, epilepsy, experimental therapeutics

Chairperson: Christian Hansen

UoA 1E: Neurocognitive (dementia) diseases

Chairperson: Oskar Hansson

UoA 1F: Neurology and clinical neurogenetics

Chairperson: Per Odin

Aggregate bibliometrics and financial data for the six UoAs of MED-panel 1 activity period 2014-2018 (reports provided by the RQ20 office; bibliometrics based on Scopus) Scholarly output: 1267 scientific articles Overall citations: 36 449

External funding: 685 239 kSEK

Government funding: 415 774 kSEK

## External panel report

## **Executive summary**

The review panel have met with representatives for each of six Units of Evaluation, the dean and the chairmen of the three departments at the Medical Faculty in Lund. We have been very impressed by many of the research groups, but we also identify shortcomings in terms of organization, recruitment of new faculty, lack of strategic vision and overarching leadership as specified in the report below. As applied to the area of neuroscience the format that RQ20 has asked the different Units of Evaluation to follow in their report has been suboptimal. This is because the groups have been gathered only for the purpose of the evaluation and did not exist before the evaluations started and items such as collegial culture, quality eco-system and leadership can thus not be evaluated in a meaningful way.

#### Introduction

We are honored to have been asked to evaluate Neuroscience at the Medical Faculty at Lund University and we find after the zoom interviews that most research groups are doing an impressive contribution to this field of research. A large part of the neuroscience research in Lund deals with research related to Parkinson's and Huntington's diseases – actually around two thirds of the groups are related to this area, dealing with pathophysiological mechanisms and potential therapies. Other groups are concerned with Alzheimer's, epilepsy, stroke and neurophysiology.

The Medical Faculty has stated that "*This is a research evaluation basic education is not included.*" We note that unfortunately most of the six units that we have been asked to evaluate have been formed ad hoc, they did not exist before the evaluation, and will be dissolved after the evaluation. It follows that the questions regarding leadership, recruitment, promotion and succession that the units have been asked to respond to by RQ20 are not appropriate. If the evaluation had considered units that had existed over a long period of time these questions had been to the point, which might apply in other areas or faculties. From this follows that our task of evaluating neuroscience in the Medical Faculty will be based on the reports to some degree, and to a very large extent on the presentations of the different groups and the pdfs of the presentations, and also on additional information available regarding the contribution of the different subgroups (from e.g. PubMed). We also note that the material provided by the units, as suggested by the RQ format, does not provide a sound basis for a scientific evaluation.

In our reports we will therefore in our "observations" be unable to adhere to the structure suggested by RQ20 because it is not appropriate when considering ad hoc groups formed for the purpose of the evaluation, but we will do our best to evaluate the research produced by the scientists within these six groups.

With regard to the evaluation of leadership, recruitment, promotion and related questions, in the neuroscience area of the Medical Faculty in Lund, we will comment on this further below under recommendations, based on the interviews of the chairmen of the three Departments, the group discussions and views expressed by individual neuroscientists.

## Observations

#### Unit 1A Neurobiology and Cell Therapeutics

Nine different research groups clustered around different aspects of Cell Therapy compose this Unit. In general, the groups in this Unit have a strong tradition on cell transplants and represent the research school generated by Profs. Björklund and Lindvall. Indeed, they initiated the cell graft experiments in animal models and the clinical trials with grafts for Parkinson's disease, being the world leaders in the field. First, with embryonic mesencephalic tissue transplants and then with human induced-pluripotent stem cells. Moreover, the scientific founders have been very important in establishing the research around neurodegeneration and neuroprotection and these lines show a strong translational research.

The panel met with the following 4 groups, which presented their research and main results and had the opportunity to ask questions regarding their work, as well as other questions related to the research and work environment:

- 1. Human Neural Development, led by Dr. Agnete Kirkeby, a former student of Prof Malin Parmar
- 2. Developmental and Regenerative Neurobiology, led by Prof. Malin Parmar
- 3. Stem Cells and Restorative Neurobiology, led by Profs Zaal Kokaia and Olle Lindvall.
- 4. Molecular Neurogenetics, led by Prof. Johan Jakobsson.

5. The rest of the groups were not represented and includes: Stem Cells, Aging and Neurodegeneration (led by Henrik Ahlenius), Neurobiology (led by Prof. Anders Björklund), Molecular Neuromodulation (led by Tomas Björklund), Regenerative Neurophysiology (led by Daniella Ottosson) and Translational Neurobiology (led by Dr Gesine Paul).

#### Leadership, recruitment, promotion, collegial culture and overarching research strategy

The composition of this Unit is asymmetric with 2 outstanding scientists (Profs Björklund and Lindvall) who are retired or semiretired offering advice and support to the groups, which is highly praised and convenient for the Unit. Four outstanding internationally known groups (Kokaia, Parmar and Jakobsson and also Paul) and additionally there are four junior groups.

Among these junior groups, one of them with a strong research project and potent curricula with high impact publications in the field that strengthens the future of the Units.

If the Unit is to continue, rather than to be dismantled after the evaluation there are some needs to be addressed to support the junior groups to gain in excellence, impact and visibility. These include a common location, instead of being distributed in three different places and belonging to three different administrative departments, which results in administrative barriers in terms of collaborations on a day to day basis.

In term of research lines, the Unit is well balanced, because it incorporates clinicians, translational researchers and basic researchers covering the three arms in biomedicine.

#### Strategic Research areas (SFOs).

This Unit played a key role in the generation of the previous BAGADILICO funding program and now receives funding from the Stemtherapy and Multipark funding programs. Members of this Unit receive Direct Governmental Funding and external funding.

#### Publication patterns

Over the period 2014-2018, the entire Unit (9 research groups) published 178 papers, roughly around 4 papers per group, with **5.6 in the Top 1** citation percentile and **29.2 in the Top ten** citation percentile, which represent an excellent production with high impact in the field, as showed by an average of **21.4 cites per article**. A fair amount of these papers are published in top range journals, such as Cell Stem Cells, Acta Neuropathologica, Neuron, Nature Methods, Nature Communication etc. The consolidated groups in this Unit are known leaders in the field of cell therapy and cell transplants with excellent international visibility and international collaborative research projects and clinical trials. To mention just a few of the publications.

#### Research groups - Neurology and Cell Therapeutics

The group of Agnete **Kirkeby**, tenure track Associate Senior Lecturer, Lund University. She trained with Prof M Parmar, and is one of the new groups, if not the newest in the Unit. Her main interest relies in the study of neural tube development *in vitro* to understand lineage differentiation from human pluripotent stem cell to provide a regenerative therapy for different diseases. She is currently holding two different positions and labs and have a good publication record. She seems to have the capacity and the necessary skills as a leader to achieve her goals and establish a successful career. She is an excellent addition to the Unit.

The group of Prof **M Parmar**, a well-consolidated group with important and excellence contributions in the field of cellular therapy for Parkinson's disease, as demonstrated by her articles in very high impact journals with solid results and even more with a high number of citations of her work. She is Professor at Lund University, trained originally with Prof Anders Björklund and leads a large laboratory. Her research focus is on improving a cell therapy for Parkinson's disease, with human iPSC-derived dopamine neurons and more recently by making the conversion *in vivo* and also is using new models of Parkinson's disease that recapitulates the alpha-synuclein pathology. She participates in various European consortiums and has excellent European and American networks with high international visibility.

The group of Prof Z. Kokaia, is also well established and consolidated with an impressive record of excellent results and publications in the field of cell therapy in stroke and ischemia using human somatic iPSC-derived cortical neurons. He has recently showed that when injected in the rodent damaged cortex, neurons integrate in the host, form synapses in the contralateral cortex and are able to restore motor activity.

The group of Prof Johan Jakobsson, leads another potent group, coming from the same school of cell therapy. Jakobsson's lab is using another method to produce neurons, such as the direct conversion from human fibroblast to large amounts of neurons. Interestingly, he is using these neurons as cellular models of different diseases and for drug screening. These are very interesting research lines, which could give important results in the molecular and cellular mechanisms underlying different degeneration processes.

There was no information on the rest of the groups, except for the list of publication and achievements that, in all cases, were provided from the whole Unit by year rather than a list of publications per group, which would have been very useful.

#### SWOT analyses as reported in UoE

The main strength of the Unit is the common background and research lines coming from the same school, that make them very competitive in this field, the rich research environment with several groups working in the same area, with different complementary expertise covering all the arms in the field, including cellular models, preclinical rodent models, clinical experts, etc. The major weakness is the lack of career paths, the slow recruitment processes and lack of start–up funds, which is one of the obstacles to attract competitive scientist.s Additionally, the different locations of the groups and the assignment of the groups to different Departments creates administrative barriers to collaborate and apply for competitive grants.

The opportunities for the Unit are the common and shared research background developed in different aspects of cell therapy and in particular the development of cellular models for different diseases, which represent a powerful tool to unravel key mechanisms of degeneration. Moreover, the Unit enjoys a good translational environment for major discoveries. The main threat as perceived by the Unit is the limited faculty positions, increasing costs for running a laboratory, increasing administrative duties and bureaucracy.

#### To conclude

Unit 1A Neurobiology and Cell Therapeutics consist of nine different research groups, derived originally from Prof Anders Björklund, is very focused on cell therapy for regeneration with well-defined strategic priorities and a high level of integration. Besides the collaboration between the preclinical groups, the collaboration with clinical groups is excellent.

The scientific production is very good, with a steady flow of outstanding papers in high impact journals and important breakthroughs in the field. This also reflects the high international reputation of some of the researches. The Unit has been successful in attracting European grants and leading European networks and consortiums and managed to collaborate with the industry (Novo-Nordisk) for cellular therapies for Parkinson's disease.

The Unit has generated a much-appreciated knowledge on human-iPSC and iN, which represent a solid strength. This opportunity could be considered to broaden the research lines, i.e. using human-derived neuronal models of the different diseases to understand the ultimate mechanism of the degeneration/ regeneration process. There are some concerns as to whether the cell transplants will represent a forthcoming therapy for Parkinson's disease.

## Unit 1B Neurophysiology and Neuronano Medicine

This group consists of three different parts.

- 1. The Neurophysiology section in which all members have the same scientific roots, they started with professor Olov Oscarsson or with his pupils. This includes professors Jens Schouenborg, Marin Garwicz, senior professor Germund Hesslow, professor Henrik Jörntell, and associate professors Per Petersson and Anders Rasmussen.
- 2. The Neurophysiology, NeuroNano Research center (NRC) and Neuronano Medicine initiated and headed by professor Jens Schouenborg with professors Martin Garwicz, Nils Danielsen and dr Linda Eliasson as deputy coordinators. This is an interfaculty center that has been created for development of new tools in terms of tissue-friendly recording and stimulation electrodes with high resolution and nanoparticles used for tissue-specific administration.
- 3. Clinical Neurophysiology represented by associate professor Christine Ekdahl Clementsson and head of the division of clinical neurophysiology, and with principal investigators adj professor Eskil Elmer, Drs Erik Westhall, Sofia Backman, Douglas Hägerström and Sven Köhler.

#### Leadership, recruitment, promotion, collegial culture and overarching research strategy

For reasons given in the Introduction we will deal with this separately for all groups together.

#### Strategic Research areas (SFOs).

Schouenborg was part of the original application for MultiPark, but no calls were announced in the UoE area, and thus no funding has been received by any of the members of this UoE.

#### **Publication patterns**

Over the period 2014-2018 they have published 153 articles (range 134 and 356 between groups), and 2.6 in the top 1 citation percentile, and 14.4 in the top 10 percentile. In addition, 15 patents have been applied for. All groups within the UoE publish regularly in very good to excellent journals

#### **Research groups – neurophysiology**

The group of *Hesslow* now continued by Anders Rasmussen addresses as a central theme how the nervous system determines accurate timing during movements, and the appropriate interval between two successive events. They analyze this complex problem with a focus on the role of cerebellum. They use successfully both animal models, and human subjects with high demands on accuracy also subjected to virtual reality and in individuals with deficits in this regard to timing as in ADHD and autism.

The group of Jörntell has a background in demanding and impressive work on the cerebellum but has now a focus on somatosensory mechanisms and how haptic information is processed in the brain and how this knowledge can be applied in robotics. He coordinates an EU H2020 project (Future Emerging Technology).

The group of *Per Petersson* has a focus on the control of movement and the role of the basal ganglia, physiology and pathophysiology as in Parkinson's diseases. They have shown that narrow band oscillation (80Hz) over motor cortex is a biomarker of dyskinetic side effects of L-DOPA treatment. Petersson and colleagues have shown that stimulation over the dorsal column in rodents and primates can counteract Parkinsonian symptoms, and a clinical trial is planned in Sweden.

Neurophysiology, NeuroNano Research center (NRC) and Neuronano Medicine. *Jens Schouenborg* has a strong background in pain research and motor control. He realized that chronic recordings from single cells or groups of cells over weeks or months were needed over an extended time, and that conven-

tional electrodes, like tetrodes widely used for long time recordings gave rise to marked gliosis and tissue damage. He therefore initiated NeuroNano Medicine, an interfaculty center with expertise also in material science with funding from the Wallenberg foundation and the Swedish Research Council and Lund university. During this period new ultrathin flexible electrodes were developed that are tissue friendly causing little or no gliosis and can be used for stable recordings over long periods with very high signal quality. When introduced into the brain the thin electrodes were initially glued with gelatin with a high melting point. The gelatin was absorbed within the tissue after the implantation. Similar biocompatible cluster electrodes for deep brain stimulation have been developed and also drug-loaded nanoparticles. This technological development has needed expertise from several areas/faculties. The usefulness of these electrodes is demonstrated in ongoing experiments, while the technology is being further developed. In addition to publications, 15 patents have been filed for.

*Clinical Neurophysiology* was represented by associate professor *Christine Ekdahl Clementsson*, head of the division of clinical neurophysiology. Her extensive research is focused on epileptogenesis using both rodents and human subjects, studying the effects of inflammation, microglia and immune responses. Moreover, the therapeutic effects of physical exercise are explored in animals and humans. Mitochondrial dysfunction and possible interventions are the focus of the research of Eskil Elmer. The effects of cardiac arrest prognostication are central to the research of Erik Westhall and Sofia Backman.

#### SWOT analyses as reported in UoE

The different techniques mentioned in the Neuronano section and above are considered a particular *strength* of the environment, as well as the broad methodological repertoire and high general competence of the researchers. As a *weakness* is the lack of positions in Neuroinformatics. The techniques developed within the unit combined with the many recent opto- and chemogenetic methodology and light sheet microscopy are seen as providing *opportunities* together with decades of long-term basic and clinically related research in a range of disorders. Among the different disciplines within neuroscience, neurophysiology takes, by its complex nature, often longer time to produce a complete report than other disciplines, which is perceived as a *threat* for the unit.

#### To conclude

In Unit 1B Neurophysiology, NeuroNano Research center (NRC) and Neuronano Medicine there is a number of research groups each of which contributes importantly to the development of knowledge with regards to the physiology of the brain, and to the pathophysiology of epilepsy and Parkinson's disease, and through NeuroNano to the development of important novel methodologies.

#### Unit 1C Basal Ganglia disease and models

This group consists of eight research groups headed by Maria Björkqvist, Angela Cenci Nilsson, Joao Duarte, Andreas Heuer, Deniz Kirik, Cecilia Lundberg, Åsa Petersén, Maria Swanberg. Interestingly, three of these groups are junior groups with two assistant professors having created their own group with competitive starting grants obtained at national level.

All research group of this unit focus their interest on diseases of the basal ganglia such as Parkinson's disease and Huntington's disease. They focus also their research on the development of animal models of the diseases.

The written document was clear and allowed a good evaluation of the unit and the teams. The oral presentations were of excellent quality but not all eight groups could present their work and only three groups were able to speak due to time constraint.

#### Leadership, recruitment, promotion, collegial culture and overarching research strategy.

Thus, despite the fact that this unit has been generated artificially for this evaluation there is a clear common scientific interest for these groups, and they should possibly continue to interact with each other after the evaluation. Given that this unit has a clear focus on basal ganglia and neurodegenerative disorders they should be encouraged to create a basal ganglia/movement center or association at local and national level. This strategic action should be encouraged by Lund University and initial funding provided by the university to initiate new dynamics. The return on the investment would be an increase of the visibility of the University at an International level and consequently an opportunity to attract more students and postdocs from abroad. If created in conjunction with other units and in particular more clinically oriented units, it could promote the opportunity for further links between preclinical and clinical research.

## Strategic Research areas (SFOs).

The research developed in this unit has gained an excellent national and international recognition but is also very well integrated in the Lund University ecosystem. Some groups in the unit were at the origin networks of excellence that have attracted highly competitive government funding to Lund University. These networks are: NeuroFortis (2005- 2010); BAGADILICO (basal ganglia disorders Linneaus consortium, 2008-2018); Multipark (multidisciplinary research on Parkinson and neurodegenerative diseases, 2010-present).

Moreover, one group leader within this UoA (ÅP) is the Head of the recently formed Huntington Disease Center (HDC, 2018), a unique Swedish competence center supported by Lund University and the Health Care Region Skåne.

Given the excellence of these research groups in the field of neurodegenerative diseases Lund University should be encourage to lobby at the level of the ministry to encourage the participation of Sweden to the European Joined Initiative on neurodegenerative disease JPND. Indeed, about 30 countries participate to this initiative but Sweden is only moderately active and clearly should increase the funding devoted to this field. Such a lobbying should be undertaken at presidential level of the university.

#### **Publication patterns**

Over the period 2014-2018 they have published altogether 142 peer-reviewed scientific articles, attracting an average of 15,5 citations/article. Moreover, 17.6% of these articles were ranked among the top 10% cited publications for the field (defined as the journal's subject classification). All groups within the UoE publish regularly in very good to excellent journals (Neuron, JCI, Acta Neuropathologica, Cell Report, PNAS, ....). One can highlight especially articles published in JCI entitled "Chemogenetic stimulation of striatal projection neurons modulates responses to Parkinson's disease therapy" and an article published in Neuron entitled "DREADD Modulation of Transplanted DA Neurons Reveals a Novel Parkinsonian Dyskinesia Mechanism Mediated by the Serotonin 5-HT6 Receptor". Despite being extremely difficult, the Unit should try to publish from time to time in more generalist journals.

## **Research groups – Basal Ganglia Disease & Models**

## The group of Maria Björkqvist

The research group aims at analyzing peripheral pathology in Huntington's disease. The ultimate goal is to increase understanding of Huntington's disease specific molecular changes and provide markers of disease progression and novel therapeutic targets. This is a small group composed by the team leader, 1 PhD students, 1 postdoc, 2 technical staff. The group has not presented its work and it is thus difficult to analyze the research performed by the group. Based on a Pubmed search the PI has mostly published in special journals of good but not excellent level.
## The group of Angela Cenci Nilsson

This group aims at dissecting molecular and circuit mechanisms in Parkinson's disease, and the plastic effects of dopaminergic treatments and to rapidly translate this knowledge into novel therapeutic approaches. This is a relatively large group composed by the team leader, 3 PhD students, 2 postdoc, 1 guest scientist, 1 technician, 1 master student and 1 research engineer. The group is a world leader in the field of physiopathology of dyskinesia in Parkinson's disease as attested by the involvement of the PI in multiple international committees. The group has developed several new methodologies revealing pathway imbalance signatures behind different motor abnormalities in animal models of Parkinson's disease. Their work has resulted in articles published in high impact journals such as Journal of Clinical investigation. The funding of the group is excellent with grants obtained from Sweden but also from USA (MJ Fox Foundation, NIH). Dr Cenci-Nilsson has been the coordinator of Unit 1C, which has been presented in an excellent way. Given her organizer capacities she should be given more responsibilities to coordinate the whole research in the field of neurodegenerative research at Lund University.

#### The group of Joao Duarte

The research of this group aims at understanding the molecular determinants underlying cognitive impairment associated with diabetes and metabolic syndrome components. The major focus is on astrocyte-neuron metabolic interactions, how they are regulated to support adequate brain function, and how they adapt to metabolic disease states. It is a small junior group composed of the team leader, 2 PhD students, 1 postdoc and 1 research engineer. The group has not presented its work and it is thus difficult to analyze its research. Based on a Pubmed search the PI has mostly published on imaging of astrocytes in the brain and on the impact of diabetes on brain function. The journal in which the PI is publishing are of medium quality. Furthermore, the topic is not directly in the same area as the other groups constituting the unit and therefore his assignment to this evaluation unit is questionable. The group is encouraged to publish in journals with a higher visibility.

## The group of Andreas Heuer

This group aims at the development of more relevant animal models of Parkinson's disease based on AAV vectors, assessment of non-motor symptoms in these models and assessment of stem cells for cell replacement therapy. It is a junior group composed by the team leader, 1 PhD students, 1 postdoc and 2 students. This is a very competitive field and the team is encouraged to find its own originality. Furthermore, in terms of clinical outcomes these researchers should take into account non-dopaminergic lesions in Parkinson's disease. The PI is a co-author of excellent publications but not as first, last or corresponding author. He is encouraged to reinforce his leadership as an independent researcher.

#### The group of Deniz Kirik

The research group aims at the development of animal models, gene therapy for Parkinson's and Huntington's diseases, protein technology assays and brain imaging. The group did not present its research and it is therefore extremely difficult to assess its activity. It is particularly involved in technological and therapeutical development and apparently associated with a biotech company. This group has a solid reputation in viral vector development and has provided the virus to various collaborators as assessed by the publications in collaboration with several international groups. The focus of the recent years was on GDNF delivery and alpha-synuclein animal model developments. This research group should perhaps more exploit the technical developments to promote their own questions.

## The group of Cecilia Lundberg

The main interest of this group is to develop systems for sufficient, sustained and cell-specific expression of transgenes in the CNS. The group did not present its research and it is extremely difficult to assess

its activity. This is a small group composed by the team leader, 1 PhD students, 1 postdoc, 1 technical staff and 1 master student. The group has published a few papers on gene therapy in specialized journals, which is compatible with its small size.

## The group of Åsa Petersén

This is a research group focus on Huntington's disease with a special emphasis on the psychiatric symptoms and the involvement of the hypothalamus. The specific aims are to 1) determine if and how mutant huntingtin in oxytocin and/or orexin-neurons in the hypothalamus leads to psychiatric symptoms, 2) study how neuropsychiatric symptoms/signs are related to changes in hypothalamic networks in the Lund-Huntington's disease study, 3) test whether modulation of hypothalamic networks ameliorates psychiatric symptoms and modify the development of Huntington's disease. This is a relatively large group composed by the PI, 1 postdoctoral fellow, 1 junior researcher, 6 research engineers/technicians, 1 administrator, and 1 computer technician. A large proportion of the personnel is shared with Professor Deniz Kirik's research group, which is an excellent way of sharing expertise and maximizing the capacities of research. The group is well-respected in the field and has been at the origin of the Huntington's disease Center in Lund. The level of funding is very good. The publications are numerous as expected from a large group and in very good journals. This group is encouraged to pursue his work and perhaps have some papers in very high impact journal as first, last or corresponding authors.

## The group of Maria Swanberg

The research of this group aims at identifying genetic risk factors for Parkinson's disease. They use a use a translational strategy to study 3 hallmarks of Parkinson's disease (neurodegeneration, inflammation, and alpha-synuclein pathology) in experimental *in vivo* models and also perform gene-environment interaction studies in human cohorts. This is a small group composed by the team leader, 2 PhD students, 1 postdoc, 1 technical personnel and 1 student. The group has not presented its research and it is thus difficult to comment on the activity of their work.

## SWOT analyses as reported in UoE

The excellent international visibility of the teams in the field of Parkinson's disease and Huntington's disease and their involvement in international organizations and networks is clearly one of the main *strengths* of the unit. This has been achieved thanks to the excellent scientific quality of the research conducted. The unit has also been able to develop new technologies perfectly adapted to the scientific questions posed. One *weakness* is independent of the units and that the teams and consist mainly in a lack of a coordinated plan for supporting research projects and positions on the part of the relevant funding organs (see also recommendations). An absence of proper response is perceived by this committee as *threat* for the long-term competitiveness of the research in the field of neurodegenerative disorders.

## To conclude

The Unit 1C Basal Ganglia Disease and Models consist of eight groups, which are excellent to good and some of them have a very strong international reputation. They contribute to a better understanding of the basal ganglia in hypo- and hyperkinetic conditions. They were very successful in attracting important grants. Yet, the administrative and organizational support of the University is relatively moderate and should be reinforced to allow them to really act as a structured organization. This would allow even more funding to be attracted and an increase of the overheads for the University. Furthermore, the size of the junior groups and their leadership is suboptimal and a mentorship program should be developed to help them to reach international competitive level.

The two largest group (Cenci-Nilsson and Petersén) are excellent. The unit should perhaps think about merging some of the smaller groups to increase the work force and reach international competitiveness. Alternately, recruitment of junior group should be performed on the basis of international calls with candidates already holding an ERC grant and a starting package including salaries for the PI, students, technicians and lab space with running costs as it is done in many countries.

## Unit 1D Neurodegeneration, Epilepsy, Experimental Therapeutics

The group consists of 11 principal investigators, but one is professor emeritus (Lars Åke Fransson) and Patrik Brundin left Lund in 2014, so in fact the current group has 9 principal investigators. There are 3 starting PIs (My Andersson, Christian Hansen and Marco Ledri), and 4 full professors (Merab Kokaia, Jia-Yi Li, Katrin Mani, Roger Olsson). The other 2 PIs are Laurent Roybon and Carol Nilsson.

The themes of research in this group are mainly in the field of epilepsy (Merab Kokaia, Marco Ledri and My Andersson) and neurodegenerative diseases (Jia-YI Li, Patrik Brundin, Laurent Roybon and Christian Hansen), but there are also some diverse research topics such as glycobiology research (Katrin Mani and Lars Åke Fransson), biochemical research with a focus on drug development (Roger Olsson) and translational pharmacology (Carol Nilsson). In general, the research in this unit is preclinical in nature, with some links to clinical research projects. The panel notes that the research groups of this unit do not have a clear internal research or other connection, since the unit was mainly composed for the purpose of this evaluation.

## Leadership, recruitment, promotion, collegial culture and overarching research strategy

For reasons given in the Introduction we will deal with this separately for all groups together.

## Strategic Research areas (SFOs).

This unit is strong within the research field of neurodegenerative diseases, mostly Parkinson's disease, and epilepsy. Hence, most of the research groups are part of MultiPark or of the epilepsy center. In addition, they have been able to secure external research grants, such as VR grants (starting and project grants), grants from the Swedish brain foundation and EU.grants in particular JPND. The extension of the MultiPark grant is considered of major importance.

## **Publication patterns**

Over the period 2014-2018 they have published 134 articles, of which 122 are peer-reviewed research papers, 3% in the top 1 citation percentile, and 13.4% in the top 10 percentile. The number of citations per publication is on average 16.8. As publication highlights we can mention publications in PNAS and Acta Neuropathologica from the Li group in 2014 and 2016 and 2 publications in the Journal of Neuroscience (in 2014 and 2016) from the epilepsy group. In addition, there are several collaborative publications in high impact journals such as JAMA Neurology, Nature Communications, Lancet Neurology, Nature Methods and PNAS.

## **Research groups**

The scientific presentation included only 3 research groups (Hansen, Li and Kokaia). So except for these 3 groups, the evaluation by the panel of the other research groups is only based on publication data, since the self-evaluation report provides little information on the individual groups. The size of the research groups was mentioned to range from 3 to +8 people.

## Epilepsy group

*Merab Kokaia* is an established researcher in the field of epilepsy. He has published 21 papers in the report period, of which 14 as last author. He publishes in general in good to very good specialized journals. His research concerns mostly preclinical investigation of molecular mechanisms of epilepsy in rodent models using a variety of experimental techniques and tools such as electrophysiology, optogenetics, DREADDS, etc. There is also a translational aspect in his research by the inclusion of recordings in human hippocampal slices. Finally, he is evaluating preclinical strategies for gene therapy for epilepsy based on expression of NPY/Y2 or GDNF. This is certainly an interesting new direction, although it is too early to predict how successful this can be developed into a clinical therapy.

*My Andersson* is a starting PI, who was previously a postdoc in the group of Merab Kokaia. The panel has no specific information when she started her own group. She has published 8 papers in the period 2014-2018, among which 1 first author paper in Scientific Reports and 1 last author paper in Stem Cells International. In addition, she is second last author before Merab Kokaia on a number of other papers. She has also 1 paper in BMC Neuroscience without Merab Kokaia.

*Marco Ledri* is a starting PI, who also was a previous postdoc in the group of Merab Kokaia. The panel has no specific information when he started his own group. He has published 8 papers in the period 2014-2018, among which 2 first author papers in the Journal of Neuroscience and 1 last author paper in Frontiers in Cellular Neuroscience. All his publications are together with Merab Kokaia.

*In conclusion*, Merab Kokaia performs high quality research and can be considered a key opinion leader in the field. For the 2 younger PIs who were previous postdoc in his group, it is quite difficult to estimate the quality and independent nature of their research based on the information that was provided, but they should be encouraged to develop their own research line.

#### Neurodegeneration

*Jia-Yi Li* is an established PI working in the field of Parkinson's disease. He has published 13 papers in the period 2014-2018, among which 12 as last author in good to excellent journals. The main theme of his current research centers around prion-like propagation of alpha- synuclein and neuronal dysfunction in Parkinson's disease in preclinical models, both rodents and non-human primates. His research is of excellent quality with several publications in high-impact journals. He has international recognition for this research in the field of Parkinson's disease.

*Christian Hansen* is a starting PI in Lund since 2015. He has published 3 papers in the period 2014-2018, among which 1 last author paper in Scientific Reports. His research focuses on the role of molecular chaperones (DNA Js) in protein aggregation in Parkinson's disease and Huntingson's disease. He is investigating the molecular mechanism of the DNA Js in cellular and rodent models. He is also setting up drug discovery with DNA J activity as target. The base of this research was laid in a research exchange in the lab of David Ron (Cambridge).

Christian Hansen seems to be developing his own independent research line in Lund now. It is a bit early to fully estimate the quality of his research. In the self-evaluation report, he clearly mentions a lack of support for young PIs at Lund.

*Laurent Roybon* is a relatively young PI (total number of publications is 59). He has published 21 papers in the period 2014-2018, among which 8 last author papers in Scientific Reports. He publishes in general in good to very good specialized journals. His research is situated in the stem cell field with a focus mostly on iPS cells in the context of Parkinson's disease. Based on the limited information available, his research appears of very good to excellent quality.

*In conclusion*, the groups working in the field of neurodegeneration in this UoE are of very good to excellent quality. It is, however, not clear why they have not been grouped with other groups at Lund working on Parkinson's disease or stem cells. The starting PI should receive sufficient support and mentoring.

## Others groups

Katrin Mani is a researcher working in the field of glycobiology. She belonged to the group of Lars Åke Fransson. She has published 15 papers in the period 2014-2018, among which 9 last author papers, mostly in specialized journals. It appears that Katrin Mani is doing well, but in a quite specialized field of research.

Carol Nilsson is working in the field of translational pharmacology. She has published 7 papers in the period 2014-2018, among which 4 last author papers, mostly in specialized journals. It is difficult to judge the quality of her research, but based on the publications, it appears mostly technology-driven (proteomics)

*Roger Olsson* is working in the field of biochemical research with a focus on drug development. He has published 19 papers in the period 2014-2018, among which 7 last author papers, mostly in specialized journals. It is difficult to judge the quality of his research, but based on the publications, it appears mostly technology-driven (mass spectrometry).

#### SWOT analyses as reported in UoE

The main strengths reported are the excellent research environment in the field of neurodegeneration and epilepsy. This is reinforced by the presence of the MultiPark platform and the epilepsy center. It appears that there are still opportunities to even better benefit from this strong environment and to increase interactions with other groups at Lund working in the field of Parkinson's disease and epilepsy. As main weakness, the lack of appropriate support for young research groups is perceived at different levels. Therefore, the continuity for some well-established research groups is considered as a threat. The recruitment of postdocs internally may ensure continuity, but also includes a risk of insufficient innovation in the research projects.

#### To conclude

In this unit, there are strong groups and excellent research in the field of neurodegeneration and epilepsy. The other groups appear to work more in a very specific niche, often technology driven, and might be isolated in this unit.

## Unit 1E MED

The unit 1E consists of four research groups with different focus. However, looking from the outside they can be found under a common headline – neurodegeneration and dementia from bedside to bench to bedside:

- 1. Clinical memory research (PI: prof. Oskar Hansson)
- 2. Experimental dementia (PI: prof. Gunnar Gouras)
- 3. Experimental neuroinflammation (PI: ass. prof. Tomas Deierborg)
- 4. Glia immune interactions (PI : ass.prof. Iben Lundsgaard)

It seems obvious that the organisation is a functional unit for translational neuroscience and not a construction for the RQ20-evaluation only.

#### **Research area and strategies:**

Well defined cohorts of healthy elderly, individuals with mild cognitive impairment (MCI), Alzheimer's disease in different stages and other dementia disorders are clinically defined, characterized with imaging, (PET, amyloid and tau, functional MRI), and by biomarkers in CSF and blood. Recruitment of these cohorts is based on effective collaboration between primary care and the university hospital.

Especially regarding "wet" biomarkers the 1E unit is well established in the international research front. In this innovative development, collaboration between the Lund group and the Clinical Neurochemistry Laboratory, Sahlgrenska University Hospital, plays a fundamental role. The international network is impressive. On a break-through-paper from the group published in Lancet Neurology May 2020 with co-authors from UK, Canada and US it is shown that p-tau 181 in a blood sample can be used as a simple scalable diagnostic test for Alzheimer's disease.

These unique cohorts and the arsenal of biomarkers for detection of "preclinical" dementia and disease progress will be crucial in future clinical trials. So far, immunotherapy, active or passive, to reduce brain amyloid accumulation has not been successful. However, monoclonal antibodies from the pharmaceutical industry, Biogen and Bioartic, still hold some promise for clinical benefit. Therefore, basic experimental dementia research performed today within the 1E unit is most important, not leaving the amyloid hypothesis but with open eyes for other primary pathogenetic mechanisms in neurodegeneration and the role of neuroinflammation.

Studies on the glymphatic system are ongoing related to the hypothesis that impaired clearance of beta-amyloid from brain tissue might be involved in the pathophysiology of Alzheimer's disease. Further, clinical epidemiological investigations on neurodegenerative disorders in a cohort of Swedish athletes exemplifies the innovative multidisciplinary approach within the unit.

The 1E unit is actively using local high-tech methodology such as the 7T MR and MAX IV facilities. One explanation for the successful translational research of the unit is a background in basic research within the clinical leadership.

#### Publication pattern, funding and recruitment:

During the RQ20 evaluation period more than 300 scientific articles, mostly in relatively high impact journals have been published and the citation numbers are high.

From 2014 to 2018 the 1E budget has doubled into about 33,5 m SEK with dominant support from national and international funds, (Swedish Research Council, Wallenberg foundation, Hjärnfonden, EU funding, NIH etc.). A renewal of the strategic investment MultiPark in 2020 will be important for most of the MED 1A – F units.

One of the three full professors has about twenty five years until retirement, the other two less than ten years. Recently, young active assistant professors and PI's have been recruited.

Several of them have recently received prestigious awards and prices, exemplified by the Minerva Leadership Award to ass.prof. Tomas Deierborg recently and the Bundy Academy price 2020, (3 mSEK), to ass. prof. Niklas Mattsson-Carlgren.

## **Conclusion:**

The quality of the multidisciplinary, translational research within the MED 1E unit is generally high and of excellence in the dementia biomarker cohort projects in the group of prof. Oskar Hansson.

## **Recommendations:**

In general, the 5-10 - year prognosis for MED 1E seems excellent. The unit is relatively young and very innovative. The interaction with dedicated basic and clinical neuroscience in the other MED units could certainly be improved. Reorganisation? For the translational research on Alzheimer's and Parkinson's diseases, a brain and tissue bank would further strengthen research on pathogenetic mechanisms. Such a task is most important but the bureaucracy in Sweden today might be complicated.

# Unit 1F Neurology and Clinical Neurogenetics

This unit consists of several different research groups. There is a strong tradition of translational work in the Division of Neurology, particularly in stroke and brain plasticity (Johansson, Norrving) and cellbased therapy for neurodegenerative disorders (Lindvall). The panel met with 4 groups:

- 1. The Restorative Parkinson Unit, represented by the Head of Neurology, Prof. Per Odin.
- 2. The post-Cardiac Arrest Brain Injury group, represented by Dr. Tobias Cronberg
- 3. Stroke registry, represented by Prof. Arne Lindgren.
- 4. Regeneration in movement disorders, represented by Dr. Håkan Widner
- Other sections from which we did not have presentations include Clinical Epilepsy, Clinical Neurogenetics, Translational Neurology and Stroke Policy. The Stem Cells & Restorative Neurology group (Z. Kokaia) was represented in the presentation of Unit 1A (Neurobiology & cell therapy).

## Leadership, recruitment, promotion, collegial culture and overarching research strategy

Unlike most other research units reviewed, this one has a somewhat longer history, as it is largely (but not exclusively) based on a clinical department (Neurology). This, however, leads to some challenges as the grouping is based on clinical and administrative needs rather than an overarching research focus. The climate seems collegial and there are attempts to rejuvenate the Division by recruiting at a more junior level, but there are financial/logistical challenges, and like many centres internationally, the culture has moved away from an expectation that clinicians will be engaged in fundamental research. Efforts are being made to recruit clinical trainees into research activities.

## Strategic Research areas (SFOs)

Multipark has been an important source of support for this Research Unit and provides infrastructure to permit clinical trials.

## **Publication patterns**

Over the period 2014-18, the investigators contribute to 287 peer-reviewed articles and 32 peer-reviewed review articles, as well as 18 peer-reviewed editorials or similar contributions. These works have been cited more than 19000 times and overall output in top 10% (35.4) and top 1% (8.1) are excellent. It should be noted that there appears to be a wide range of Lund University (LU) contributions to some of these papers, in some cases appearing as collaborators or part of an international consortium led by others, while in other cases (most notably related to neurological outcomes following cardiac arrest) LU has clearly been in the lead.

There have been more than 200 lectures at scientific meetings in the past 2 years.

## **Research groups**

## Clinical & translational stroke

The Lund Stroke Registry means that LU plays a major role on the world stage in the assessment of stroke risk factors and factors contributing to recovery from stroke, including genetic, as well as participation in a number of large treatment trials and exploration of a variety of chronic clinical sequelae of stroke (fatigue, aphasia). This work has led to a number of high impact publications and major grants, in some of which LU researchers have played the lead, although on others, they are in a more collaborative role.

## Brain injury after cardiac arrest

This is a very dynamic group that has been an international leader in a number of key trials, including the (lack of a) role for hypothermia. The work appears to be well integrated with work conducted in other clinical units (Intensive care, Cardiology, Rehabilitation, Radiology, Clinical Neurophysiology) and at other sites (Malmo, Helsingborg).

#### **Regeneration in Movement Disorders**

At present, the majority of the activities seem to consist of participation in clinical trials of cell-based therapies or trophic factors, as well as some smaller medication trials for neuroprotection. LU scientists take a lead role in the clinical aspects of some of these studies, and there is at least some degree of integration with the numerous other research units involved in cell-based therapies (e.g. the planned trial on ES-derived human differentiated dopaminergic neurons). There is also some degree of integration with pharmacological research being conducted in preclinical models of basal ganglia disease.

#### **Restorative Parkinson Unit**

This is a large and well supported group with substantial infrastructure support from Multipark, as well as other foundations and industry. A focus is the use of more advanced therapeutics to provide continuous dopaminergic stimulation, as well as the application of wearable sensors and apps to better record clinical outcomes. LU is well recognized for its participation in a number of these studies, although several have originated elsewhere. An interesting line of work is related to maintenance of capacity to remain in the workforce with Parkinson's disease.

#### SWOT analyses as reported in UoE

*Strengths* include the distinguished history of translational neuroscience at LU, the large data registries and access to great strengths in some areas of basic neuroscience. The self- assessment also describes strength in rejuvenation, including good gender balance.

*Weaknesses* identified in the self-report include some geographical dispersion of activities (unclear how much of a problem this is) and administrative barriers between the University and the health region. This is a common challenge, and LU seems to do better than many institutions in this regard, in particular with respect to the ALF funding, which is used to protect time for clinician researchers. Clinical neurogenetics is well represented by an energetic young clinician-scientist (Andreas Puschmann, with whom the review team did not meet), but he appears to be working in relative isolation and neurogenetics is not perceived as a priority for genetics activities at LU in general. Secure support for leading clinician scientists is limited, so there would be few opportunities to recruit star researchers from outside.

*Opportunities* would include further integration with other relevant research groups at LU – in particular, the extraordinary strength in regeneration and transplantation – although too much focus on this area could be a risk. Other areas with which integration should be encouraged include basal ganglia models and neuroinflammation. On the clinical side, there should be opportunities for greater interaction with Psychiatry and Geriatrics (the latter now formally enshrined), and for exploitation of growth in e-health and in data management. Enhanced support for sequencing and bioinformatics would be helpful. The Clinical Trials Unit is an outstanding opportunity to translate basic science discoveries at LU into first in-human testing. The availability of multi-modal imaging was curiously almost absent from our discussions, but should be seen within the context of other strengths at LU in biomarker development.

*Threats* include uncertainty regarding stability of funding, including Multipark. While education is not part of the review mandate, education in research cannot be divorced from the research mission. In the period 2015-2020 there were 13 dissertations in the Division of Neurology (9 physicians) and there are

currently 17 doctoral students (13 physicians). While this is very good, it appears that for a variety of reasons, the translational mission of the Division is not as firmly established as in the past. This is a universal problem and by no means unique to LU, but it must nonetheless be seen as a threat. It additionally appears to be quite challenging to recruit and support women as clinician-scientists. While the challenges are obvious, it is a deficiency that must be addressed.

## To conclude

There are many strengths within this Unit, but also several threats. Overall, the Unit could benefit from a clearer integration into an overarching vision for Neuroscience research at the University, one that integrates fundamental, translational and clinically oriented research, and that strongly encourages clinical trainees to engage in research at all levels. The Unit will also require recruitment of young faculty, as several of the senior investigators have either retired already, or will do so in the next few years. Finally, some thought should be given to the historically strong focus on cell-based therapies for neurological disease. While Lund has indisputably been one of the world leaders (if not the world leader) in this domain and the work performed in the basic labs continues to contribute to important fundamental knowledge e.g. re: developmental neurobiology, it must also be recognized that such therapies may ultimately not prove useful in the treatment of neurodegenerative disorders. As such, this may be a time to consider strengthening new areas and embracing new opportunities.

## Recommendations

Neuroscience at Lund University consists of a number of research groups, many being very competitive in an international perspective. The composition of neuroscience in Lund appears unusual, two thirds of the groups deal with potential therapies, pathogenetic mechanisms and biomarkers of Parkinson's and Huntington's diseases. As we note in the introduction the format of RQ20 as applied to the neuroscience area is suboptimal for a *"research evaluation"* of UoE formed ad hoc for the purpose of the evaluation.

## Recruitment,

From our discussions with the chairmen, the dean and the six research groups we gained the impression that the recruitment of young PIs was based primarily on that individual researchers that had obtained funding for a temporary position from e.g. the Swedish Research Council or other Foundations would be welcomed as a PI and group-leader provided that they in addition had collected external grants of 3MSEK. This applied at least in the Department of Experimental Medicine. We also got the impression that neither the Departments nor the Faculty had any provisions for start-up grants. For senior positions, many have been internally promoted, but the Departments could in addition suggest to the Dean and Faculty board that one or two positions would be opened each year.

There was no strategic planning of recruitment, essentially "bottom up", which has resulted in "more of the same" rather than a more balanced composition of neuroscience in Lund. The focus on Parkinson's disease is of course largely the result of the pioneering role of Anders Björklund and Olle Lindvall, and the fact that they have trained a new generation of outstanding successors both at the preclinical and clinical side, like Angela Cenci, Malin Parmar and Oskar Hansson. Their pupils in turn are now becoming young PIs. One can note that also on the neurophysiology side, the current professors are either first or second generation after Olov Oscarsson, a well-known cerebellar physiologist in Lund. We also note that there seem be little or no interaction with the well-known neuroscience groups in the Faculty of Science.

Essentially there is no strategic planning of the development of neuroscience in the Medical Faculty in Lund. This might be risky in the long-term, since the bottom up approach will promote more of the

same rather than having new areas introduced. One possibility to remedy this, in the long-term perspective, would be to create an *External Advisory Board* with the role of advising the University and the neuroscience community. It is critical that as many as possible of the *professorships are announced for open competition, and as important that with each position a large start up package will follow* including some training positions.

Currently a professor position with no extra resources will clearly not attract qualified applicants from any place outside Lund, particularly if the salary is not included. When any young PI is recruited it is critical that start up grants should be provided.

We also have the impression that the Lund neuroscience to a large degree is *fragmented* into a number of small research groups, each left to themselves, fighting for survival with rather limited mentoring of the young groups. Perhaps this could be solved by having more senior members of neuroscience community taking on the responsibility of nurturing the younger groups without of course affecting their science.

There is a lack of a coordinated plan for supporting related research projects on the part of the relevant funding organizations. The present organization does not favor a common organization between research groups which could reinforce the service provided to the researchers at a moderate cost. This is an important issue which should be addressed by the management of the University.

#### Leadership

As noted above, neuroscience at Lund University is composed of a large number of research groups, many of which are in the forefront of their respective research areas. There is, however, no strategic plan for the development of neuroscience and as presented to us, few innovative plans other than continuing along the lines in which they have expertise. We think that it would be important in the long-term perspective to broaden the scope of neuroscience in Lund, perhaps assisted by an External Advisory board. It would also be useful if neuroscience were made into one formal entity (center) within the Medical Faculty thereby promoting a unification of what appears as a fragmented organisation. In this case it would be important that this center gets administrative and economical resources

#### In Conclusion

Lund University can be proud of having a number of excellent research groups in neuroscience, but in the long-term perspective the items discussed in this report including the recommendations should be considered if the neuroscience in Lund should remain in the forefront.

June 1<sup>st</sup> 2020 Sten Grillner (chair), Sten-Magnus Aquilonius, Veerle Baekelandt, Etienne Hirsch, Rosario Moratalla and Jonathan Stoessl Signatures available in the original report. July 10, 2020. Sten Grillner/chair

# Cancer, Basic

## Panel overview

Panel 2 consists of four Units of Assessment (2A, 2B and 2D at the Lund Campus and 2E at the Malmö campus).

## Units of Assessment 2A: Clinical Genetics

## Chair: Fredrik Mertens

This unit overlaps to a large extent with the Division of Clinical Genetics at the Dept. of Clinical Sciences, Lund. Their research focus has for a long time been to study genetic alterations specifically in tumors of various type. Focus has been on using these genetic changes as diagnostic or prognostic markers, but in particular in recent years, increased focus has been on understanding the physiological impact of these mutations using e. g. mouse models etc.

## Unit of Assessment 2B: Hematology and Transfusion Medicine

## Chair: Björn Nilsson

This unit consists basically of three research groups headed by Björn Nilsson, Markus Hansson and Urban Gullberg. According to our information, only Björn Nilsson remains as an active researcher at the Medical Faculty. According to the information we have been given,

Markus Hansson is leaving for a professorship at another university and Urban Gullberg is discontinuing his research group.

For this reason, we have unfortunately only obtained a brief report from Björn Nilsson regarding his research group. His research is focused on inborn genetic variation influences blood cell formation and blood cancer risk with special focus on myeloma.

## Unit of Assessment 2D: Translational Cancer Research I

## Chair: Daniel Bexell

This unit overlaps with the Division of Translational Cancer Research at the Dept of Laboratory Medicine, Lund. This unit of assessment is focused on both basic and translational aspects of tumor biology with groups studying a multitude of different cancer types. A wide array of different model systems are used including cell models, organoids as well as animal models (including PDX models) and models of developing eggs. The unit also has an excellent setup of imaging of live animals.

## Unit of Assessment 2E: Translational Cancer Research II

## Chair: Maria Alvarado-Kristensson and Yvonne Giwercman

This Unit of Assessment consists of researchers from the Dept. of Translational Medicine, Malmö. As its name implies, research is both basic and translational to its nature. The research field is diverse, covering areas such as tumor metastasis, inflammation and tumor immunology, regulation of the cell cycle and genetic predisposition of cancer. Research is focused on malignant melanoma, breast cancer, pancreatic cancer as well as urological cancers.

## **Executive summary**

## The panel sums up its main findings in a brief statement, maximum half a page.

The overall impression of the panel that evaluated the different Units of Assessment (U<sup>s</sup>oA) working in the field of basic cancer research is very positive. In general, the units include nationally and internationally competitive groups with a good research trajectory in terms of publications in reputed journals of basic and translational oncology. In summary, we observed high standards of basic cancer research in all the U<sup>s</sup>oA. There is of course room for improvement in terms of quality of research, recruitment, basic research-clinic interaction, societal impact, diversity or gender equalization. Specific comments on these issues are included in this report for each of the U<sup>s</sup>oA. In addition, we included a section at the end of the report about general recommendations for all the U<sup>s</sup>oA.

## Introduction

The panel sums up its mode of operation, its composition and some general reflections on the preconditions for making the report (formation of units of assessment, background material, site visits and similar). About one page should be dedicated to this.

Below, we indicate the **composition of the panel** selected by the University of Lund at the end of 2019 to take part in the evaluation of basic cancer research UoA.

Böhmer, Frank: University of Jena, Germany Brakebusch, Cord: University of Copenhagen, Denmark Casanovas, Oriol: Catalan Institute of Oncology, Spain Pandiella, Atanasio: Cancer Research Center, Salamanca, Spain Pihlajaniemi, Taina: University of Oulu, Finland Sleeman, Jonathan: University of Heidelberg, Germany

In the next paragraphs we describe the **mode of operation** that we followed during the assessment process. After the initial selection of this panel, the Chairman (AP) attended a meeting held at Lund University (LU) on January 9, 2020. In that meeting, some general aspects about the University and the whole evaluation process were discussed. Right after the meeting, the Chairman informed panel members about the main points that were discussed. Information concerning documents available for the evaluation procedure as well as instructions about the report to be prepared were given to all members of the panel by University Officials during the month of January. By the end of January, panel members were informed that the documents to be consulted for the evaluation would be available by January 31. In January, and after the meeting that was held with University officials, the Chairman informed the panel members about the major aspects touched on in that meeting and recommended panel members to take notes while reading of the documentation provided. This recommendation was based on the fact that at the January 9 meeting this approach was discussed by some Chairmen as a reasonable strategy, considering that during the *in situ* evaluation, which was initially planned to occur in May, some panels agreed to start the writing of the report during the evaluation week, making it compatible (when possible) with the interviews that should have taken place in Lund.

All panel members reviewed the available documentation for each of the UoA from January 31 until the end of April. On April 28 we had a Zoom meeting to discuss and organize how we should pro-

ceed with the interviews with LU personnel that took place during May 5-7. In our Zoom meeting we planned to create four working groups for each of the four U<sup>s</sup>oA. The composition of these four working groups is given in the scheme below.

2A: Division of Clinical 2E: Translational Cancer Research II Genetics (Dept. of 2B: Hematology and **2D: Translational** Clinical Sciences, Lund). (Malmö Campus) Transfusion Medicine Cancer Research I **Oriol Casasnovas Cord Brakebusch** Frank Böhmer Atanasio Pandiella Jonathan Sleeman Taina Pihlajaniemi **Oriol Casasnovas Jonathan Sleeman** Atanasio Pandiella Frank Böhmer Taina Pihlajaniemi **Cord Brakebusch** 

Each of the working groups consisted of three panel members. The panel member listed first was designated in charge of writing the first draft of the report for the specific UoA. That first draft was then circulated among the rest of the members of the working group for additions/corrections, and then finally sent to the Chairman for homogenization and preparation of a consensus final report.

After the May 5-7 interviews, we started working on the reports for each UoA, as indicated above, and within 10 days the Chairman received the individual reports for each of the four U<sup>s</sup>oA. In the meantime, and by May 15, we sent some additional questions for the Faculty of Medicine and to the leader of the 2B UoA to obtain some additional information that we could not gather adequately during the May 5-7 interviews. After assembling and standardizing the different reports of each UoA, the general document was circulated several times among the members of the panel for review and correction, reaching a final report at the end of July. We decided that it was convenient, in addition to discussing each of the sections suggested by the Lund University, that the final report should include a specific section of general recommendations, based on what was observed throughout the process. After sending this report, we received comments of the leaders of different U<sup>s</sup>oA by august 14. We analyzed those comments and proposed some amendments that were included in a final version sent to LU by the end of august.

The general feeling about the **formation of the Units of Assessment** is that they were created for RQ2020 in a rather artificial manner. This feeling was substantiated in the interviews carried out in May. The preparation of the U<sup>s</sup>OA was criticized by some of the interviewed PIs and that raised some concerns among the panel members. While some U<sup>s</sup>OA appeared quite solid and well established (e.g UOA 2A), the composition of others was noted critically, for example the UOA 2B which consists in only one research group.

The **background material** provided for the evaluation was generally elaborate and informative, however, CVs of each PI together with an individual publication list of the last 5 years and bibliometric indicators would have significantly facilitated our work. The lack of an **on site visit** was definitely unfortunate. While the Zoom meetings we had during May 5-7 were well organized and satisfactory, the physical presence in Lund would have allowed us to have a more accurate view about for example the geographical distribution of the different labs and how that could impact in the performance of individual groups or even the whole UoA. That feeling is particularly present when evaluating the Lund and Malmö Translational Cancer Research U<sup>s</sup>oA. The virtual meeting was quite good but could not completely replace the *in situ* assessment.

One issue that we observed was the limited interest in the whole RQ2020 interview process shown by some of the interviewed persons. We perceived that some of the scientists interviewed considered that our interviews and the evaluation procedure were useless and time-consuming for them. The perception

that the evaluation we were performing was somehow disturbing them is something that caused certain discomfort to some of us.

## Analysis of the Units of Assessment

# Comments on the individual Units of Assessment have been made according to the guidelines sent to the panel members by Lund University.

## 2A: Division of clinical genetics

This UoA is very well established, with a track-record of more than 40 years, and has developed a strong international visibility, most notably through the work on cancer genetics over recent decades. The UoA currently consists of 8 independent groups having a strong overlap with the Division of Clinical Genetics. PIs carry out clinical work as well as research. Clinical and basic research is well balanced in terms of PI distribution, as half of the PIs are clinically oriented, and the other half is basic science oriented. Therefore, many members of the unit carry out clinical work, and some of them are physician-scientists (15 of the members of the unit), which represents a strong support for leveraging the translational potential of the work of the unit. The more basic science-oriented research groups in the UoA are led by younger PIs, but they have a strong and growing track-record that is primed to continue expanding and growing. Initially, the clinical and research parts of the division were located in the same building but later, due to space limitations, the situation changed. Though the two branches appear to be in proximity, their physical separation at present may impair to some degree the effectiveness of the UoA, as indicated in the report they provided.

#### Leadership:

• **Priority setting, including goals for external research funding.** Leadership with regard to priority setting in this UoA is mostly at the PI level, as individual PIs generally define prioritization of funding, resources and personnel due to the heavy reliance on external funding. There is no global definition of priorities or specific goals on research funding in this UoA. Instead, the UoA has set very general priorities, such as striving for science of the highest quality. Therefore defining a more focused strategy for future developments could be an important improvement for this UoA. Lack of space for expansion is a major issue that restricts the development of the UoA. This issue also impairs the ability of the UoA to implement strategic measures and set priorities.

The UoA has implemented a 3-year rotation system for the position of head of the Division. We view this very positively, as it helps to integrate the interests and perspectives of all the PIs within the UoA, facilitating integration of the clinical and basic science sides of the UoA.

• **Recruitment, promotion and succession.** Recruitment, promotion and succession are defined at the Division level in this UoA. They meet every 6 months and define new recruitment needs when they arise. Nevertheless, there is no specific recruitment or promotion plan.

A significant amount of "inbreeding" and hierarchical interdependence is evident in the PI recruitments within the UoA. The "budding" system, in which recruited junior PIs are former students or postdocs of more senior PIs, seems to be widespread and accepted as the norm, although it does not appear to represent a specific recruitment policy. This system limits the amount of external "fresh blood" entering the UoA through PI recruitment. Furthermore, there also appears to be a lack of mobility at the PI level, restricting recruitment possibilities, and promotion of young investigators.

Difficulties in recruiting high quality postdocs and PhDs seems to be a general problem of PIs within the UoA. Possible reasons for this include little contact with undergraduate students through teaching, lack of competitiveness with other established top centers, mainly located in the US, and the salary structures that are on offer.

• **Publication patterns.** This UoA has a strong track record of publications, with 20 articles in leading general scientific journals and more than 30 articles in the top journals in the fields of cancer biology, hematology, and pathology. Furthermore, they also have a strong external funding track record, which has increased in the previous years.

Despite this publication success, the UoA also faces conflicts with regard to publication impact due to the publishing requirements for PhD students and for the "Docent" certificate. Here, quantity has priority over quality, which is broadly recognized in the UoA as having a strong effect on publication patterns, leading to a bias towards low quality publications.

- The balance between activities in research, education and external engagement. This UoA is mostly focused on research and clinical duties, with teaching accounting for less than 10% of their workload. Therefore, there seems to be a good balance between research and "external" engagement in the clinical duties of this UoA, although teaching is quite limited. Lack of time was expressed as a barrier for taking on more teaching. However, access to more undergraduate teaching opportunities may help the UoA in the recruitment of good PhD students through establishing contact with potential PhD students.
- The overarching research strategy. This UoA has a broad definition of their research strategy, mostly based on their formal and functional link to the Division of Clinical Genetics at the hospital. The nearest to an overarching research strategy is the expectation that research groups should address the origin, development and mechanistic basis, diagnostics or treatment of neoplasia. This is obviously a very broad focus area. Nevertheless, the establishment of core facilities for deep sequencing (CTG and CMD) represents an infrastructure strategic decision that defined the UoA technological capacities and shaped many of the independent group's research strategy. Thus, many groups are focused on cancer genetics projects that take advantage of the proximity to clinical samples and the availability of NGS sequencing. This has allowed the UoA to participate in several important national networks and to obtain big grants. It is important to note that the biomarker research within the UoA has had an impact internationally through translational implementation.

An important development in recent years has been a shift by several groups in this UoA to include functional studies in their research, including the use of complex cell culture systems (organoids...) and animal models (to model genetic alterations in mice). While this trend has also shaped the general research strategy of the UoA, it does not seem to have been due to a predefined strategy, but rather a co-evolution of the research of some groups and adaptation to scientific demands. Importantly, the shift towards functional studies has improved the research impact and output. The ambition of the UoA to move further from descriptive to functional studies is considered to be a sensible strategy that should be encouraged. Similarly, the future perspective of forming closer collaborations with clinicians to explore the treatment potential of experimental findings will further increase research quality and impact. This is particularly relevant as there is a strong trend to fuse as much as possible the basic and the clinical world of research to address societal demands for better healthcare.

## Collegial culture:

Overall, this UoA has a very positive collegial culture, which can be observed at the highest level in their 3-year rotation system for the position of head of the Division, which allows for integration of all the "voices" of the PIs and precludes the dominance of any one subgroup of PIs. This positive collegial culture was clear in the interviews of the PIs in this UoA, irrespective of their clinical or basic focus, their gender or age.

• Opportunities for early-career researchers to develop their originality and independence. In this UoA, 50% of the PIs are young and in particular two of them have obtained permanent positions

(Lektorat) in the recent years. Therefore, an important proportion of PIs in this UoA are early career and young PIs who lead small groups with the strong potential to grow.

In the evaluation of this UoA and from the interviews with younger PIs, we observed an important lack of planned opportunities for early-career researchers. Postdocs complained about a system of stipends, in which foreigners do not receive the normal social benefits that are however implemented for Swedish nationals. This acts as a barrier for the recruitment of talented candidates. At the PI level, the reliance on short-term external funds, and the fact that external funding levels are often low makes it difficult for young PIs to develop long-term projects and take risky projects that may result in high impact scientific outputs. Young PIs need a tenure track plan, where the steps to become an independent PI and to secure a permanent position are defined, implemented and transparent. If possible, more faculty positions need to be created – apparently there used to be 2 senior lectureships for the faculty as a whole each year that were advertised on the open market, now these seem to be given directly to Centers.

Excessive administrative duties, centralization of administrative support, the lack of secretarial assistance and no HR support all act to stifle the ability of young PIs to develop original and impactful research portfolios. It also impedes their ability to gain independence due to reliance on others for support in these areas. As a general principle it is recommended that those who obtain their salaries paid through external funds should be relieved from having to do administrative tasks for the University.

• Sustainability and renewal of research strengths. The structure of this UoA is that of small research groups covering a diverse field of cancer genetics specialties (tumor types). Nevertheless, this group structure is not optimal for the sustainability and renewal of the UoA's research strengths. While most of the groups have a similar approach to cancer genetics (use of hospital's samples and NGS facility at CTG and CMD), there is no plan for sustainability or renewal of their research strengths.

The reliance on external funds – including PI's salaries – represents a potential threat to thematic sustainability and renewal of research strengths, particularly because the funding agencies determine the topic of research that they are prepared to finance. This is exacerbated by the fact that little if any core funding is available from University, that there is a lack of permanent positions, and no tenure track system. The reliance on fragmented and short-term external funding therefore mitigates against continuity and represents a loss of the ability to intervene strategically at the leadership level.

The reliance on external funds reflects the widespread view that the University has become a "research hotel" – you pay for everything and rent space. This makes it difficult to maintain a critical mass and attract top scientist, and also makes it difficult to recruit good postdocs and PhD students. It also has another negative impact on sustainability, as it means that there is a lack of central funding to pay for maintenance costs and the everyday running of research infrastructure.

- Academic networks and collaborations outside the unit. The students, postdocs and PIs generally appreciated the good collaborative environment within the UoA both amongst the research groups and with clinicians. In addition, the UoA collaborates with several groups from other U<sup>s</sup>OA within the faculty, and also engages in interfaculty collaborations. For example, several groups have moved to functional studies with mice, and have started collaborating with groups within Medicine. Furthermore, they also collaborate with some groups of the Faculty of Natural Sciences and the Faculty of Engineering, which allows for shared PhD programs. Nevertheless, there is no overarching strategy and sometimes the collaborations are seen as high cost and low gain efforts.
- Diversity, integrity and ethics. This UoA currently seems to have an appropriate gender equilibrium at the PI level (4 females, 4 males). The 3-year rotation system for the position of head of the Division

represents a very good mechanism of equal opportunity. It was explicitly stated in the interviews that gender did not matter in decisions or structure of the UoA. The UoA has also apparently worked to promote women at Prof and PI level. Nevertheless, one female PI stated that it is difficult to advance to full professor as a woman. It is therefore notable from this perspective that the male PIs are mostly older and clinically oriented, while the female PIs are the younger and mostly basic science oriented. Where possible, it is recommended that measures should be implemented to specifically support the promotion of women to senior leadership positions.

There is no evidence for ethnic diversity at the PI level, as all PIs are Swedish. This is presumably due in part to the "budding" system of PI recruitment. Efforts to recruit top scientists from leading institutions rather than using the budding system would help not only to increase science quality, but also to increase ethnic diversity at the PI level. Furthermore, the postdoc stipendium system in which foreign postdocs do not receive normal social benefits discourages the development of increased ethnic diversity. Moreover, this state of affairs is seen as being ethically questionable. Attention should be paid to this salary issue, because if this situation persists, it may negatively impact into the University's prestige and may even be the source of legal conflicts.

• Quality in applications and publications. This UoA does not have a structured plan for assessing the quality of their grant applications or publications. A mentoring system could perhaps be considered in this context. Nevertheless, unpublished data are shared and discussed in research seminars, which provides a forum for feedback, at least at this level.

As pointed out above, the publishing requirements for PhD students and those looking to qualify as "Docent" strongly encourage low quality publications. The prevailing philosophy is "prioritize Quantity over Quality". This system needs modernizing, with a new orientation towards encouraging and recognizing quality. This will require a shift away from the assumption that "one size fits all". The PhD requirements need to be tailored to account for the requirements to all types of PhD projects, not only those coming from the clinical research arena. In addition, students reported a major distraction from their research work through the course work requirements for the PhD degree. Sometimes courses were seen as "not useful enough" and could diminish their focus on research. While course work is important for PhD students, the relevance and scope of the current demands should be carefully evaluated. The need for students to run core facilities also distracts from their research, and this should be limited as far as possible.

#### Quality ecosystem:

• Research strengths and how these are reflected in the educational portfolio. This UoA has important strengths in cancer genetics and NGS sequencing of patients' samples. Furthermore, as most of the groups have this similar expertise, there is a surplus of this expertise. This expertise is reflected in the teaching carried out by the members of the UoA. Nevertheless, they have limited opportunities to teach (<10% of their workload) and sometimes the topics allotted to them are not always in line with their expertise. Furthermore, they see teaching as a need for qualifications to obtain stability (docent, lekturer), but having ample research money produces less pressure to have to teach (most PIs in this UoA have ALF money already).

Teaching in the UoA mainly focuses on the training of PhDs and postdocs. The relatively minor focus on other teaching in the UoA therefore means that the UoA has only a limited educational portfolio.

• How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research. This UoA

has good external (private) collaborations, which incremented their research and generated new research lines within the UoA. Furthermore, two spin out companies have been generated from the UoA, linked to the Center for Translational Genomics (CTG).

The UoA has strongly benefitted from external collaborations with industry partners, which have helped to increase the quality of research. Innovation possibilities are considered to be good and are supported by the University.

- How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration. As mentioned before, integrity and ethics are properly dealt with in this UoA. They have courses on research misconduct and integrity, and several researchers at different levels knew the university mechanisms in place to deal with conflicts of interest or to research misconduct, including an Ombuds Committee.
- How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere. This UoA has generated the NGS research infrastructure in Lund University, the Center for Translational Genomics (CTG), and the NGS infrastructure at the Hospital, the Center for Molecular Diagnostics (CMD). These are currently top infrastructures that are strategic not only to the UoA but also to all the Faculty of Medicine and other faculties (i.e. Faculty of Natural Sciences uses CTG). Furthermore, the clinical link of the UoA to the Hospital foster a close relationship to the Local Biobank, and many cross-collaborations currently ongoing.

More recently, the need for more functional studies from several groups in this UoA has led to an increasing use of animal models. Therefore, this UoA also takes advantage of the Animal Facility by being direct users or collaborating with other groups outside of the UoA that are current users of the animal facility.

Access to research infrastructure was rated as good within the UoA. In addition, the breadth of the facilities that are available was considered to support research in an appropriate manner.

• If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized. This UoA is not only aligned but has been part of the university's SFO for cancer research, as some PIs were co-coordinators of BioCare strategic research area. Loss of national BIOCARE funding due to administrative issues represents a major loss for the UoA. More recently, PIs from this UoA are also co-coordinators of the newly created Lund University Cancer Center (LUCC). While the UoA sees the advantages of the opportunities offered by LUCC for meeting with other researchers and recruitment of students (e.g. seminars, networking, collaborations etc), some doubt was expressed about whether the LUCC has any significant impact on the research of this UoA, and whether it is cost efficient. In addition to LUCC, this UoA has important collaborations with external SRAs such as NanoLund.

## Recommendations

- It would be beneficial to have a plan to evaluate grant applications, mostly for the younger PIs, and a mentoring system by most experienced researchers.
- Given the scarcity of government funding, as per the report and interviews comments of the researchers, an effort to increase private and international (EU) funding should be considered. Groups within this UoA are perfectly competitive to increase funding through international calls, especially in collaborative transnational EU funding schemes.
- Collaborative/alliances Strategy to potentiate internal collaboration within the UoA and alliances with other LUCC groups to facilitate joining national and EU networks.

- Establish a plan to discuss and increment quality of publications via collaborations inside and outside the UoA.
- In the case of this UoA, with one PI over 70 years old, and others 55-60, it is critical to have a renewal plan to foster new PI recruitment, or alternatively to evaluate the possibility of "Growing" of internal promising young fellows. It is therefore important to establish a Recruitment Plan to maintain research strengths and acquire new strengths by external strategic recruitments (at PI and also at PostDoc levels)
- Postdoctoral recruitment could be improved by implementing attractive scientific+labor packages. The frequent lack of social benefits of the foreign postdocs is particularly shocking, it is ethically questionable, and may even create legal problems in the future.
- It would be wise to implement a Career Plan for the "growth" of young fellows into PIs, and a strategy to secure these early PIs into permanent established group leaders.
- Define a merit-based compensation for researchers, to motivate high quality research and teaching. That aspect will probably depend on the University but is something to be considered as it could increase the chances of retaining talented researchers as well as attracting Professors form other Universities in Sweden or abroad.
- Decrease the administrative burden to PIs. Local administrative support could help interface with the central administration from the university.

# 2B: Hematology and transfusion medicine (Hematogenomics)

This represents a peculiar UoA because it basically includes one research team. Therefore, most of the report on this UoA will be based on analysis of the characteristics of that group, together with some comments on how the review panel thinks it should be adapted to the future research requirements and LU environment.

In the initial report, we received information about the composition of this UoA, indicating that the unit consisted in three research groups: that of the leader of the UoA (Dr. Björn Nilsson) and two additional groups (headed, respectively, by Drs. Markus Hansson and Urban Gullberg). The information provided to us indicated that Dr. Hanson moved to another university and that Dr. Gullberg decided to discontinue his group. Therefore, we consider that the UoA includes the group of Dr. Nilsson. Given the relatively large number of research groups bundled together in each of the other UoA, it is unclear why this one was not integrated into another UoA such as the Clinical Genetics UoA, particularly considering that the latter includes groups with research interests similar to those of the Nilsson's group. Moreover, Dr. Nilsson was trained at Clinical Genetics. It remains unclear to the panel which circumstances prevented the creation of a larger multigroup UoA.

## Leadership:

• Priority setting, including goals for external research funding. The group headed by Dr. Nilsson has obtained important research funding, which will sustain his research activities until 2024. Sources of financing include national as well as international (ERC Consolidator) granting agencies. The degree of interaction with important international institutions (e. gr. Broad Institute of Boston, and the deCODE Institute of Iceland) and consortia allows this group to be highly competitive in the national and international arena. Adequate funding possibilities from Swedish sources is identified as a problem since it is commented in the report that there is a lack of funding for mid-career researchers in Sweden. This aspect was also commented in the interview and the PI ratified that. Dr.

Nilsson mentioned that specific packages are devoted to promote young scientists, while mid-age established PIs even with a fair success, struggle to sustain their groups due to poor support. It is important to notice that this PI certainly has been successful in obtaining external funding and his group is among the biggest at the Faculty of Medicine.

Recruitment, promotion and succession. This is one of the most relevant aspects that need to be addressed by this UoA. The fact that it consists of a single research group raises severe doubts about the self-existence and promotion of the UoA. Of the three PIs that initially composed the UoA, one of them decided to step aside due to the age of the PI. The other, who moved to another University, represents a major loss to the UoA. The leader of the UoA was of the opinion that the University could have done more to retain the PI who moved elsewhere. Specifically, Dr. Nilsson indicated that he has made attempts to retain the PI that moved to Gothenberg and tried to convince the Faculty to offer a professorship to the PI. However, the handling of this issue by the upper management was too slow, an aspect that was also raised by other UoA in the context of other cases. While the moving of the researchers is normal and even desirable, in the case of this UoA the loss of a group weakened the whole structure of the UoA, particularly due to the low number of constituent groups. If it is planned that the UoA should continue as a discrete entity, detailed plans of expansion should be developed, and the sustainability of the unit should be properly thought out. Beyond mentioning the possible incorporation of two young investigators (one internal and one from the Broad Institute), no detailed description of plans to sustain this UoA were presented. It also was stated on several occasions (not only by Dr. Nilsson) that the UoAs were formed for RQ2020 purposes, to give the evaluators a target to assess. Dr. Nilsson stated that the partitioning of research groups into UoAs was imposed from above, and at least in this case was not based on input from the group concerned.

At the interview, Dr. Nilsson stated his ambition to recruit young PIs to reinforce the structure of the UoA. This would positively expand the PIs environment with complementary expertise.

He insisted in the lack of recruitment possibilities offered by LU as one of the critical aspects that restrained incorporation of novel talents.

- **Publication patterns.** The group of Dr. Nilsson publishes is journals of prestige in the field of translational genetics and in hematology. Those journals include Nature Genetics, Blood, EMBO Mol Med, Leukemia, and Nature Communications. The output in terms of publications is very good. Dr. Nilsson mentions in the report that the group would like to publish in even higher impact journals, an aspect that was also addressed in the interview. Dr. Nilsson presented an adequate strategy regarding how to achieve this objective. The panel appreciates this goal, and fully endorses the efforts to reach that objective that will be made by the group. In any case, the scientific output in terms of quality of publications of this group is very good.
- The balance between activities in research, education and external engagement. Research activities of the group of Dr. Nilsson are adequately presented. The group mainly works on hemopoietic cell formation and on blood cancer risk, with special interest in multiple myeloma. As mentioned above, the scientific activities in those areas, particularly those on population genetic studies are satisfactory. However, the report initially provided did not include educational or other external activities. With respect to education and training, we had the opportunity to speak to students, postdoctoral workers, as well as junior research associates in one of the interviews held in May. The overall impression was positive. All the researchers that participated in the interview, from PhD students to the most senior postdoctorals, expressed that their training was good, and they were basically happy with the environment of the laboratory. Perhaps, this set of personnel was among the most satisfied with their mentor and research group. The only concern worth being mentioned refers to the situation of

foreign postdoctoral workers, an issue that was raised by a senior postdoctoral that has now become a research associate. She indicated that the salary and especially the benefits offered to foreign workers represent a problem that not only affects this UoA but to the entire University of Lund.

The UoA interacts with clinicians and clinical study groups, for example clinical hematologists across the Nordic region and Nordic Myelom Study Group (NMSG). As far as public outreach, the activities of the group have been featured in national news media, for example when they discovered SMIM1 as the gene underlying the Vel blood group system.

• The overarching research strategy. The initial report offered limited information about research strategies. The report just mentioned that there are "major stories on the way out" but the general aims of the UoA/group were not detailed. Additional details were discussed at the interview. Dr. Nilsson explained that reinforcement of the research capabilities of the unit largely depends on two major aspects (i) the capability to obtain funding and access to research infrastructures and (ii) the attraction of novel competitive groups. In general, these two aspects are shared by other UoAs. After specifically asking about this, we obtained the following information: "We focus on how inborn genetic variation influences the human hematopoietic system, including blood cell formation and our risk of blood disorders. Towards this we combine unique population-based sample streams, unique technical platforms, advanced large-scale genomic approaches, and advanced bioinformatic approaches." That answer is rather a scientific expression of interest about future work, quite specific, but does not entirely fit with what a general research strategy is expected to be. This is of particular relevance if one expects that this UoA should be truly independent. An overarching research strategy therefore needs to be developed for the UoA.

#### **Collegial culture:**

- Opportunities for early-career researchers to develop their originality and independence. Dr. Nilsson has successfully formed a large and competitive research group. The number of groups within the UoA may increase in the future after successful recruitment as PIs of former postdocs of the group who have trained abroad, especially at the Broad Institute. The possibility of offering attractive starting packages is restricted by the limited opportunities provided by LU. At the interviews, representatives of the Faculties did not sufficiently clarify the scheme that LU uses to incorporate scientific talent.
- Sustainability and renewal of research strengths. The UoA is actively encouraging early-career researchers to develop their originality and independence, including at the Ph.D., postdoc and assistant researcher levels. At the moment, the group is coaching two assistant researcher-level investigators to develop their own, independent research program (one female researcher who has done a 5-year postdoc within the UoA and one male researcher who has been recruited back to Lund after a 2-year postdoc at the Broad Institute). Dr. Nilsson indicated that the ambition is that these two researchers will develop independent programs within the UoA within approximately 2 years.
- Academic networks and collaborations outside the unit. The group of Dr. Nilsson has established collaborations with national as well as international groups/institutions, most notably with the Broad Institute (USA) and the deCODE Institute (Iceland). These collaborations appear successful in terms of publications.
- Diversity, integrity and ethics. After the May virtual meeting, in which we did not have time to fully address this, we sent a question about this to Dr. Nilsson. The answer we received was: "According to standard policies and Swedish law".

After the sending of the panel report to the University of Lund, Dr. Nissson added some additional comments to clarify these points: "I explained that the UoA is markedly international, and is comprised

of individuals of highly diverse scientific backgrounds, and originate from many different parts of the world (with Swedes representing only about 20%). Foreign nationalities in the UoA include India, Italy, Denmark, Catalunya, Basque Country, Iran, Greece, Nepal, Austraila. Further, I explained that the UoA actively seeks to maintain a gender-balanced environment (target between 30-70% to 70-30% M:F; currently about 65% women and 35% men). Finally, I explained how the UoA actively seeks to maintain a multi-disciplinary atmosphere, and engages people with a different technical expertise, ranging from clinical to computational to experimental. As for integrity and ethics, this is of course maintained in agreement with standard policies and Swedish (and European) law, as everywhere else!

• Quality in applications and publications. The group of Dr. Nilsson is well financed and has obtained funds from national as well as international sources (ERC). The group is sufficiently competitive as to attract additional funds that will help both the group and the University. Because of this, one of the recommendations to this group is to increase its participation in international consortia that may result in increased funding. Plans to obtain funding from other EU programs should be made. In addition to augmenting group and University funding, this will help to increase the prestige of the University. Moreover, increasing participation in European projects may counteract the problem of the scarcity of funding opportunities available to mid-career researchers in Sweden that were mentioned by the PI.

With respect to publication quality, as mentioned above, the group publishes in quality journals and the number of publications/year is very good. As would be expected from a group of this profile, its aspiration to increase the quality of the publications is laudable and possible. To achieve that, the group should receive adequate support from its environment.

## Quality ecosystem:

- Research strengths and how these are reflected in the educational portfolio. While research is of unquestionable quality, the educational aspects of this group, including to which extent research impacts on education, was not covered in the report provided, but was briefly discussed in the May interview. Dr.Nilsson indicated that he regularly participates in teaching of the medical program As mentioned above, the interview with the members of the laboratory, from the most junior PhD students to the senior postdoctoral workers, offered a satisfactory view regarding the training of personnel was adequate. Therefore, in terms of formation of human capital, the group offers a satisfactory impression.
- How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research. As mentioned elsewhere in this report, the group of Dr. Nilsson has fluid collaborations with national as well as international groups/institutions. Such interactions, especially those with the Broad Institute (USA) are expected to be reinforced, as suggested in the report provided to us. The panel considers this very positively, given the important role of the Broad Institute in the cancer research field. The group in general is active in pursuing international collaborations and this increases visibility as well as their capability to obtain competitive funding from both at national and international calls.
- How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration. As commented above, Dr. Nilsson stated that they adhere to *"standard policies and Swedish law"*. See also his comments on diversity, integrity and ethics (above).
- How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere. Dr. Nilsson commented that the activities of the UoA are facilitated by (a) infrastructure created by their own lab, particularly a unique platform for high-throughput phenotyping of blood and immune cells

and an advanced flow-sorting facility; (b) infrastructure available at the University Hospital, including unique high-volume population-based sample streams (e.g., cord blood samples in large numbers and national sample biobanks for blood malignancies); (c) infrastructure available at Lund Stem Cell Center (e.g., lentivirus vector core); (d) infrastructure for bioinformatics created by his group in collaboration with Mauno Vihinen ("Lund University Bioinformatics Infrastructure", LUBI); (e) sample biobanks from other Nordic countries (e.g., biobanks with multiple myeloma samples in Denmark, Norway, and other hospitals in Sweden); (f) world-class genomics facilities at deCODE Genetics (Reykjavik; available on a collaborative basis); (g) world-class genomics, bioinformatics and drug screening facilities at the Broad Institute (Cambridge, MA; available thanks to the fact that the PI (Dr. Nilsson) remains a Broad affiliate since 2008).

• If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized. The group is part of the Lund Stem Cell Center and collaborates extensively within the center and with other groups in Lund and with clinical units in Region Skåne. Additionally, they have continuous collaborations with several national and international entities, particularly with deCODE Genetics and the Broad Institute but also with multiple other academic and clinical institutions (e.g., in London, Heidelberg, Rotterdam, Little Rock).

## Recommendations

- A critical aspect of this UoA is its composition. It is comprised of a single research group. While we all agree that the scientific output of that group is excellent, relying on just one group represents a clear weakness of this UoA. The research of the unit is just that of the group and if something would happen to the group (e.g. moving elsewhere) then the UoA would collapse. For that reason, a serious consideration of a research strategy, especially for growing, needs to be implemented.
- One of the groups that initially belonged to the UoA, the Hanson's group, moved to another Swedish University. The impression of the panel after interviewing the head of the UoA is that Lund University failed to retain that group. The University should do its best to prevent losses of key groups such as this one. Apparently, the reason for that moving was a slow response from LU to a request for the academic promotion of Dr. Hanson. He obtained an important funding from a Swedish Cancer Research Fund, which included full support for 6 years of an academic position, but the Faculty of Medicine failed to offer a permanent position, and the researcher decided to move.
- Starting packages should be offered by LU. Selective processes should be clear and accompanied by a scientific trajectory to facilitate incorporation of talented scientists.
- Recruitment of postdoctoral workers, especially from abroad, needs to be improved. The conditions in terms of salary and especially benefits are not always adequate: foreign postdocs do not generally have unemployment coverage and other rights that are, however, endowed to predoctoral workers in their working contracts.
- While the head of the UoA has succeeded in obtaining good external funding during the last years, he identifies problems for middle-aged and late-career researchers in terms of the limited availability of Swedish-based funding. That situation threatens competitiveness and even survival of established research groups. As the group is highly competitive, it should increase participation in EU-funded programs.
- LU should support and encourage young and middle-aged researchers in the search for external (EU, international) funding. Offices coaching scientists should be very active, as groups as the one headed by Dr. Nilsson and other young scientists could be highly competitive in the international arena. Administrative support is recommended.

- In general, PhD students were satisfied with their training and research environment. Nevertheless, they commented that the timing and content of graduate courses should be better tailored to their needs.
- There was a quite general complaint about the requirement of a number of papers to allow completion of the PhD. degree Prioritization of quantity instead of quality was identified as a problem. This is a situation that should be re-evaluated by LU. For example, the requirement for a specific number of papers could be reduced if PhD students are able to publish one or two good quality papers, rather than having to publish four lower impact papers.

## 2D Translational cancer research I

The UoA Translational Cancer Research I consists of 13, relatively small research groups located at Lund mainly at the Medicon Village site. The majority of these groups is part of the Division of Translational Cancer Research (a unit in the rather large Department of Laboratory Medicine). Several of the groups moved in 2012/13 from Malmö to Lund to acquire better lab space, which became available at the former Astra Zeneca campus (now Medicon Village). The groups are relatively close to the Lund site of the Lund/Malmö University Hospital, to the Stem Cell Center (a substantial infrastructural foundation) and to companies at the Medicon Village site. The UoA has generated an elaborate, careful and reflective self-evaluation, which clearly points out strengths and weaknesses, as well as issues to be addressed for future development.

Leadership:

- Priority setting, including goals for external research funding. Leadership at the UoA appears strong and transparent. The UoA has been very successful in grant acquisition, which increased in the last years to external funds of 43.4 Mio SEK/2018 (~0.7 Mio SEK/capita). The priorities for these applications are largely set by the individual group leaders. There have been partially successful joint applications for joint equipment, and there are also some ideas on joint grant applications in the future. Lack of core funding makes it difficult for the UoA to set research area priorities and the heavy reliance on external grants means that the grant providers dictate thematic developments.
- Recruitment, promotion and succession. The UoA has recruited six independent researchers from 2014-18. This recruitment was entirely or largely based on external funding, which was acquired by these persons through grant applications. Apart from quality of research and the aim to complement the methodological repertoire in the UoA, it is not completely obvious from the report, which strategic considerations were the basis for the recruitments except excellence and productivity. Several of the group leaders used the designation "research hotel" for the LU structure, indicating a great deal of spontaneity and freedom in terms of research areas, but also emphasizing the lack of an overarching research strategy and the minimal local financial support at the site.

Based on a very much emphasized collegial atmosphere (report and interviews), there is a very good network for supporting the transition of junior fellows to PIs by providing joint equipment use, joint utilization of lab managers, some financial support by established PIs (e.g. for space rent), co-supervision of Ph.D.s by established PIs, and joint seminars. However, even for very successful young PIs, there is no clear career perspective at LU, given the complete absence of tenure-track positions or a clearly defined career path. This puts a high psychological pressure on the PIs, which appears detrimental to research quality. Furthermore, the "Docentship" system and its requirements to some degree also represent a distraction from generating high quality research output, but is

required for promotion, and for supervising PhD students. Moreover, inefficient bureaucracy and the administrative burden impedes career development, particularly for junior PIs.

Despite the very good research environment, recruitment of excellently qualified postdocs seems to be difficult.

It remains unclear how succession of elderly PIs upon retirement will be managed. Again, the lack of core funding is a problem. Upon retirement, tenured positions revert back to the faculty, rather than remaining available to the UoA so that the retired PI can be replaced. This poses potential problems in terms of stability, continuity, and the ability of the UoA to steer in a particular strategic direction. Nevertheless, the UoA has managed to maintain a critical mass of PIs after the retirement of experienced professors through the recruitment of new junior PIs.

• **Publication patterns.** The UoA has an excellent publication record. In the highest-ranking papers, members of the UoA have in ~50% a leading role. Collaboration within the UoA, with other entities of LU (Clinical Genetics of particular importance) appear instrumental. Some of the high-ranking papers were obtained by contributions to large international consortia, also indicating the visibility of research in the UoA. The UoA has analyzed and emphasized the generally better quality of collaborative papers (mean IF 8.7; n=23) vs. single group papers (IF 5; n=43). The publication requirements for Ph.D. students to complete their studies were indicated as forcing premature completion of projects, thereby reducing the quality of output. Regulations for Ph.D. thesis state: *"..generally required to have been involved in writing three to four papers of which two are to have been published or accepted. The doctoral student is to be the sole first author of one of the published/accepted papers as well as first author for at least one of the other papers."* In fact the quantitative measures regarding PhD theses were felt to incentivize premature publication of low-quality papers rather than supporting high-quality, multi-authored studies.

While research output in terms of quality of publications is very good, one of the ambitions of the UoA is to increase the quality of publications. That is reasonable and speaks very well about the intention to continuously improve.

- The balance between activities in research, education and external engagement. Teaching undertaken by the UoA PIs does not appear to cause a work overload. Given that teaching is a requirement for academic promotion, there even seems to be a shortage in teaching opportunities for some PIs. The UoA has been active in creating specialized teaching programs (MSc. Biomedicine, special courses Advanced Cancer Biology, Ph.D. courses) based on its specific expertise. This has helped in recruiting qualified students to the labs. The UoA also contributes to teaching in the Medical school for a number of courses, and to teaching at the Masters level. The UoA report states that many of the key educational activities in cancer research in Lund emanate from the UoA. While qualified Ph.D.s are welcome in the labs, the increasing volume of courses that the students need to take, together with the need to guarantee virtually all of the 4-year salary is considered to be a disincentive for PIs to take on PhD students, and the system is clearly in need of reform.
- The overarching research strategy. Although several of the topics that are successfully investigated in the UoA could form the basis of an overarching research strategy, no such strategy has been developed. As a consequence, research in the UoA tends to be fragmented into many topics. In the absence of an overarching research strategy, the PIs aim for flexible collaborations and joint use of infrastructure. There appears to be no incentives at all, and little financial possibilities at the Department or Faculty level to initiate overarching research. This is instead entirely left to the external granting agencies (e.g. Swedish Research Council/ Scientific Council for Medicine and Health, Wallenberg foundation), who launch at times larger programs or "steer" by their individual funding policy. As the Faculty of

Medicine indicated in response to a related question of our panel: "The Scientific Council for Medicine and Health surveys, evaluates and develops strategies for the area, and performs regular research overviews.

and Health surveys, evaluates and develops strategies for the area, and performs regular research overviews. The Scientific Council goes to great lengths in maintaining a strategic dialogue with the medical faculties in Sweden." "The Wallenberg Foundation prefers to operate by personal contacts and selected individuals... The Foundation can also be approached by personal initiative and occasionally, faculty representatives are then invited." Clearly, there appear possibilities to influence the funding policy of the external agencies at the faculty level.

The interactions of the PIs with the Department leadership, and of the Department heads with the Dean are well functioning but are not involving the development of research strategies. Overtaking responsibilities at the Department level by PIs is not attractive because such duties are time consuming reducing available time for research, involve much administration and little budget, and there is no appropriate financial bonification.

The initiative of creating the Lund University Cancer Center (LUCC) appears to provide a potential basis for developing overarching research ideas but has only been created recently. The function of the LUCC appears to be that it should act as a "matrix" and administrative backbone that stimulates scientific exchange and lobbying for LU or external programs. Activities of the LUCC are also intended to increase transparency in developing research strategies. At this point, the financial possibilities of the LUCC are quite limited. The long-term funding perspectives for the LUCC also appear to be in doubt.

## **Collegial culture:**

- Opportunities for early-career researchers to develop their originality and independence. The interviews clearly indicated that the PIs in the UoA are generally very happy with the overall collegial culture. The degree of freedom to select research themes together with access to equipment and facilities allows PIs to satisfactorily develop their research interests. A strong enthusiastic spirit was associated with the move of several groups from Malmö to the new premises at Medicon Village, which continues to persist. The group leader interviews generally indicated enthusiasm about their research and satisfaction with the environment, with some exceptions that need to be noted:
  - The lack of tenure track options, the slow processing of all issues related to academic advancement (e.g. promotion to lecturer, filling of open faculty positions) is a big problem. Insecurity regarding future options creates stress for most of the PIs, which is likely to have negative impact on research and strategic thinking. This insecure situation is also noticed by postdocs and Ph.D. students, and acts as a disincentive that discourages some of them early on from pursuing an academic career.
  - The ever-increasing burden of administrative work, which is partly attributed to the centralization of administrative staff, and partly due to unnecessary administrative requests.

The postdocs and Ph.D. students who were interviewed generally reflected very positively about the research environment. It was evident that they strongly benefit from good communication (e.g. they were well informed about career training offers) and a helpful and supportive scientific atmosphere.

• Sustainability and renewal of research strengths. As mentioned before, the UoA takes care to establish contemporary technology that complements the existing methodology through recruitments. The renewal of PIs suffers obvious shortcomings: There is a strong prevalence of Swedish PIs, in part caused by the pursued "budding" of groups from existing groups, by lack of attractive start-up packages, and by lack of strategic concepts underlying the recruitments. Narrowly defined topics for

any PI positions that are advertised also tends to foster "inbreeding". Several aspects of the academic career procedures (e.g. teaching and language requirements) create additional barriers for foreigners to enter the system. As pointed out elsewhere, the lack of a dedicated core budget for the UoA also represents a threat to the renewal of research strengths and long-term sustainability.

- Academic networks and collaborations outside the unit. The UoA has strong links to industry, which should likely foster research translation. Many of the PIs are engaged in company advisory boards or were founders/co-founders of companies. A range of collaborative research projects with external academic partners and commercial enterprises have also been established. These collaborations could be better supported by LU through the timely conclusion of agreements with the collaborating companies. The clinical collaboration is generally judged as very good and seems to function excellently. The Lund Stem Cell Center is also a very much appreciated partner in collaboration.
- Diversity, integrity and ethics. Clearly, the UoA needs to improve diversity based on national origin and gender. The majority of PIs are Swedish males, who have in part a common scientific history (through the "budding" scheme). While tenured PIs are all male, non-tenured PIs show a reasonable gender balance (4 male, 3 female) indicating that a possible gender bias exists when tenured positions are filled. The PIs are aware of the gender imbalance but consider it difficult to address. Furthermore, due to the aim of trying to achieve a gender balance in faculty committees and other administrative activities, female PIs spend more of their time with such administrative duties than their male counterparts, placing them at a competitive disadvantage when applying for tenured positions that are given based on parameters such as research outputs.

The implementation of groups led by international scientists educated at leading institutes would be desirable but appears difficult due to lack of attractive employment conditions. The UoA houses coworkers with 19 different nationalities, indicating that diversity is present, but not necessarily at the highest leadership levels.

Integrity of research and preventing scientific misconduct are well integrated into the Ph.D. training programs. Also, the collegial scientific culture in the UoA is described as excellent, for example through discussion in seminars of research ideas and data already at an early stage of project development, thereby beneficially correcting potential misconceptions and interpretations.

An obvious ethical issue is the payment structure: Ph.D. students get paid regular salaries with social benefits, postdocs get mostly scholarships – provided they are foreigners – which do not provide social benefits, placing them at a material disadvantage. Swedish postdocs are not eligible for scholarships. This may be considered as an unethical imbalance.

• Quality in applications and publications – See above.

#### Quality ecosystem:

- Research strengths and how these are reflected in the educational portfolio. The UoA has translated its expertise into teaching, notably in the MSc. program Biomedicine, in the special courses Advanced Cancer Biology, and with participation in the courses at Medical School, such as Problem Based Learning (PBL) seminars.
- How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research. Many PIs reported that external collaborations with startups and pharmaceutical companies play an important role in their research portfolio. This is also underscored in the long list of companies the UoA PIs own or collaborate with. Collaborative research was seen as being very important for maintaining research quality, for example in terms of the quality of publications.

- How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration. These issues were not addressed in the self-evaluation or interviews, less relevant perhaps.
- How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere. The UoA has made successful use of several important infrastructures in Lund or within the unit. These include the in-house animal facility, a recently acquired high-end imaging facility, an MS-facility at Medicon Village, high-throughput sequencing at the Center of Translational Genomics (CTG, a SciLifeLab infrastructure). Another excellent infrastructure available to researchers at the UoA is the SCAN-B Biobank for mammary cancer samples and data. Long-term sustainment of these facilities appears extremely important, including the availability of trained personnel for supporting the users. In addition, the UoA has made joint applications for infrastructure funding (e.g. FACS sorting) and will continue to do so. The limited access to SciLifeLab platforms in the Uppsala/Stockholm area is considered as a problem. The University and Faculty are requested to address this problem at the political level.
- If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized. The UoA will only for a very limited residual time profit from the SFO Biocare, which was terminated after midterm evaluation. This is unfortunate, given that basic cancer research generally deserves a high priority. The recently formed LUCC is intended as successor of the SFO Biocare but is currently equipped only with limited funds from the Faculty to maintain and develop a scientific network. Given the high standards of basic cancer research in Lund, an eventual re-consideration of creating an appropriate SFO with national funding appears desirable and if worked properly by the University, achievable.

## Recommendations

- Overall, basic cancer research at the UoA 2D has been rather successful, indicating that the previous structure and supporting policy was to a large extent functional, despite concerns about the supporting policies. However, given the increasing complexity of high-level cancer research, improvements appear to be required if future needs are to be met. Overarching research strategies, generation of scientific consortia/larger research groups, efforts to attract excellent researchers from abroad, and sustaining contemporary infrastructure should be tailored to meet these requirements.
- Strategic plans for development of research directions and disciplines appear required to support the recruitment, funding and infrastructure development. They should complement the currently prevalent bottom-up initiatives, and may be proposed by the UoA and notably the LUCC, but need to be adjusted and pursued at Department and Faculty level, including lobbying at the level of policy and granting agencies.
- Bonus systems for success in grant acquisition and publication by Faculty/Departmental funding may help the stability and growth of some excellent research groups to a size enabling larger-scale projects.
- In many aspects, there is an excellent infrastructure existing and accessible to the UoA. The joint activities of the Medical Faculty with the Faculties of Science and Engineering for establishing such infrastructure are to be appreciated. However, the available funds for infrastructure funding at Departmental and Faculty level, while not negligible, appear insufficient for a sustained development. Re-installment of a strategic research area "basic cancer research", and better access to SciLifeLabs outside the Lund/Malmö area should be aimed for at the Department/Faculty level.
- The generation of some tenure-track positions with attractive start-up packages will be instrumental in enabling recruitment of leading researchers both among the excellent PIs, and importantly from abroad. This may require restrictions on the number of groups of the UoA.

- Some degree of decentralization of administrative personnel from the Department level to the Division(s) is strongly recommended to relieve administrative pressure on PIs in the UoA.
- The rules for Ph.D. thesis need reform to allow PIs/Ph.D. students carrying out ambitious and collaborative projects (quality instead of quantity, shared 1<sup>st</sup> authorships on high-impact papers valued). Time spent by Ph.D. students for their educational courses needs to be covered by LU funds.

## 2E Translational cancer research II

We wish (The Panel) to indicate that Dr. Karin Leandersson suggested, after reading the former version of this report, that the name of this UoA should be **Translational Medicine**. As the name of the UoA was given to us, we prefer to maintain the original one.

## Leadership:

Malmö has several strong advantages as a location for cancer research. Firstly, private foundations support cancer research in Malmö every year with around 10 Mio SEK Furthermore, interaction with clinicians is very easy as the research labs are located in direct vicinity of the hospital and clinicians are also eager to interact with basic cancer researchers. Finally, good research infrastructure for cancer research, which was a shortcoming in the past, now exists. However, this UoA has been reduced strongly in recent years by the move of many cancer researchers from Malmö to Lund and by retirements. The remaining groups are locally scattered and meet only once a year during a retreat. This unfortunate splitting of the cancer research in Malmö is not expected to be changed in the coming years, as the department leaders explained, due to other prioritized building projects and severe financial restraints.

In general, all PIs interviewed expressed severe frustrations with respect to the strategic development of Malmö cancer research and their possibilities of influencing it. The evaluation group considered this subdued atmosphere as very serious problem that urgently needs to be improved. The average group size is small and most of the PIs have mainly focused on "surviving", i.e. obtaining sufficient external funding to keep a research group running. It is very important to improve this spirit in particular as new retirements are expected soon. All researchers approached perceive the absence of financial research support from the department or faculty as a serious problem. This includes the fact the PhD student salaries now have to be paid now nearly exclusively by the PI.

A larger average group size will increase synergism within a group and result in more effective and higher quality of research. It will also facilitate the maintenance of knowledge and technologies in the group.

There is no overarching research strategy for this UoA and no vision for its development, be that at the level of the PIs as a group, the department, or the faculty leadership. The department has no money for start-up packages that can be used to recruit additional cancer research groups, while there is a wish to hire new cancer researchers.

Prof. Karin Leandersson is highly engaged in the newly formed LUCC and is hoping to use the LUCC to bring cancer researchers in Malmö and Lund closer together, which is an excellent initiative.

The current groups in the UoA are publishing regularly, but in most cases not in top journals, which makes it difficult to obtain highly competitive grants. A strong publication record is in the field of urological cancer. Few publications in the last five years have been together with other groups in the department, indicating internal interaction. In general, the acquired external grant volume of the UoA (20 Mio SEK in 2018) could be improved.

Teaching is carried out in order to obtain income for salaries and research. Teaching opportunities are present, though maybe not always to the extent requested by individual PIs.

All PhD students and post docs interviewed were very happy with the support they received from their PIs for their research project and with guidance and mentoring for future careers. However, none of them is planning an academic career, a decision that might be influenced by the problems the PIs are facing.

PhD students appear to have an ever-increasing load of courses, which reduces their time in the lab and their chances of obtaining high impact publications.

LU is offering a number of career-promoting courses for post docs. This is an excellent initiative and should be a positive stimulus for choosing LU as a site for postdoctoral studies. However, not all post docs, particularly those in smaller groups, are aware of these opportunities. It would therefore be good to introduce all post docs immediately after starting their job to these possibilities. Along that line it would furthermore be helpful to introduce all new personnel to the core facilities that are available at LU, both at the Malmö and the Lund campus.

#### **Collegial culture:**

The lack of daily interactions due to the scattered research labs makes it difficult to generate a strong group feeling amongst the cancer researchers in Malmö. Some of the premises are old, small and outspread as well as crowded. This naturally hinders meeting of different groups and their cooperation and was said to be a real obstacle for setting up new research groups, as additional lab space is not available. The construction of a physical Malmö cancer center would probably have the biggest positive impact for the future development of cancer research in Malmö, perhaps very much in connection with the hospital.

Strategic hiring of at least one excellent cancer researcher with a meaningful start-up package would have a strong positive impact on the general spirit and will enhance research quality in general, due to new ideas, new techniques, and more high level scientific discussion. This would result in an increased quality of applications and publications and more collaborations. Without such hiring there is a risk of a further decrease in groups and moral. Moreover, lack of space makes hiring new personnel difficult. In contrast to the Lund Translational Cancer Research UoA, the one in Malmö appeared threatened by a sense of impotence to increase its research capabilities.

The LUCC is a very new initiative of yet unproven value, but the general ideas of increasing transparency and visibility of cancer research at LU, of integrating both Malmö and Lund cancer research, and of optimizing synergistic use of resources and core facilities are very much in the interest of Malmö cancer research.

The cancer researchers in Malmö have a good percentage of female PIs. For some but not all female PIs interviewed this was considered to result in a work atmosphere that is preferable to the nearly all-male cancer research environment in Lund.

Diversity with respect to gender, nationality, and scientific background is very limited. Many scientists did their PhD at LU, stayed for 2-3 years abroad, and then returned as young PIs to the department where they originally obtained their PhD. This "budding" might create a pleasant homogeneity, but will often limit the quality of science as less new ideas, technologies, and thinking are introduced. New hirings should try to break this system.

#### Quality ecosystem:

An obvious matching between research strengths of the UoA and the teaching responsibilities was not observed. However, this is due to the relatively large number of cancer researchers at LU in comparison to the teaching hours in the curriculum on that subject.

A severe threat to the quality and quantity of research work is the high amount of administrative duties the PIs have to perform. In particular, frequent reports and documentations, as well as a complete lack of help for low-tech tasks like room booking for PhD thesis defense etc. Clearly, this is not an efficient use of the working time of highly qualified PIs.

A problem for producing high quality publications from the work of PhD students is the thesis requirement for at least one first author and one shared author publications that are accepted plus two manuscripts. This requirement is forcing PhDs and PIs to slice one publication that could be published in a high impact journal into several publications in lower impact journals. This does not make scientific sense and drastically reduces the chance of funding for the PI as well as career opportunities for the PhD student, since the international scientific community considers a few high impact publications to be more important than several low impact ones. This favoring of quantity instead of quality in basic cancer research is clearly reducing the chances for sustained research support and thus the chances for high quality research.

There are multiple strong interactions between the basic cancer research in Malmö and the clinic and the alignment of clinical and basic research interests is also high on the agenda of the department. These easy contacts are clearly a great strength of the cancer research in Malmö compared to Lund, where the groups in Medicon Village have to be more active to meet and collaborate with clinical cancer researchers.

Cancer researchers in Malmö have access to relevant infrastructure in Malmö and also in Lund, although due to the physical distance not all of the infrastructure in Lund is of practical use for the researchers in Malmö. An important infrastructure in Malmö is the tissue microarray (TMA) facility, which is widely used.

The Malmö cancer research groups took part in the BioCARE SFO, which unfortunately was not prolonged. Some of the aims of BioCARE should be taken over by LUCC. It is excellent that the faculty has decided to support LUCC to facilitate interaction and cover certain administrative expenses. LUCC will also be a chance to increase synergistic interactions between Lund and Malmö and to overcome established reservations on both sides, which at least by some scientists is described as very severe. A strength of the cancer research in Malmö is the successful work on urological cancers, which may form the basis for collaborative grant applications, the chances of which would be further fostered by interactions between the Lund and Malmö sites that could be facilitated through the LUCC.

Malmö cancer research also has a strong record in industrial interaction, e.g. on Wnt5 antagonists as antimetastatic agents, that hopefully continues despite the upcoming retirements. Very good support by the Faculty in legal matters associated with company interactions was mentioned in the written report by the section head.

There is a poor record in attracting external talents to cancer research at LU in general, including the Malmö location despite the attractive location of the greater Lund-Malmö-Copenhagen area. This reduces the quality of research and needs to change if LU has the ambition to improve. Start-up packages or tenure-track positions could increase the chances of recruiting excellent young scientists who come with a grant of their own. In addition, it would be good to have all administrative forms and information available in English and also to conduct also administrative meetings in English if this is necessary to facilitate the participation and integration of foreign scientists.

## Recommendations

To overcome the challenges described above, we suggest several activities at the level of the PIs, the department, and the faculty.

• Regular monthly meetings of the PIs either physically or by Zoom, and regular seminars of group members and invited speakers. This regular interaction is more important than a yearly retreat and might be financially supported from the money dedicated to the retreat.

- Active participation of all Malmö cancer researchers at LUCC. Zoom meetings with LUCC partners
  in Lund will avoid the burdensome and time-consuming traveling to Lund or Malmö. There was a
  perception that the groups in Lund and Malmö do not synergize effectively. Interaction between the
  sites should be fostered as it will likely result in an increase in competitiveness of the groups at both
  locations.
- Reduction of administrative reporting requirements. Perhaps some of the reporting could be done using online forms with multiple-choice boxes to tick or with numbers if a rating/ranking is required. Only five shortlisted candidates for a position should be evaluated in more detail. To rank and comment on all candidates is mainly a waste of time and not done at other comparable research institutions.
- More flexible PhD thesis requirements with a focus on quality instead of quantity. Maybe different requirements for MD and non-MD PhD theses could be considered, since impact factors of more clinically-oriented journals and the number of publications in the case of MDs are not comparable to the outputs of non-MD PhD theses.
- Concrete planning of a Cancer Research Center (building) in Malmö that brings together all cancer researchers, perhaps supported by private+health care system, together with LU.
- Strategic hiring of an excellent cancer researcher with a lighthouse-function for the cancer research in Malmö. If a building to host all cancer researchers is constructed, that could represent an excellent opportunity for hiring a high level strategic director
- Tenure-track positions and start-up packages for young PIs in cancer research. The future panorama for the young researchers must be optimistic and a highly positive environment with respect to stable positions and a structured scientific career should be in place.
- An ambitious and active research strategy for the cancer research in Malmö at the departmental level. In order that the department can be more than a "science hotel" (citation) passively watching from the sideline, the department needs a budget for strategic support. A long-term measure to achieve this with a restricted budget could be to decrease the number of professors. Maybe after the upcoming retirement of two professors, the salary for one position could be transformed into strategic money for cancer research in Malmö. Short-term solutions could be to increase the percentage of the overhead that stays with the department, or to reduce the percentage of the PI salary that is covered by the faculty.
- Mandatory introduction of all PhD students and post docs to core facilities and training courses available at LU immediately after hiring.
- Standardize the use of English in forms, information, and official meetings to facilitate participation of non-Swedish talents.
- Reduction in the time the PhD students have to spent in courses and in assisting as pseudo-technicians for core facilities.

# Overarching recommendations that concern multiple Units of Assessment

## 1. Requirements for PhD degrees and the "Docent" qualification.

The rules governing the requirements for a PhD degree dictate against research quality through favoring the quantity of publications, in part due to the dominance of clinicians in deciding the requirements for a PhD degree. One sizes does not fit all. Students have to take many courses, all before the mid-term review. Not all courses are "high content", or are relevant for the needs of individual students. The research time taken out for the courses (several months), is paid by the supervisors who are invariably reliant

on external funds. External funding bodies are starting to refuse to pay for study courses, and only pay for research. It is therefore unattractive to hire a PhD student due to the higher costs than a (foreign) postdoc on a fellowship, and the fact that funds for PhD students have to be guaranteed for 4 years. The demand for a 4-year guaranteed funding for PhDs has resulted in a 50% reduction in the number of PhD students. Rules for PhD degrees are constantly changing, the number of courses required is increasing. The reasoning behind the requirement for 3-4 papers, with at least one first author, was reported as follows: (i) students need to see the whole research process from project inception to paper publication; (ii) several papers are necessary to prevent "quickie" PhDs (especially from clinicians) through low-level publications.

A more flexible approach in terms of PhD requirements is needed. High value and relevant coursework needs to be developed, that can be studied in a time-effective manner. Central funding to cover the coursework time needs to be provided. The demand for a guaranteed four years funding needs to be reconsidered. Publication requirements that allow quality to compensate for quantity should be implemented. A possible solution to this latter problem - that would also fulfil the apparent aims of the current publication requirements - would be to mandate a single first author paper, with a minimum impact factor. Another aspect to be studies would be that of segregating clinical from non-clinical PhD/MDs in terms of output (papers) required to access to the final PhD degree.

The "Docent" qualification is required for PIs to act officially as PhD supervisors. To gain this qualification, mandatory courses and hours of teaching are required. The "Portfolio" requirements for the Docent qualification also foster low level publications rather than quality outputs. Again, this system needs to be re-evaluated in order to improve quality over quantity of publications

#### 2. Malmö.

Historically, the dominance of a leader in Malmo polarized the research community. Five research groups left and moved to Lund. While the remaining Malmö Cancer Research has a good gender balance this is not the case with the groups that moved to Lund. Fear for male dominance was at least for one scientist a reason not to move to Lund, which is noteworthy taking into consideration the strong focus of Lund University on equal opportunities in research careers. Malmo and Lund collaborate at individual levels, but there is a systemic problem – as evidenced by two U<sup>s</sup>oA for translational cancer research. This issue urgently needs to be addressed to ensure that optimal synergy is achieved in this research area, that resources are capitalized on effectively, and that a vibrant and forward-looking research environment is fostered.

#### 3. Administration.

There has been an increasing tendency to centralize administrative positions, leaving researchers without local administrative support. At the same time, the administrative burden has increased on researchers. A lot of the demands on researchers are excessive (e.g. salary review three times per year), or are of limited value. Decision-making processes are inefficient, which has resulted for example in the loss of key PIs. Lund lost BIOCARE not due to poor science but due to poor administration. A root and branch stream-lining of administrative procedures is needed. Centralization is not efficient and should be fixed. Overheads need to be used more effectively to foster research quality. Those PIs that fund their own salaries should not have to take over administrative tasks for the faculty. "The administration is divorced from reality, and just defends laws and regulations rather than serving scientists." (citation from the interviews).

## 4. Limited possibilities for strategic development and self-determination by U<sup>s</sup>oA

U<sup>s</sup>oA do not have real self-autonomy due to low levels of central funding. Very little central funding is provided at the faculty level or by Lund University. University professorial positions are lost to departments upon retirement of the incumbent. U<sup>s</sup>oA cannot therefore determine their thematic development. Most groups are almost completely dependent on external funding. Thus, it is the agenda of external funders that actually dictates the strategic thematic development in the UoAs. However, the faculty expects that all strategic decisions are made at the departmental level.

Lack of recruitment possibilities or a thematic development strategy was clearly an issue for more junior PIs. On the other hand, some of the more senior permanent leadership expressed that view that "free research" without prioritization of topics or areas is the best approach – the best scientists should get the money.

These observations indicate that there is clearly a need for logical joined-up leadership at all levels, with a common strategic development strategy that considers the needs of all stakeholders. Without improved central support, meaningful strategic development is unlikely to be realistic at the departmental level. Therefore, strategic planning and identification of important research fields is desirable.

#### 5. Gender equality, diversity and ethical issues.

U<sup>s</sup>oA have little possibility to influence leadership recruitments in terms of gender equality due to reliance on external funds – the funder choses the successful candidate. Currently there are fewer female than male PIs. This places female PIs at a disadvantage compared to their male colleagues due to demand to maintain a gender balance in committees and other administrative bodies. This imposes a disproportionate demand on the time of female PIs for administrative tasks, placing them at a disadvantage when applying for promotions or permanent positions that are given on the basis of research output and performance. Measures to ensure gender equality and a fair level playing field for female PIs need to be considered.

The current recruitment system fosters academic inbreeding. Swedish PhD graduates go abroad for postdoc, then are recruited back to Lund. The faculty demands that topics for PI positions are very narrowly defined in job adverts, which tends to lead to nepotism. Successful lab heads recruit back former PhDs / postdocs, leading to dependent hierarchical structures. Strategies to break this cycle, encourage PI diversity, and ensure that fresh intellectual blood and the best of talent is continually flowing into the U<sup>s</sup>oA need to be developed.

The funding of foreign postdocs with fellowships that do not include social benefits is considered ethically questionable and needs to be fixed.

#### 6. Poor career prospects and job insecurity

Currently there are many small research groups, which results in poor stability, and generally leads to low impact research. All groups are considered good, none are rated as poor. Resources are therefore spread very thinly. There is no reward for good performance or success. In general, there are too many PIs for the resources that are available. There is no defined tenure track or career path for junior PIs. Only a very limited number of permanent positions are open for applications across the faculty. This state of affairs means that the university has become a "research hotel" that offers uncertain and insecure career prospects, particularly for incoming junior PIs. These issues need to be addressed to ensure effective use of limited resources, while offering attractive career prospects for incoming PIs (increasing the competitiveness of LU in the recruitment market) and fostering the best talents.

#### 7. Public outreach and societal impact

The dissemination of research results to society is one of the aspects that should be taken care of most for the future, as well as the societal impact of the research performed at universities and other institutions. These are critical aspects in the face of the modernization of research and its adaptation to the requirements of the general population. In several EU calls for research projects, the societal impact and the dissemination of research results to the public have become relevant aspects within the general qualification that transnational research projects receive.

# Cancer, Clinical

## Panel overview

This panel includes all research groups within the current Department of Oncology and Pathology.

The scope of research is clinical and experimental oncology, pathology and cancer epidemiology.

Physically, these activities are located at the clinical Department of Oncology, at Skåne University Hospital, research facilities close to the hospital (the Kamprad building), at Medicon Village (former AstraZeneca site) and at the Biomedical Centre (BMC).

In the clinical department, there is access to a unit of clinical research, with coordinators and research nurses, involved in clinical trials, both academic and industry-sponsored. The hospital has recently applied for membership in OECI, with the ambition of receiving accreditation as a Comprehensive Cancer Centre.

From 2020, the Department of Oncology and Pathology (both clinical and experimental oncology) will be restructured, and divided into 17 independent research groups, responsible for their own staff and finances. The groups will be grouped within a newly constructed Division of Oncology, with common activities, such as common seminars, PhD student activities, responsibility for teaching, and shared equipment.

All research groups within our division will also be part of the upcoming Lund University Cancer Centre (LUCC).

## External panel report

Review panel 3 Lund University Oncology and Pathology

## EXECUTIVE SUMMARY

The clinical cancer research at Lund University holds overall very good quality and some groups have multidisciplinary teams with excellent translational constellations with both clinical and preclinical PIs working close together. Some groups repeatedly publish in high ranked journals, and have the potential to take further lead at the European level. In order to achieve an overall increased quality, the following recommendations are given;

- The leadership structure of the Kamprad and Medicon Village needs to be tightened up as the panel sees a clear threat towards a high administrative burden for all independent PIs. The Kamprad building works well as a translational environment but the panel see a risk that the fractionated workspaces at Medicon Village, Lund and Malmö Hospitals gradually increase the collaborative distance leading to a decrease in translational research. The panel suggest an increase in the support of LUCC as a virtual network for increased translational collaborations.
- 2. The panel recommend the University and University Hospital to benchmark howother universities with translational profiles have visualised clinical and preclinical researchers career pathways.

- 3. There is a gender imbalance at the units and the panels opinion, this cannot only be explained by difference in excellence. The University would need to systematically work on the gender imbalance towards senior lecturers and professorships. One potential benchmarking organisation is the Swedish Research council that has a detailed model for including gender in all assessments.
- 4. The Pathology unit is recommended to become more integrated towards molecular pathology and artificial intelligence diagnostics, and with closer collaboration towards Genomics Medicine Sweden.
- 5. The panel suggest to develop a clear method for generation shift of leadership in larger research environments.
- 6. There are several very talented mid-career researchers at the units with no view regarding upcoming possibilities of open positions as for example as senior lecturer or professor. At the same time there are several professors that are in path towards retirement plan. A clear plan regarding potential open lecturer/professorships over the next 5 years needs to be settled.
- 7. More external recruitment to broaden the basis for recruitment and increase the mobility is recommended by the panel. In order to achieve successful recruitment and repatriation a substantial recruitment package needs to be offered.
- 8. The publications listed are difficult to evaluate but the four units all seem to have some very good quality publications. Some groups maintain several high ranked publications with senior authorships over the years and this could be a benchmark for the other groups in the environment.
- 9. The panel recommend the medical faculty to make a clear strategy how they can benefit from the physical existence of MAX IV and ESS and expand collaboration across faculties. This is raised as an opportunity by several units but still unclear by which means.
- 10. There is a potential to have further collaborations within LUCC and internationally.
- 11. There are excellent biobanks with high quality clinical annotations, but they need to have a stable support for maintenance and there is a potential for better usage of these existing biobanks.
- 12. The Bioinformatical and biometrical support system for analyses are raised as a general shortage where not all groups can have the possibility to employ their own person. A core facility, also performing own computational/biometric/biostatistic research, with user fee would be a possible solution.

## INTRODUCTION

Lund University have decided to perform a broad evaluation, RQ2020, and cancer research were divided into two panels, one for clinical cancer research and one for basic cancer research. The panel members responsible for evaluating clinical cancer research included three members, Beatrice Melin professor in Oncology (chair), Peter Naredi Professor in Surgery and Anne-Lise Børresen-Dale Professor Emerita in Molecular Tumor Biology.

Initially the panel was intended to include four reviewers but one declined due to clinical work in relation to the ongoing pandemic. The chair visited Lund for an introductory meeting January 2020, and in February the self-reviews were accessible for reading. The panel members met by a virtual meeting beginning of March, to discuss and divide tasks in the review. Some clarifying questions regarding the new organization that is planned for the cancer research area and regarding funding was asked and swift answers received. After this, the pandemic changed the overall plan of the meeting to be virtually over ZOOM during three days, 5-7th of May instead of 4-8th of May physically. Technically this is fully acceptable but the model and the ongoing pandemic and the effect it had on all of us must be taken in consideration in the evaluation of the reviews. The final schedule for the virtual meeting was sent out the week before the meeting, and the panel asked to add a session with 2-3 junior faculty, including PhD students and Post
doc level. The panel met on 4th of May to further discuss the research environments according to self-assessments. 22 interviews were made and each research group was asked to present shortly a summary of their review in 10 minutes, following a discussion of benefits and development areas for the University. Several groups from Medicon Village and the Kamprad laboratory were interviewed which was very supportive to the written reports. The interviews with the Faculty of Sciences, the Faculty of Medicine and the division head were valuable for better understanding of LU organization and strategies. For two of the units of assessments (surgery and urology, pathology) only two interviews were performed for each unit, which complicated a comprehensive analysis of these sections by the reviewers. The interview of several PhD students, postdocs and young researchers with PhD was valuable as complement to the interviews with mainly senior group leaders (having their own billing account) The panel further met on the 8th and 25th of May and 4th of June to sum up the observations from the review. The first draft was circulated 27th of May and the final version was submitted on 10th of June after email approval from all panel members.

## **OBSERVATIONS**

This panel report is based on its own analyses and the evaluation templates, and includes all research groups within the current Division of Oncology and parts of Division 5 (Pathology and Surgery) at the Department of Clinical Sciences, Lund and also urological cancer at the Department of Translational medicine. Pathology organized under Department of Laboratory Medicine was not evaluated (nor the oncology under Translational Medicine that was evaluated by Panel 2).

The scope of research at the four reviewed units of assessment are clinical and experimental oncology, pathology and cancer epidemiology. The units were selected according to having a separate billing account, and there are clinical researchers not included into the review that have their affiliation at the surgery or oncology clinic and/or lower amount of research grants. We notice that several of the researchers not included in the report are listed in the excel sheet of bibliometric data and that they contribute to several highly cited publications in high impact factor journals. The observations are listed for the different units respectively and some of the recommendations are specific to a unit while several are overall recommendations.

Physically, these activities are located at the clinical Department of Oncology, at Skåne University Hospital, research facilities close to the hospital (the Kamprad building), at Medicon Village (former AstraZeneca site) and at the Biomedical Centre (BMC), the pathology clinic. The branch of urologic cancer is physically located at Skåne University Hospital in Malmö with facilities in the urology clinic, pathology building and in the clinical research centre (CRC) but one group leader is also situated at Medicon Village. In the Oncology clinical department, there is access to units of clinical research, and a clinical trials unit with coordinators and research nurses, involved in both academic and industry-sponsored clinical trials. The hospital has recently applied for membership in OECI, with the ambition of receiving accreditation as a Comprehensive Cancer Centre. The ideas and development are evolving to expand collaboration in cancer research with a Lund University Cancer Centre (LUCC) with 8 organ-specific and 4 technology-based networks. A full organisation schedule for this future setting is not provided in advance and not fully explained during the assessment, (see below under leadership).

From 2020, the Department of Oncology and Pathology (both clinical and experimental oncology) was restructured, and divided into 17 independent research groups, responsible for their own staff and finances. The groups are assembled within a newly constructed Division of Oncology, with common activities, such as common seminars, PhD student activities, responsibility for teaching, and shared equipment. All research groups within the division will also be part of the upcoming Lund University Cancer Centre (LUCC).

In the following section a background and analyses are presented based on questions raised by evaluating the self-assessments and during the interviews of the four different units of assessments.

## Unit 3A Cancer research -Clinical basic

#### Summary of staff, publication and funding.

The self-evaluation has been made by a joint working group effort of the researchers chaired by Bo Baldetorp. In total the environment includes 126 people, and their publications are listed according to LU-CRIS, the publication registry. There is a statement that LUCRIS has not included all publications, but no further explanation to this is given and no additional list of publication has been provided. In a bibliometric analysis looking at 2014-2018, there are 607 publications that has rendered 15074 citations, on average 20 percent in the top 10<sup>th</sup> percentile, and 2,8% in the top 1 citation percentile. Some of the publications are in high ranked journals and many in good or moderate journals. External funding has increased markedly over the years being at 24 million SEK at 2014 and 50 million SEK in 2018, totalling 197 million SEK over the five years. The grants include the Swedish Research Council, Swedish Cancer foundation, Paediatric cancer foundation, EU and NIH. The information regarding leadership on international grants is not given. In Melanoma there is a participation in the Cancer Moonshot program where no funding is directed towards Lund University but collaboration through the Cancer Moonshot program is performed.

The main research assignment is clinical and experimental (both preclinical and clinical) translational cancer research, and epidemiology. Set goals: Basic and applied oncology sciences with a clear focus in patient perspective and patient outcome. Limited information is given how the research includes patient involvement in study design, and how epidemiology and biomarkers are going to be brought closer to the field of molecular epidemiology.

The research environment is mainly located at the Department of Oncology, Skåne University Hospital (SUS), Lund, with immediate proximity to the Kamprad building, that has relevant equipment for experimental and translational research. Staff in addition to researchers (clinical, pre-clinical and epidemiological) include technicians, postdoctoral students, PhD students, research nurses, and administrative personnel. Overall, the Unit is distinguished by a multidisciplinary (*e.g.* doctors, full-time researchers, nurses, and expertise in radiophysics) and translational environment that is closely integrated with patient care. The leadership in the division has been preclinical until recently, but is now lead by a clinician. The academic activities are intimately associated with the university hospital operations in terms of set goals (R&D and teaching / training), clinical trials with integrated basic research, staff, researchers, finances and physical placement.

There are important recourses in the available biobanks with annotated clinical data including tissue and blood samples from at least 100.000 individuals from patients and healthy controls. Questionnaire data, clinical patient registers and case controls studies exist for approximately

70.000 patients. There is lab space with general equipment for advanced imaging, cell culture, immunohistochemistry, animal experimental lab and general wet lab facilities. The research environment highlights the benefit of being close to surgery and oncology and the clinical research and trial unit.

The senior researchers participate in several national and international networks include:

- -Tanja Stocks: Metabolic syndrome and Cancer project, cohort consortium of 800,000 individuals in Sweden, Norway and Austria.
- -Håkan Olsson: GENOMEL and BioGenomel, The CGG-ICGHBOC, Collaborative Group on Hormones and Breast Cancer, Collaborative Group on Hormones and Ovarian Cancer, Hereditary Breast Cancer Group.

- -Mattias Belting: LU-UU Brain tumor network (Belting was recently recruited as guest professor of clinical oncology at UU), ISEV (International Society of Extracellular Vesicles).
- -Mats Jerkeman: Nordic Lymphoma Group (Chairman), European Society of Medical Oncology (Guidelines Editor), European MCL Network.
- -Helena Jernström: Collaboration with Professor Pollak McGill University, Montreal Canada, Professor Jeff Holly and Dr Claire Perks at Bristol University, UK.
- -György Marko-Varga/ Bo Baldetorp et al: The Cancer Moonshot, SPS (Swedish proteomic society).
- -Signe Borgquist/Ann Rosendahl: Karma (The Karolinska Mammography Project), MDCS (Malmö Diet and Cancer Study), collaboration with the Danish Breast Cancer Group, the Ki67 International Collaborative Group, University of Vermont (Ass Professor Thomas Ahern), Dana-Farber Cancer Institute/Harvard Medical School (Professor Judy Garber).

Information is not provided regarding leadership from Lund in any of the presented networks.

A new recruitment is recently done to the environment. Dr. Vinay Swaminathan was recruited as part of the Wallenberg regenerative medicine initiative (young, excellent, foreign researchers at senior postdoc level).

A general overview to understand the mobility of senior researchers and junior faculty after dissertation into the environment has not been provided in the background. There is limited information regarding additional senior lectureships planned in the environment considering that there are faculty members who still have external funding as a bases for their current research position. The senior professors observe a lack of succession plan regarding harboring and further exploring existing large epidemiological and biospecimen data sets.

The researchers have several outreach activities in local and national media, and more rarely in international news agencies. Group leaders regularly reach out and present their research areas to patient advocacy groups.

#### SWOT analyses

**Strengths** - the unit stress that major advantages are the proximity to the clinical facilities, large clinical trials and ongoing biobanking projects, giving large scale assets to clinical data and samples. An expertise in handling large amount of data and the understanding and leading the work of quality registers is also a major strength, and so is the external funding that has doubled over five years from 24 MSEK to 51 MSEK yearly.

Weaknesses – The unite defines that after the PhD thesis the career path is often unclear, especially for clinical researchers. The lack of incentives for younger clinicians to start a career as part time researchers constitutes a major limitation for further development. There is limited information in the background regarding possibilities for ALF supported salary over some years for researchers, and limitation regarding the information in the background of existing and working career paths regarding younger preclinical researchers in the environment. There is a need of a fully functional clinical trial unit but limited information is given what is actually lacking. In addition, there is a need for more support in biostatistical analyses. There is a low mobility of PhD students moving to other institutes, as well as only on rare occasions senior researchers have been recruited to the unit. The epidemiologists express a need for a larger epidemiology community.

**Opportunities** - The units should be able to initiate more clinical trials in early phase. Considering the large effort in biobanking more molecular profiling studies would be able to be performed in the line of the development of personalized medicine. This could also be a platform for novel biomarker analyses

and diagnostics. There are options for clinicians to apply for positions with part time research funded by ALF from the University hospital.

Threats – There is a lack of senior group leaders as several are retired or approaching retirement. Few clinicians take on research as part time researchers following their dissertation. Future oncology patients deserve well-educated oncologists that can take optimal treatment decisions based on solid scientific knowledge. A strong academic back-ground and continuous engagement in research will be an absolute requirement. Clinical trials are more and more dependent of support from clinical pharmaceutical industry. There is a general lack of research nurses, due to limited financial resources. Region Skåne is interested to support clinical research but in reality, it is difficult to maintain adequate level of research activity in the everyday practical situation with an understaffed environment. It is important that research-oriented co-workers receive time for research and that there is space for more targeted seminars during work time. Middle managers at clinical departments and wards must have an academic thinking / understanding also to support the colleagues in the profession that are engaged in research. Recruitment of doctoral students should be reviewed.

# Highlight 3–5 important events and achievements (publications, grants, or others) during the last five years (2014 – 2018).

The groups have external funding from the several external funders, such as Mattias Belting: Top ranked project grant from Vetenskapsrådet (2018-2022, 9 MSEK), Bo Baldetorp: Fru Berta Kamprad cancer foundation (24 MSEK) for biomarker studies by proteomics and masspectrometry in metastatic malignant melanoma .Anders Wittrup has received funding from Wallenberg Molecular Medicine (WCMM) and SSMF. Signe Borgquist and Helena Jernström received funding for their positions form the Swedish Cancer foundation.

## **Completed clinical trials:**

Final reports of the following randomized, controlled trials, initiated and conducted by the groups have been published during this period: RASTEN (Belting, lung cancer), NLG-MCL4 (LENA-BERIT) (Jerkeman, mantle cell lymphoma), NLG-MCL6 (PHILEMON) (Jerkeman, mantle cell lymphoma), and NORDIC ACT-2 (Johnsson, colorectal cancer), MAST (Borgquist, breast cancer).

## Citations:

The journal Fokus recently published a ranking of the most cited papers published by Swedish researchers during 2012-2015, based on data from Web of science. As the only cancer researcher at LU, Belting was ranked nr 60 among top-100 in medicine/life sciences: https://www.fokus.se/wp-content/up-loads/2019/10/Forskarlistor\_100-i-topp.pdf

## Benchmarking

The Unit use Department of Oncology and Pathology at Karolinska Institute as benchmark. The Belting group systematically relates to activities of the Department of Immunology Genetics and Pathology (IGP) at Uppsala University (Belting is visiting professor of clinical oncology since 2018). Signe Borgquist was appointed chair professor of clinical oncology at Aarhus University 2017, which has provided the unit with new network opportunities, while she still holds a position at Lund University (visiting professor).

The Olsson group relates systematically to the Department of Genetics/Cambridge, the Department of Epidemiology/Oxford and Amsterdam. Another benchmark is that of the International Agency for Research on Cancer (IARC), Lyon.

#### Organisation changes since last evaluation.

Since the 2008 evaluation, the Department of Oncology has been physically divided geographically, with operations both close to the hospital (Kamprad building) and at BMC and Medicon Village (former AstraZeneca site).

Since 2019 the department of Cancer Epidemiology is integrated into the Division of Oncology. From 2020, the department of Oncology/Pathology (both clinical and experimental oncology) has been restructured, and the new Division of Oncology is divided into 17 independent research groups, responsible for their own staff and finances. The advantage is that each group get oversight of their economical and work environment situation, but the obvious risk is an increased administrative burden for all 17 groups.

More focus has been established on different seminar programs, held weekly at the clinical department and every other week at the Kamprad building.

A senior panel has been established to serve as expertise to young scientists in their writing for research applications.

## Unit MED 3B, Medicon Village

#### Summary of staff, publication and funding

The Unit, known as the Canceromics Branch, has during the years 2014-2018, comprised approximately 80-100 people in 10-14 research groups with the following PI's Borg, Bosch- Campos/Honeth, Gruvberger-Saal, Hedenfalk, Hegardt, Howlin, Häkkinen/Kvist/Vallon- Christersson, Höglund, Jönsson, Nilbert, Planck/Staaf, Ringnér, Rovira, Saal). The Canceromics Branch addresses the major healthcare challenges in oncology in a broad and impactful manner, focusing on translational cancer research with high clinical relevance, often leveraging advanced "-omics" technologies. The PI's in the unit have been highly productive during this period in terms of publications, citations, and grant awards. During 2014-2018, the research unit published 433 works, 400 peer-reviewed, and produced 11 PhD dissertations. The publications are mostly in highly ranked journals with 23.8% in the top 10th percentile for citations, and 3.9% in the top 1st percentile. They have also been successful in attracting funding over these 5 years, with 146-152 MSEK per year with a total of ~752 MSEK, of which 141-145 MSEK per year was from external sources.

#### SWOT analyses:

#### Strengths

The Unit is indeed cross-disciplinary in nature (clinical, genomics, functional, bioinformatics, pathology, etc), has exceptional methodological experience, and has a broad international collaboration and a strong reputation both nationally and internationally.

Many of the PI's have excellent track records of publications, citations, and funding. Furthermore, the environment has exceptional methodological experience and unique possibility to develop and clinically-implement new diagnostics and biomarkers.

#### Weaknesses

There are unclear career paths, very few women PIs, an insufficient leadership structure, and a generation gap (retiring professors without succession plans). There is a physical distance from clinic and medicine/ science classrooms.

#### **Opportunities**

The environment is located a couple of kilometers from the hospital but have excellent close clinical collaborations and is close to a large oncology clinic. There is access to large well characterized patient

cohorts like the SCAN- B, there is proximity to other cancer researchers at Medicon Village, LTH-IT and LUTRC, and close collaboration to spin out companies from the University such as the SMILE incubator. A good opportunity is also the physical location of MAX IV and ESS platforms.

#### Threats

The unit describes obvious threats as the scarcity of academic positions, unclear prioritization of cancer as LU focus area, control of physical space and the questions regarding rent, and the experience of a barrier and paternalistic attitude of clinical research towards preclinical research.

### **Major Achievements**

The most important events and achievements during 2014-2018 are:

Provided the basis for three changes to standard clinical practice: 1) defined the algorithm for breast cancer subgroup classification using immunohistochemical markers that is part of the Swedish national guidelines; 2) created the internationally accepted molecular taxonomy for bladder cancer; and 3) helped to identify several new hereditary breast cancer susceptibility genes and incorporate these in the standard clinical screening test.

In addition an important work is to continue the recruitment of the population-based SCAN- B breast cancer study, that largest study of its kind in the world which enrolls ~1500 patients with breast cancer per year since 2010 (over 14500 patients to date) across 9 hospitals in Sweden, and has led to 17 publications so far (9 during 2014-2018). The environment graduated 11 PhD students, enrolled 17 new PhD students, and established the Cancer Research South (CARES) School (2014-present), which provides PhD-level research education to approximately 25 students per year from LU and GU (continuously financed through a competitive process by Cancerfonden).

#### Collaborations

Collaborators include, locally the clinicians at the Skåne University Hospital (oncology, surgery, pathology, clinical genetics, respiratory medicine, gynaecology, urology, radiology) and other cancer research groups at Lund University, nationally collaborators at Karolinska Institute, Gothenburg University, and Uppsala University, and internationally collaborators at institutions such as Harvard University, Cambridge University, Columbia University, Memorial Sloan-Kettering Cancer Center, Wellcome Sanger Institute, Netherlands Cancer Institute, King's College London, McGill University, University of Copenhagen, Aarhus University, and the University of Leeds.

The unit has extensive national and international collaborations with academic networks. For example, during the period 2014-2018, key academic networks have included BioCARE (no longer funded due to low score on management in the SFO evaluation) LUCC (limited funding from Lund University so far), CREATE Health, SWEA, UroCan-LU, UroScanSeq, LUCAS / PPMC, and SCAN-B, and key international networks have included EU FP7 BASIS, EU H2020 BRIDGES, U GenoMEL, EU H2020 Marie-Curie PhD program MelGEN, EU H2020 CanFaster PhD program, European Organization for Research and Treatment of Cancer (EORTC), and the NIH-funded ENIGMA.

The environment has external funding from several sources (CF, VR, Vinnova, ALF) as well as a number of international sources (EU H2020).

#### Benchmarking

The unit indicates that they do benchmarking towards the Department of Oncology- Pathology, Karolinska Institute; the Department of Cancer Genetics, Oslo University Institute for Cancer Research at Radiumhospitalet; and the Sahlgrenska Cancer Centre, Gothenburg University. No information is given regarding how they view their own work compared to the others.

## Organisation changes

The division has been split into 17 economical units, where 8 are located at Medicon Village. Among the 8 in Medicon Village they have assigned a unit representative (Ingrid Hedenfalk) and an assistant representative Göran Jönsson. The 8 groups have decided to share tasks and responsibilities regarding work environment, health and safety, lab/office space questions and fire safety. They also collaborate around the administrational staff.

# Unit 3C, Pathology

## Summary of staff, publication and funding

The pathology unit evaluated here basically consists of two research groups, one is Elisabeth Englund who has stayed on at the Pathology unit and the other is Karin Jirström at the division of Oncology and located at the Kamprad building. Englunds major research interest is in neurodegenerative disorders where she has made major discoveries. Apart from that, she is a key collaborator in brain tumor studies, and have made contributions regarding work with TMA from tumors, and has published papers in several moderate to good journals. Professor Jirström is working in many collaborative efforts using TMAs to assess biomarkers for prognosis, with several different research groups, and collaborates with the colorectal cancer research group. She is therefore not seldom mid-author on several of the publications, and as they are mainly validation studies, the impact factor is generally in the lower range. The unit lists approximately 315 publications 2014-2018 the top 10 or top 1 percentile the panel found that to be 20.1% and 3.1% respectively according to the attached excel file and ppt presentation and many of the publications have only listed the first authors and then et al, which makes it difficult to judge the level of last authorships.

No information is given regarding funding from ALF, external or international grants.

## SWOT analyses

## Strengths:

Pathology is an important bridge between basic research and the clinic. There is a vast source of clinically well-annotated tissue and associated know-how available to the research community. There is also an integration with Oncology which has facilitated translational research and launch of prospective clinical studies

## Weaknesses:

Pathology units in Malmö and Lund belong to different departments at LU, and the fact that Pathology in Malmö has been drained of academic competence since the relocation of researchers to Medicon Village in 2013, has also effects on the unit in Lund.

## **Opportunities:**

The development of digital pathology, increased use of artificial intelligence and pathology- driven clinical trials are important areas that could be further developed. In the era of precision medicine there is possibility to be further integrated with the molecular analyses of tumors through for example Genomic Medicine Sweden (GMS).

## Threats:

Clinical pathology belongs to a different organization (Medicinsk Service) than Skåne University hospital. There is a lack of research nurses for clinical trials often considered a laboratory specialty, while in fact being a genuinely clinical specialty. The unit experiences that there is too little focus on pathology as a clinical discipline in medical education – often mixed up with other more or less unrelated disciplines/themes.

Σ

## Highlights during last years pointed out in the self assessment.

The unit highlights the first pathology-driven prospective clinical on-treatment biomarker trial, the Chemotherapy, Host response And Molecular dynamics in Periampullary cancer (CHAMP) study was launched in 2018, for which considerable funding has been received, e.g. from the Sjöberg Foundation: http://thechampstudy.org. Another important achievement is that Hans Brunnström received a "Junior Clinical Investigator Award" by Cancerfonden in 2018.

## Benchmarking

The unit does its benchmark towards the human protein atlas project but there is no further self-assessment or details given regarding this work. Apart from scientific papers, the unit has published several books:

## **Organisation changes**

Karin Jirström has changed her affiliation during the evaluation period; Division of Pathology (-2011), Division of Oncology and Pathology (2014-2018), and from 2020 to Division of Oncology, Therapeutic Pathology unit, located at the Kamprad building Elisabeth Englund has stayed on at the Pathology unit in Division 5.

## Unit 3D, Surgery and Urology

*This unit contains* abdominal surgery and prostate cancer, and partly by breast cancer. It is not a full report regarding all research in surgery in Lund and Malmö, and the reason for lacking information is not fully clear but may be reflected by the selection of "kostnadställe" to create the units for this evaluation. The report is based on activities within two research groups that have been covered in bibliography and in the summary of funding. However, Professor Lisa Rydén, a surgeon and group leader in breast cancer research was also listed in this unit of assessment and took part in the evaluation. Some groups actively performing clinical cancer research (urothelial cancer, colorectal cancer and others) were not listed for self-evaluation in this report. There are three strong research groups (Web of Science data): Professor Anders Bjartell, urological cancer research, h-index 54 (Web of Science), Professor Roland Andersson, upper tract gastrointestinal surgeon, h-index 43 and Professor Lisa Rydén, breast cancer research, h-index 36.

The total of the three research groups from 2014 – 2018 was estimated at 84 MSEK of which 14 MSEK in governmental funding and 70 MSEK from external grants. Only minor variation from year to year was noted, i.e. about 17 MSEK per year in average. In addition to the funding estimated form university accounts, the research groups are also well funded at a similar level by grants from EU, the healthcare provider (Skåne University Hospital and Region Skåne) and from the industry and Life Science companies. Exact information regarding these funding sources are not given.

Publications in peer-reviewed journals (2014 - 2018): original articles = 378 and peer- reviewed reviews = 28. Number of PhD thesis = 14 (variation from 1 - 5 per year). No information on top 10 and top 1 percentile is given in the report but in the excel file 23.6% in the top 10 citation percentile and 3.6% in the top 1 citation percentile.

Professor Andersson's group is based at Skåne University Hospital in Lund. Professor Rydéns group is based at Medicon Village in Lund and Professor Bjartells group at Skåne University Hospital in Malmö.

Like in previous evaluations (RQ08, RQ14), the clinical cancer research activities are not located at one campus. In two cities (Lund and Malmö) there are different buildings and locations where the surgical / urological clinical cancer research is performed.

## SWOT analysis

## Strengths

This research area is well funded by local, national and international grants, and highly productive both regarding publications and PhD theses. There a long track record to work towards innovation and collaboration with companies. There is active biobanking on registries, and a system for promoting young clinical researchers from governmental funding (ALF).

## Weaknesses

There is a lack in University/Faculty positions in surgery / urology and it has decreased over time. There is less time for clinical researchers to take part in seminars and conferences. The research activities are hampered by the fact that research activities are performed in two different cities and in different centres within each city.

## Opportunities

The unit points out the new cancer centre constellation that has been developed the last year (LUCC Lund University Cancer Centre) as a potential. There is an ongoing process to reach appointment as Comprehensive Cancer Centre at Skåne University Hospital. Both Lund University and Skåne University Hospital/Region Skåne, are well represented in LUCC and CCC which is a great opportunity for clinical cancer research in the future. The ongoing centralisation of advanced surgical procedures to main hospitals is an opportunity for clinical research where high-volume cohorts and biobanking is possibly. The implementation of new electronic medical records that will facilitate extraction of clinical data will enable new projects with possibly funding from EU.

## Threats

The observed threats are a trend towards fewer academic positions including future lack of supervisors for PhD-students. Permanent academic positions are not always substituted upon retirement. The number of clinical trials is being described as decreasing over the last few years and there are several explanations for this. The reimbursement for clinical trials is not as generous as before and more studies are now being performed in countries like in the Eastern Europe. There is a lack of funding for research nurses and possibilities at several clinical departments to perform clinical trials. It is also difficult to obtain funding for investigator- initiated trials. The funding is not stable and uncertain from year to year.

## **Events and Achievements**

A new professor in clinical urology has been appointed, (a key player in Lund Bladder Cancer group). An IMI-funded project on big data in prostate cancer, PIONEER, is funded with a total of 12 million Euros for the coming five years. Professor Bjartell is deputy coordinator for the whole project and WP3 leader to collect big data clinical cohorts in a centralized and a federated model. Approximately 1 million SEK per year is included towards Lund University within the work package. In addition, Professor Bjartell's group has also received funding from Vinnova for artificial intelligence in digital pathology and they are coordinating a global study in Sweden since 2018 with observation of patients with metastatic prostate cancer for three years with collection of patients reported outcome measures, blood for a number of biomarkers and genetic analysis and clinical follow up. This is a project aiming at 5000 patients in ten different countries.

## Abdominal surgery:

There is one adjunct professor contracted (Jan Johansson). In 2014 the Nordic Hepato- Pancreato-Biliary Association HPB was founded in Lund. 220 members. There is increased funding from VINNOVA (Andersson), but the exact amounts are not given.

### Breast cancer:

External grants from the Swedish Research Council (2015). Nordic Prize in Medicine for breast cancer research (2016), a permanent position as professor has been installed.

#### SWOT positive and negative observations.

#### Positive:

During the last decade, clinical translational research has been substantially developed including networks built through collaboration with basic researchers in different disciplines. The output has increased in terms of publications and PhD dissertations per year, of which two have awarded best dissertation of the year (Crafoord) since RQ14.

A system has been developed to facilitate translation from early discoveries to clinical implementation and new grants for innovative research are available from Vinnova, EU and other funding bodies. Lund University is supportive through LU Innovation and has also promoted other collaborative efforts.

#### Negative:

High-level academic positions (professor and associate professor) are not as frequent as before, although a number of retired professors are still active through own national grants (senior professors). In clinical urology, there is only two professors today (combined positions at LU and Region Skåne) of which one is fully funded by the Region Skåne. A decade ago, there were three full time professors and one adjunct professor (20%). Today the unit has only one associate professor in urology (no academic position).

#### Benchmarking

The unit describe that they do benchmarking in Sweden: Departments of Surgery and Urology in Göteborg, Uppsala, Karolinska, and internationally Dept of Urology Erasmus Rotterdam, Dept of Surgery, Candiolo Institute for Research and Cure Turin University, Dept of Surgery Copenhagen, Dept of Surgery Århus, Dept of Oncology Oslo, Australian Pancreatic Cancer Genome Initiative (APGI), especially Royal North Shore, Sydney, Department of Surgery, University of Glasgow, UK. No information is given in how they view themselves towards these other centres.

## LEADERSHIP

The Division of oncology pushes the researchers to get external research funding by giving group leaders with an annual funding of at least SEK 3 million and having two university employees, some independent administrative and economic responsibilities. Several objectives were given of which one important, stated by several interviews, that it was difficult to find one person who would take the responsibility for all administration of the Division. By using funding as the organizational discriminator external funding inevitably becomes important. We did not find that reaching the financial goal was any driving force for becoming a group leader. A majority of the groups do not see external research funding as a goal but funding as necessary to be able to perform their research. This is much more evident for groups with mainly experimental research.

An overall observation is that core facilities could be expanded. Several groups experience that research is hampered by lack of certain competencies, e.g. biometricians (biostatistics and bioinformatics) and that continuous development of biobanks and databases does not only need organizational improvement but also additional funding for high quality and sustainability. We agree that these are critical elements. In our discussions we found that including these elements in a common university core facility was seen as advantageous.

Large national commitments as MAX IV, ESS, and SciLife make hope for national funding less likely and therefore LU or the Faculty of medicine should consider allocating funding for such core facilities to support biometricians and easy access to biobanks and data. To improve clinical research there needs to be better administrative support for setting up clinical trials and recruitment of research nurses should be expanded. External funding for clinical trials is mainly a problem for academic driven projects while we see it as a strength that there are good opportunities for innovative projects to get external funding from companies or incubators.

Most group leaders at the Kamprad laboratory put the good collaboration between clinical and laboratory units as high priority and deemed this as one strong reason for successful research. External funding was seen as a consequence of the quality of research and mostly not a limiting factor. For employing certain competencies or running biobanks it was clear that the groups were not pleased with funding possibilities.

At Medicon Village the collaboration between the groups is seen as a big advantage both from an administrative and research perspective. While groups at the Kamprad building felt close connection with the clinic this was not evident for all groups at MV. We believe that some groups have the potential to improve by following the example of the groups at MV that are located both at MV and in the clinic or have very close collaboration with clinicians.

Several groups have a co-leadership with one preclinical and one clinical PI that are leading the work which could be seen as a road model for successful translational work.

This unit has been very successful in external funding at local and national level. Most international grants do only allocate lesser amounts to LU groups. Our suggestion is that the research leaders at MV, just as several other research leaders in evaluated by this panel, should aim at being main applicants on international grant applications, e.g. Horizon Europe, ERC, NIH. The quality of the research is at that level and there are many good international networks in place.

The research area of pathology was even after several interviews difficult for us to place. It seems like the clinical task at the Malmö and Lund hospitals has made the pathology research to a secondary organisation. We recognize strong research in areas primarily not cancer at some parts of the Pathology department but the strongest pathology research group has a very close connection to the oncology department and clinic. Although external funding could be better it seems like a priority by the Faculty of medicine should be to strengthen the academic units of pathology both in Malmö and Lund. Molecular Pathology, in particular in oncology, is constantly changing and there is a short way from basic research to clinical implementation. Academically driven cancer pathology is a prerequisite for moving into precision medicine, and with own research in close collaboration with the many excellent researchers at LU this might attract young pathologists to enter the academic arena.

*The Surgery unit* includes three research groups of which two also have activities at Medicon Village. We interviewed two of the three group leaders and see strengths in the close connection between clinical research at the hospital and translational/basic research at e.g.

MV. The groups in this unit are all focused on one specific tumour type and the group leaders have combined academic positions which is a strength. Another strength when a group can provide clinical data, biobank collection, clinical experience, national and international networks is that there is a winwin situation in collaboration with other research groups.

External funding is not a limiting factor but rather difficulties in getting enough research time for clinicians.

At the hospitals in Malmö and Lund most solid tumours are surgically treated at the departments of surgery and urology. In the report it is mentioned that colorectal cancer and endocrine tumours are not included and for other tumour types research leaders are mentioned but we have no further information. Some of these researcher's publications are included in the publications list. We made the assumption that the limited number of groups in this unit was because many researchers not mentioned have limited external funding or collaborate with groups that are mentioned in the other units. It is not possible to

scrutinize strengths and weaknesses of this research but the successful combination of clinical and translational research and the ample collaborations that the Bjartell and Ryden groups have can serve as models.

#### Recruitment, promotion and succession.

The four units describe the strengths and weaknesses fairly similar and there is room for improvements. Recruitment is problematic from several aspects. While there is an open attitude to external recruitments and need for several different competencies, it is acknowledged that it has been difficult to attract researchers outside of Lund and Malmö and especially international scientists. The language barrier is one obstacle and LU needs to look at the necessity to master the Swedish language from case to case. Today english is enough in many academic environments and with MAX IV and ESS in the area it should be easier to do international recruitments. External recruitments would also be facilitated by attractive starting grants. To set up a competitive research group takes several years and few external researchers can expect to keep ongoing grants when they move, or expect part of their research group to transfer to a new location. Recruitments should be offered attractive starting packages. A good and successful example how LU has been able to attract external researchers is the WCMM initiative (Unit of Assessment 3A – Cancer research – clinical, basic). Internal recruitments are much more frequent which is for good and bad. The person is known and the faculty or group leader knows what to expect. It is evident that these internal recruitments mostly are at positions for support of the existing group and not tenure track positions. A majority of young researchers find the career path too narrow, too slow and they leave the academic world. Promotions are not very common but those we had a chance to assess seem to be very successful. Several of the group leaders of the units had been promoted and we see it as a strength that LU have this option and it should be used.

Succession was a repetitive point of discussion. Age is not a limiting factor for having a research group in Sweden and there is no age limitation to get funding from several of the national funding bodies. At the same time senior professors, who have some of the larger research groups in the panel, cannot apply for ALF-funding and find difficulties securing enough funding for their staff and research. The new organization at the division where a group leader get administrative and financial responsibility is contradictory to a more common situation in the academic world where senior professors or senior researchers have to leave their positions as head of units. With these prerequisites we could not find any strong drivers for group leaders to find successors. The faculty should have a strategy to stimulate succession by initiating this process much earlier. That can be done by directing resources to the successor, giving the successor the administrative and financial responsibility and by announcing academic positions.

#### **Publication patterns**

Using the bibliometric data provided by LU the four units show several common features. The annual number of publications has been fairly constant during 2014-2018. For each unit most publications are middle impact factor journals but there are also publications in top journals with high impact factor and this is seen for all four units. The average number of citations per publication is 17.4 to 24.8, the outputs in top 10 citation percentile is 19.3 to 23.8% and the outputs in top 1 citation percentile is 2.8 to 3.9% for the four units.

Between research groups there is larger variation in how often the lead authors are from the group, how often the group manages to publish in leading journals and if pivotal publications were published a few years ago or more recently. An overall goal could be to aim at higher impact publications and to focus on higher innovation discoveries and clinical relevant studies.

### The balance between activities in research, education and external engagement

In general, the research groups we have audited have been large enough to present several activities in their focused research areas, and there is mostly a good balance between research activities and external engagement. The external engagement can be innovations together with companies, implementation of research findings in the clinic, and leading roles in national or international societies and guideline groups. There are innovative teaching models for example in radiotherapy and radiophysics, but this could be further developed as some groups cannot present any external engagement.

Only a few groups could present how research and educational activities were well balanced and that group members had leading roles in course planning and execution. Also here is room for improvement.

#### The overarching research strategy

Each research group could present a research strategy which can be based on methodological competency, a specific tumor type, or collection of a larger data set or patient material. Any or several of these assets is then used to expand the group's research projects or expand the collaboration with other local, national or international groups.

The Faculty of medicine's strategic plan was communicated and while the plan has strong incentives it was only brought up by the dean and no researcher interviewed or no unit report refers to the strategies of the faculty. The question is whether the researchers are very well informed and mapping their own work in relation to Lund University strategy, both from the Medical Faculty and the Science Faculty. There is a possibility to increase collaboration across faculties regarding innovative bioinformatics, AI, modelling and computational medicine, and towards facilities such as ESS and MAXIV. Overall there is a possibility to increase the effort in collaboration internationally and take lead internationally.

#### Summarizing list

Leadership strengths:

- Possibility to gain independence and form research group.
- Flat organization possibility for influence
- Attracts external funding and positions.
- New formation of LUCC could lead to increased collaboration

Leadership weaknesses:

- Organizational spread out under many different divisions and units
- At Kamprad and Medicon Village, too flat organization leading to a lot of administration for the PIs.
- Unclear how the leadership of LUCC is integrated in all units.

## COLLEGIAL CULTURE

### Opportunities for early-career researchers to develop their originality and independence

Several of the young researchers had received grants in national competition which gave them a multi-year independent research position, e.g. from Cancerfonden, WCMM, VR. Similar clinicians could develop independent research careers if they received ALF positions. Without his kind of funding and support there were no obvious opportunity for young researchers to develop their originality and independence.

## Sustainability and renewal of research strengths

This goes back to what is mentioned under the leadership section above. Sustainability is very much a consequence of how long an older research leader wants to continue, can generate enough funding for research but also maintaining data sets and patient material. A clear plan and strategy on how research areas should be secured was not presented by the medical faculty. Similar there was no plan for renewal of research strengths at faculty level but the introduction of some younger research leaders clearly does renew and strengthen already strong research areas. The strong senior PIs represents good role models in the environment in terms of broad collaborative networks, large data collections and attractiveness for grants.

However, a more defined method for transition a succession plan for larger data sets and mentorship to support a smooth succession for younger researcher to take lead in the environment could further improve the environment.

## Academic networks and collaborations outside the unit

The units have national and international collaborations and are active in different networks. The LUCC could be further developed and the collaboration across faculties could be increased for example regarding novel biometrical analyses. An expansion of the LUCC organization will require additional funding to support the development of closer collaborations, building of joint supportive infrastructures for data analyses for example, depending of the needs of the organization.

## Quality in applications and publication

See Publication pattern above for publications. The quality of the publications is very good with some excellent papers, and comparable with cancer publications from other Scandinavian medical faculties. For some units there are a lower number of publications where the group from LU has a leading role. Some groups with interesting research objectives and excellent methodology have not recently had any publications in high impact journals. On the contrary there are some research groups who manage to continuously have publications in high impact journals.

The division of oncology's new organization highlights groups that generate a minimum of SEK 3 million every year and thus most groups we could assess had several successful grant applications. We have not read any applications so we cannot have any opinion about the quality of applications to local funds. On the other hand, most groups who had larger local funds also receive grants from national funding bodies, e.g. Cancerfonden, VR, which indicates good quality.

While many groups participate in international networks and collaborations it is striking that researchers from the units rarely receive larger grants from international sources and there is only very few researchers who have a leading role in applications that receive international grants.

## Summarizing list

Collegial culture strengths:

- Strong research environment with long tradition of launching larger studies and establishing new clinical standards.
- · Possibility to create an independent group if you can attract funding

Collegial culture weaknesses:

- Unclear path for succession in larger environments for younger PIs.
- Unclear career path for mid-career researchers. Both the preclinical and clinical career paths could be further visualized at the University to support younger investigators.

## QUALITY ECOSYSTEM

#### Research strengths and how these are reflected in the educational portfolio

There are innovative collaborations in education both in radiophysics and regarding AI with the faculty of science. There are also collaborations with companies for further implementation of novel therapies and diagnostics.

Academic Pathology need to be strengthen to recruit and educate in molecular pathology

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research

The proximity at Medicon Village where there are several start-up companies in place is advantageous for the groups located there. There is a close collaboration with the surgical and cancer clinic and pathology. However, some suggested biomarkers are not readily put into clinical practice and the process how the University Hospital choose to actually implement major research findings is unclear. Alternatively, that there are limited interest to implement research findings from the hospital side. Information regarding a possible innovation implementation facility on the clinical side was not given.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

There is a clear gender imbalance towards higher frequency of male PIs in the environment, and this is also raised as an issue by the researchers. The system how the gender fact is systematically analyzed in all recruitments and assessments are not clear and visual for the interviewed PIs.

There is a low mobility as approximately 80 percent of the researchers that have done the major part of their career at Lund University. A larger openness and system to support external recruitments would probably enhance the environment even further. There are some strong leaders with excellent research, and they should be encouraged to give more responsibilities and mentor the younger ones to become leaders as well.

#### How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere

There is some cross-faculty interaction within teaching but there could be more interaction regarding research and biometrical analyses. There is a good collaboration with the clinical trial unit. Further development, if specifically funded, could be gained by a more comprehensive transfaculty investment in biostatistical analyses and artificial intelligence/machine learning that could support the mining of the rich clinical and biobank data. The management of the LUCC structure needs further support to become fully functional as a matrix organization and not only a paper product.

## RECOMMENDATIONS

- The leadership structure of the Kamprad and Medicon Village needs to be tightened up as the panel sees a clear threat towards a high administrative burden for all independent PIs. The Medicon Village has defined a chair and co-chair person who are leading the administrative coordination, but these are no formal roles and do not give any advantage in their merit list. The panel suggest a structure with unit heads at each place and a joint leadership group to enhance the collaboration between the two units in clinical oncology.
- 2. The Kamprad building works very well as a translational environment with preclinical and clinical environments physically close, but the panel see a risk that the fractionated workspaces at Medicon

Village, Lund and Malmö Hospitals gradually increase the collaborative distance leading to a decrease in translational research. The panel suggest an increase in the support of LUCC as a virtual network for increased translational collaborations.

- 3. There is a gender imbalance at the units and it is not likely that difference in excellence can explain the difference. The University would need to systematically work on the gender imbalance towards senior lecturers and professorships. One potential benchmarking organisation is the Swedish Research council that has a detailed model for including gender in all assessments.
- 4. The panel recommend the University and University Hospital to benchmark howother universities with translational profiles have visualised clinical and preclinical researchers career pathways. Several researchers have raised that the career paths are unclear as stated under observations. This likely needs to be on faculty level.
- 5. The Pathology unit is recommended to become more integrated towards molecular pathology and artificial intelligence diagnostics, and with closer collaboration towards Genomic Medicine Sweden. The future diagnostics of cancer and precision medicine will require an integrated approach in pathology. Currently the facilities are spread out and part of the facilities are evaluated under panel 2, so it is not easy understandable how a reorganisation could be done to support this to happen.
- 6. The panel suggest to develop a clear method for generation shift of leadership in larger research environments. The more senior PIs suggest that ALF grants should be open even after 68 years of age but the panel believes that internal grants such as ALF should be directed towards the "next-generation" PIs, that could successively establish and take over the environment. It is excellent that also senior PIs attract external funding and can maintain their research activity. However, senior PIs should be actively pursuing a plan for their decreasing activity in maintaining the economical platform and taking a more mentoring role the last years before retirement.
- 7. The University needs to have a clear plan in how many senior lectureships they will support, to give a clear picture for emerging scientists in what final positions there are, and also what options there are outside and inside the university after an externally funded position as for example Senior investigator award by Cancerfonden.
- 8. There are several very talented mid-career researchers at the units with no view regarding upcoming possibilities of open positions as for example as senior lecturer or professor. At the same time there are several professors that are in path towards retirement plan. A clear plan regarding potential open lecturer/professorships over the next 5 years needs to be settled.
- More external recruitment to broaden the basis for recruitment and increase the mobility is recommended by the panel. In order to achieve successful recruitment and repatriation a substantial recruitment package needs to be offered.
- 10. The publications listed are difficult to evaluate, but the four units all seem to have some very good quality publications and a few groups with excellent publications. The lists of publication and bibliometric analyses is sometimes inflated by a few articles where the LU representative is only a recruiting site for a clinical study, so bibliometrically the units are quite different. Some groups maintain several high ranked publications with senior authorships over the years and this could be a benchmark for the other groups in the environment. Overall the panel recommendation is that it is important to collaborate in international environments. Lund and especially the Medicon Village unit could take further lead in for example EU projects.
- 11. The panel recommend the medical faculty to make a clear strategy how they can benefit from the physical existence of MAX IV and ESS and expand collaboration across faculties. This is raised as an opportunity by several units but still unclear by which means.

339

- 12. There is a potential to have further collaborations within LUCC and internationally.
- 13. There are excellent biobanks with high quality clinical annotations, but they need to have a stable support for maintenance and there is a potential for better usage of the existing biobanks.
- 14. The bioinformatical and biometrical support systems for analyses are raised as a general shortage where not all groups can have the possibility to have a group of biometricians. A core facility also performing own computational/biometric/biostatistic research with user fee would be a possible solution.
- 15. The panel concludes that it has been interesting to commit this task although it was not overall easy due to the pandemic, inflicting on the number of panel member that could participate in the evaluation and lack of person to person contact in the interviews. The units had undergone a major reorganisation, and it took much of our time for review, to fully understand how the units were organised and actually functioning. It would also have helped if the self-assessments had been written in a similar fashion. The interviews were very interesting and helpful and Malin Bredenbergs administrational support very good. There were gaps in information given from the other administrational level. The overall conduct on ZOOM with interviews went well, even if a physical meeting may had given even more information for the panel.

# Regenerative Medicine

# Panel overview

Despite the rather broad title assigned to Panel M4, this panel harbors two Units of Assessment (UoAs) with a research focus on normal and malignant blood cell development. The formation of the UoAs was based on the composition of two existing divisions each located at one physical location (Floor A12, 4A and B12, 4B). The physical proximity of the two units promotes close interactions and coordinated activities, and together they constitute a coherent and collaborative research environment in experimental hematology.

Both divisions belong to the same department (ILM) and are closely affiliated with the Lund Stem Cell Center. Hematology has since the late 1990s been an important area of research at Lund University.

At this time the medical faculty harbors four divisions exploring different aspects of blood cell function and panel 4 has come to include two of these. While the majority of the research groups in Panel 4 are focused on basic research, intentions towards clinical implications are obvious in the research programs of most of the principal investigators (PIs).

The translational efforts are largely supported by the fact that several of the PIs are clinically active scientists and a close connection to pharmaceutical industry provides a good ground for commercialization of relevant findings.

While there are ample examples of collaborations both within and between the UoAs, the activity of both units is based on independently funded research programs headed by several PIs per UoA (Please see the self-evaluations provided). This creates an organic organizational structure in which each PIs has a high degree of autonomy. The importance of the independent research groups is further enhanced by the structure of the department as divisions are not part of the formal organizational structure.

Hence, these units (divisions) are to be considered as collectives of researchers having shared research interest but with each researcher developing independently funded research programs. While the current organizational model contributes to the independent status of principal investigators, it fails to provide critical mass and functional infrastructure to create a supporting research environment for the conduction of excellent research.

Hence, the UoAs of panel 4 (the divisions) have had their focus on the formation of a functional and supportive infrastructure as well as intellectual exchange between research groups rather than to coordinate joint research efforts. This is highlighted and described in the 4A and 4B self-assessments.

## External panel report

## **Executive summary**

The UoA 4B is fairly new and was started in 2014 when the current head (MS) assisted by the co-head (DB) created a new environment that assembled groups attached to the Stem Cell Center and groups that were not directly members of the SK laboratory and added few new recruits. UoA 4B quickly established itself and is about the same size or slightly larger than UoA 4A. It is composed of 12 independent groups from which four have medical training; four PIs are full professors, and the remaining have positions as researchers or lecturers. They have an impressive track record of accomplishments and grant support. Unit 4B performs cutting- edge research in normal and malignant hematopoiesis and stem cell biology using a broad range of technical platforms. The research and career initiatives are tightly linked to the SFO (for example for funding, research school, and recruitments) and partially overlaps in topic and overall interests with UoA 4A. This overlap is not complete and UoA 4B is unique in many aspects. The main strengths of 4B in this panel's view is the strong collegial structure, broad collaboration, and cutting-edge science. It was clear from the interviews that this unit is bubbling with innovation, ideas, and drive. However, the main weaknesses of the unit is that this effervescence is more and more funneled into frustration over the absence of possibilities to develop the unit further, and to do so in a decisive fashion. Particularly damaging in the panel's view is the lack of transparent recruitment and promotion strategies, difficulties in expanding or altering research space, and increasing administrative duties for the head and PIs of the unit. These PIs are outstanding scientists who trained for a decade or more to perform curiosity-driven research and to teach and inspire younger colleagues-thus, the habit of making these individuals perform more and more administrative duties threatens the future of the university and deprives society and healthcare of important future discoveries. This unit has a lot more to give, and we propose the new leadership of the university work closely with representatives of the department and unit to provide the best possible environment for their best researchers.

## Introduction

The panel was composed of Profs. Martin Bergö (Sweden, basic and translational cancer research including leukemias); Ana Cumano (France, basic research on lymphocyte development and hematopoiesis); Claudia Waskow (Germany, immunology of aging, hematopoietic stem cell research); and Axel Schambach (Germany, basic and translational molecular hematology research and gene therapy).

The panel was given excellent documents, well-described analyses of the unit's personnel, research, resources, problems, frustrations, and possibilities. The interviews were well planned and well executed and we met both with senior and junior PIs, several of whom had participated in producing the reporting documents. We were also happy to be given the opportunity to meet with a few technicians, administrators, students, and postdocs whom, importantly, had not been part of drafting the report. The latter was important for identifying potential bias. However, there was strong alignment with the views of the scientists and those of the technical personnel and students. Thus, it seemed like everyone in the unit is well informed and that there is culture of sharing information and discussing issues and problems.

The site visit was virtual and composed of well-functioning and -scheduled Zoom sessions. The panel was grateful for the careful planning of these interactions.

We were asked to comment on the formation of the UoA: It is clear to us that Unit 4B is not an artificial UoA created solely for this evaluation, but an actual, well-defined unit with a unit leader (MS).

## Observations

### **Observations: General**

The Stem Cells and Gene Therapy (UoA 4) environment was historically masterminded by Stefan Karlsson who in the 1990s attracted to Lund highly motivated and internationally trained scientists (Sten Eirik Jacobsen, as an example) and together with neurologists and cancer biologists they founded the Stem Cell Center of Lund. Both the Molecular Medicine and Gene Therapy division (4A) and Molecular Hematology (4B) division are today affiliated with this Center that over the years gained international visibility and recognition as hosting leaders in the field of Stem Cell Biology. This Center also attracted large governmental funding programs that financed core facilities and start-up packages that allowed new PI recruitments. The visibility of the Center, in turn, attracted new scientists many of whom have started their careers in the Center, then left for post-doctoral training abroad, mostly in the US, and later returned to be recruited back to Lund. After the departure of SEJ the hematology environment has been centered in a large structure headed by SK. In 2016 JL took over the leadership of this laboratory that now forms the 4A division. In 2014, MS and DB created a new environment that assembled laboratories attached to the Stem Cell Center that were not directly members of the SK laboratory and a few new recruits to form the 4B division.

Upon reading the Opportunities from the SWOT-analyses of the self-evaluation, it seems like all of the unit's ambitions are composed of things that they should be able to take for granted, such as participation in basic education. The panel believes that whenever hematology, stem cells, cell therapy, and even basic cell biology is being taught at LU's medical students and other undergraduate students, it should be the best researchers in these topics that the students should be able to interact with and get inspired by. At least a few of those teachers should come from this unit.

Another opportunity mentioned in the SWOT analysis was to explore long-term visions for research excellence through synergisms within the unit and surrounding partners. The panel believes it will be difficult to realize visions if the department (which holds the funding, personnel responsibilities, and salaries) does not participate in the vision building.

#### **Observations: Leadership**

## Priority setting, including goals for external research funding

UoA 4B is a young unit that was installed in 2014 and has 4 full professors (MS, head of unit, DB, cohead of unit, ESQ and SS). On the level of full professors this includes 25% female scientists and 25% clinically trained scientists. The remaining 8 groups include 37.5% female scientists and 37.5% clinically trained scientists.

UoA 4B is part of a large department (approximately 300 people and 100 PhD students) and the head of the department is ultimately responsible for final decisions (ARH). The department is diverse and activities range from regenerative medicine (represented by UoA 4A and 4B) to a large clinical cancer group. The Cancer center currently has no governmental funding such as the Stem Cell Center (funding sources of the Cancer Center were not discussed). A department board is in place (12 members). UoA 4B is represented by two members in the board (CB and GK).

Σ

UoA 4B supports collaborative research and this is evidenced by a number of published manuscripts in high-ranking journals that are co-authored by PIs from the unit.

StemTherapy funding: The activities of the unit are strongly supported by StemTherapy funding of the Bioinformatics and FACS core facilities and the apparently popular research school. The importance and use of other small core facilities is not clear. Also, the contribution of StemTherapy funding to rent, animal costs, and recruitments is unclear. There is no strategy outlined on the level of the unit, department, faculty, or at the university, what to do in case this funding line is discontinued. Discontinued funding of other SFOs occurred before and could potentially also affect the StemTherapy funding. However, there seems no alternative based on the lack of appropriate funding sources in Sweden. Lack or loss of StemTherapy funding would result in the loss of 1-2 persons per core and in an increased user fee to cover the expenses of core facilities. The remaining financial consequences were not precisely calculated but are predicted to reduce the overall drive and possibilities of the Unit.

StemTherapy funding at the university level: Right now 95% of StemTherapy funding is channeled to the Stem Cell Center – this could change from the side of the university at any time. In particular, the upcoming changes at the university level at the end of summer 2020 may introduce new strategic plans that may result in the re-allocation of StemTherapy funding. Another threat to SFO funding in general is the Covid-19 situation, which may prompt LU to use the funds or part of them, to cover losses or make strategic investments elsewhere. The SFO funding is deemed to be extremely important for the future of both 4B and 4A.

The LU faculty covers 70% of the salary costs of tenured staff. However, this does not include overhead which means that the actual support is lower.

Overheads are in the height of 22%. Of these 4% go to the department and the rest goes to the university; none goes to the PIs.

Many PIs hold prestigious external grants (ERC, Wallenberg foundation) and have impressive track records and achievements.

#### Recruitment, promotion and succession

The unit comprises groups recruited from outside (including the head of the unit) but also several groups that previously were associated with UoA 4A. Gender balance is good and acceptable on the tenured and non-tenured level.

This unit is successful in promoting PIs who are part of the unit, both on the junior and more senior level, suggesting that the leadership of the unit takes responsibility for unit PIs and support their promotion. This endeavor should be similarly supported on the level of department and faculty. Together, internal recruitments at the time point of installation of the unit and external re-recruitments but also de novo recruitments since that time—a vivid and highly successful unit was established.

Space was mentioned as a major limitation to develop the unit further (including new recruitments). The unit would like to bring in more clinical research groups to strengthen translational and clinical research, however, this is not feasible right now.

The unit is an internationally renowned hub for excellent research on hematopoiesis.

Promotion paths within the department and faculty lack transparency and formalization. This applies to all different levels. Eye-catching examples are different outcomes of promotion success in cases where the applicants clearly showed equal qualification. Outspoken and/or female scientists seem to suffer most from this threat. This is a serious issue upon which the panel reflected at length. The panel notes that the support for promotions of female and male scientists within the Unit does not suffer this type of bias; the bias appeared to be external although the precise cause unknown. There was no evidence found for a strategy by the University to support tenure options of young PIs (on the level of department and faculty). This leaves young PIs without clear career paths which can hamper initiative, hurt research, and lead to brain drain.

Promotion requests are handed in to the department that passes them on to faculty where decisions are taken. The department leadership was perceived as indifferent to the scientific excellence of UoA 4B. This may explain the apparent lack of pride on the success of UoA 4B and, consequently, the lack of structures supporting the promotion requests from truly outstanding scientists. This was perceived as one major threat to the continued excellence of UoA 4B. And of course this issue relates to the fact that the department serves as a collection of heterogeneous divisions without a common vision and with few common goals and strategies. The department leadership are obviously both excellent scientists in their own fields and have the best intentions of governing well, but the structure seems too rigid for anyone— either on the unit level or department level—to suggest, and drive through, any meaningful changes.

Other observations along these lines: The department can rank applicants for positions, and it was stated that the promotion of recipients of outstanding grants have priority over other researchers. However, this is not evidenced by previous promotions nor is there a guideline how and whether this ranking occurs. This may be due to the very diverse and partially non- scientific background at the department leadership.

Young research groups are recruited via the Stem Cell Center and/or are entirely based on external funding mounted by the candidate. Based on the availability of external funds the offers vary significantly between different recruitment processes. There is not contribution from the university side to support sustainability of such a research group upon positive evaluation.

Recruitments are difficult also because of many different organizational structures involved in the process. This limits the speed and decisive space of the units.

Open calls funded by the Wallenberg foundation—a possibility to recruit junior research groups – were planned but these plans have been discontinued due to the Covid-19 situation.

Selection of students (PhD and Master) is largely made through a competitive program, however, preselection and previous employment by the unit possible and used to assess qualification.

Students seem overall very happy with the research environment and with their supervision; although they also expressed some concern over their future as scientists.

Students raised their voice to emphasize the need for more 'central' information on how a PhD thesis needs to be structured to deal with the required obligations in order to graduate. This largely refers to the need of having to accomplish the publication of several manuscripts during the PhD qualification phase and this rule generally leads to the prolongation of the PhD time. This rule further results in the preference of several publications in low impact factor journals as opposed to the scientifically more important and thereby preferable strategy of publishing few publications in high impact factor journals. Finally, some students brought up the point that the PIs should be more aware of these constraints and define milestones to make sure that the publication needs are addressed by the time of graduation. The panel agrees but wants to add that it would be more effective and sustainable to change the requirement because publishing small studies in low impact journals. The latter strategy is also, as mentioned elsewhere, necessary for obtaining the most competitive postdoctoral grants and becoming accepted as postdoc in leading labs.

Funding of PhD students: The faculty covers a maximum of 3 months and the remaining time, up to 4 years and 9 months have to be covered by the PI through external grant money. However, the students have obligations to follow courses during their qualification phase, which results in the situation that PIs use external grant money to pay for students attending courses—a scheme that is usually not supported

Σ

by the funding agency and it is certainly not effective from the perspective of fostering scientific breakthroughs in the panel's opinion.

## **Publication patterns**

UoA 4B is very productive and PIs from this unit continuously publish in very good to excellent journals. There is a sufficient number of publications co-authored by PIs from UoA 4B which the panel judged was important.

The UoA wrote in their assessment that the medical faculty/LU base promotions to docent on quantity rather than quality of publications, and similar comments were made by both UoAs regarding the demand for publications in PhD student's theses. See the segment above for additional comments on this topic.

## The balance between activities in research, education and external engagement

Teaching activities are very low in the unit and all PIs would like to increase the teaching activities. There seems to be two reasons for this wish: First, promotion to lecturer depends on teaching activity of the candidate, and second, university funding of the unit partially depends on teaching and would correspondingly increase. However, most important is the accumulation of teaching experience for particularly young PIs because it is crucial for their career path. The panel would like to add the point that continuous undergraduate teaching at a reasonable level helps to engage and inspire the next generation of scientists. A key aspect in generational scientific strategies is to catch students early; teaching also helps junior and senior scientists practice how to present difficult biological phenomena in pedagogically effective ways—which in the long run will help their scientific careers and is good for the development of the subject area.

Administration is realized by the department (personnel responsible for HR, purchase). There are no administrative personnel close to the administered units because they are widespread and not sufficient coworkers are available. HR employees have the guideline to respond within 48 hours to any request sent to a 'function mailbox'. It is ineffective, the panel believes, to have administrative personnel far away from the unit they administer and this situation adds to the other weakness of the department that it is heterogeneous and diverse and lacks a common scientific vision.

Thus, the department has no impact on the strategic plans of the units. However, the department is supportive if recruitments are conducted via Stem Cell Center.

It was unknown at the panel's conclusion whether UoA 4B has a representative in the faculty board to represent the interests of UoA 4B in the faculty.

There is no common activity (seminars, management, purchase) between UoA 4B and 4A outside of the Stem Cell Center. This could perhaps be effective and something to consider for the two units.

## The overarching research strategy

UoA 4A and 4B work on highly related topics (hematopoiesis, immunobiology) but the level of interaction and collaboration is surprisingly low (surprising in the eyes of the panel members). Both units are part of the Stem Cell Center, and together comprise about 2/3 members of the Stem Cell Center, but there seems to be no further effort for deeper collaborations in place or planned.

UoA 4B has succeeded in recruiting highly competitive groups and manages to promote and foster collaborations. Overall, the PIs were very content of their placement in the unit and the overall organization and support by the head of the unit (MS). Added to this is a sense of great pride of belonging to this unit and to contribute to its success; career development seems to be vigorously supported and promoted by the senior PIs. As discussed later, the unit has limited possibilities to make decisions on recruitments and promotions and hence a limited possibility to forcefully develop and foster the overarching research strategy.

#### **Observations: Collegial culture**

#### Opportunities for early-career researchers to develop their originality and independence

This division is a young and vibrant scientific environment that has created the conditions to a highly successful and ambitious program with most of its members having excellent, many outstanding, contributions to their field of expertise that covers large areas of research in hematology and lymphocyte development. At creation, the division assembled a unique collection of highly successful scientists and has since a well-coordinated strategy to attract and coach young scientists, with a reserved allocated space that works like an "incubator" of senior researchers. This has proven very efficient and is to be praised considering that space a major constraint and a *bone fide* threat for the future of this division. From the four junior scientists that were recruited in the past 5 years all progressed to a senior career. This is in the panel's judgement an outstanding development.

#### Sustainability and renewal of research strengths

As outlined in other sections, this division has been very efficient in ensuring continuity. By supporting and mentoring young researchers the PIs and the leadership of this division are guaranteeing the longterm sustainability. However, for this strategy to be efficient there should be the possibility to allocate additional laboratory space to highly successful groups that have the financial capability to expand and to attract new competitive scientists from Sweden or abroad. This possibility seems to be absent at present.

An important aspect of sustainability is the participation of the PIs within this division in the overall life and leadership of the department and university. Considering that several PIs do not speak Swedish it would be important that all meetings be held in English so that these PIs can be included in this important part of the academic life.

Another aspect that was discussed is the criteria for promotions and evaluations. The university leadership is dominated by medical faculty that has a limited knowledge and understanding of the challenges of basic scientists. This appears to be a recurrent problem to both divisions 4B and 4A and the value of numbers of publications irrespective of their impact is a threat to both divisions. In the evaluation for promotions the impact of the publications criteria has to be different in the case of clinicians from those of basic scientists. The same should also apply to the requirements of publications in a PhD thesis. One very good high impact first author paper is crucial to obtain competitive postdoctoral fellowships and acceptance by high-performing host laboratories. Three average publications decrease the candidate's chances of having solid postdoctoral training. First co-authorships should also be considered as a first author publication as it has become increasingly used to foster major contributions usually reflecting true collaborative efforts.

The division is supported by a sustained financing from the SFO Stem Therapy and BioCARE/LUCC. These have been used to establish core facilities and finance the appropriate technical support. It is therefore important that these fundings are not discontinued or that other equivalent sources of support should be considered.

#### Academic networks and collaborations outside the unit

The different members of the division 4B have a strong intramural collaborative network as revealed by senior co-authorships in major publications. The interactions between the different PIs appear to work efficiently and the division has outreached in a concerted manner to international collaborations and networks. They use these to attract post-doctoral fellows to reinforce the division. Although this unit is efficient at starting and maintaining networks, it doesn't hurt to develop these strategies further and consider inviting visiting professors and going on sabbaticals and other similar strategies.

### Diversity, integrity and ethics

The division 4B functions around the 12 group leaders that have complete responsibility over the ethics questions. It is the strong philosophy of this environment to enforce the autonomy of the groups in all aspects that include management of reagents, technical support and scientific autonomy. Yet, in a collaborative spirit that has so far been very efficient. The division comprises a fraction of female leaders and is international in their composition with three of their faculty being foreigners. Decisions within the division appear to be taken collegially in monthly meetings where all PIs are invited. While the communication within the division appears very dynamic, the communication with the University leadership and with the Department appears less harmonious. Divergent opinions as previously mentioned on academic but also administrative issues are mentioned as distracting the PI from their major focus of research. A combined strategy with other divisions that have similar viewpoints could reinforce their representation in the departmental board or even try to create a new smaller Department.

## Quality in applications and publications

The division assembles highly motivated and ambitious PIs that have a very high standard of publications, sustained since their creation. Although the responsibility of the publications is ultimately that of the individual PI, it appears obvious that this division has attained a level of scientific interaction and collaborative network that has been beneficial to all members. Although there does not appear to be available any help from a dedicated grant office, the PIs of the environment nevertheless criticize and contribute to all high-profile individual grant applications that leave the unit and this initiative has resulted in a high level of prestigious external funding. The PIs also plan to apply for several European and American agencies for external funding to circumvent the relatively low level of funding that more senior scientists have access in Sweden past the junior level.

## **Observations: Quality ecosystem**

## Research strengths and how these are reflected in the educational portfolio

The unit has established a collaborative research environment made of teams with ambitious research and complementary expertise. This creates a solid environment and home for young scientists, including postdocs and PhD students. The high profile of the research programs— which include ERC and similar grants—is further underlined by a successful publication strategy. In addition, the easy access to several state-of-the-art technologies, e.g. scRNAseq and bioinformatics, and a stem cell-focused research school are ideal contributing factors to the development of young scientists, including PhD students, postdocs, and younger PIs.

The unit's combined research strengths are also explored in its PhD training, which is supported by the SFO Stem Therapy Research School as well as regular seminars, journal clubs, and meetings of the individual research groups. The training provided by the Stem Therapy Research School complements well the scientific training in the laboratories. Here, the unit further supports the young scientists by giving them tools at hand and valued mentoring to handle the difficulties during daily scientific work and to develop their full potential as scientists.

The scientists of the unit are internationally well connected and wish to explore the scientific exchange further to increase the possibilities of their graduate students to obtain postdoc positions in internationally leading environments.

## How external research collaborations (with e.g. industry, governments and states, county

councils, municipalities and non-governmental organizations) influence the quality of research As a major strength, the unit hosts three clinically active PIs in the division. This creates the necessary clinically expertise to work on current medical needs and to advance their research from bench to bedside and *vice versa*. Also, this may serve to attract further young physician- scientists in the unit and to further translationally develop the scientific work of young PhDs and PIs. Consequently, the units would like to increase collaboration between clinically active and basic researchers to create a win/win scenario.

As a further line of development, the unit aims to develop its cooperation with industry to increase commercialization of research units, which is good timing as industrial interest in modern molecular medicine is constantly increasing. As Swedish law ensures that each inventor has the rights of IP exploration of their own discoveries, this creates room for the generation of spin-off companies. In this regard, the units would like to support this by serving as a mediator of contacts between relevant parties, e.g. LU innovation and the PIs. Having open channels to innovation and commercialization is essential so that one can act swiftly when a research finding worth exploring in this direction arises.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

This topic is only briefly discussed by the unit in their own analysis. All collaborative experiments with clinical investigators have undergone ethical board review. Because of the "lärarundantaget" (teacher's exception) regulation and LU rules on integrity and ethics and available university rules, the unit has not developed independent policies for these points.

In our talks with the younger PIs, postdoc and students, it became apparent that the career pathways for the scientific research track are uncertain to them. That kind of situation is obviously unwanted as it creates worry and anxiety and can significantly hamper their drive and curiosity-driven research efforts. It could also make them more amenable to recruitment by other entities (industry and other universities). As discussed elsewhere in this report, it would be essential for the university and faculty to install clearer guidelines and base promotions and tenure on regular evaluations.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere As for many divisions in LU, the unit is highly dependent on and heavily uses functional infrastructure. Moreover, the unit has invested 7 million SEK of its own research funds into local infrastructure. Note-worthy, the unit is in charge of the Bioinformatics core unit and has installed an efficient pipeline for scRNAseq. The unit finds, although an improvement in the infrastructure provided by the faculty was seen, that the possibilities for advanced animal work still need improvement as the international demands in research with humanized mouse model and large animal models for preclinical/translational research are increasing. In addition, the unit discussed that LU has made recent major infrastructure investments over the last few years. While a fully equipped MAX4 (facility for X-ray) may be of potential use for the unit, the relevance of ESS (European Spallation Source; a neutron source) is less obvious to the unit.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized.

The unit is part of and well integrated into the StemTherapy SFO and to some extent into the LUCC cancer research network. The Stem Therapy SFO enabled critical recruitment initiatives and was essential for the establishment of the unit in 2014. Also the Stem Therapy Research School is strongly valued by the unit as a source for talented PhD students and postdocs. The role of the department is less explicitly mentioned in the reports. As also mentioned in the report of unit 4A (see also general comments below), the scientific home of their unit is often described to be the StemTherapy SFO, rather than the department (Laboratory Medicine).

## Recommendations

#### **Recommendations: Leadership**

### Priority setting, including goals for external research funding

StemTherapy SFO funding: Discussions with the department, faculty and university on long- term perspectives should be initiated. In particular, the new university leadership needs to be involved in these strategically highly important discussions because it affects fundamental research, translational research and education. The research in 4B and 4A is strong and internationally leading and has become an important strategic profile for LU which is recognized by both national and international researchers in multiple medical fields. The next "regleringsbrev" from the government will most likely include money for the SFOs and it will behoove LU to funnel the appropriate funds to this strategically important LU-initiative.

The hiring of a grant manager was suggested to support the identification of grant calls and the development of successful proposals for third party funding. This activity is recommended to support the bundling of research activities under the umbrella of a broad topic. It would be constructive if such a position was provided by the university to the entire department as this strategy would also increase the collaborative research between different units.

To further strengthen the competitiveness for international grants UoA 4A and 4B are strongly recommended to join forces more than before and to improve communication and cooperation even outside the Stem Cell Center.

Overheads: To encourage the acquisition of grants further, a percentage of the overheads can be provided to the PI to cover non-project related costs.

The day-to-day business of UoA 4B is organized separately but main strategic decisions are discussed in the Stem Cell Center. UoA 4B may become even more productive if the day-to- day business is shared with other units.

#### Recruitment, promotion and succession

Promotions: the process for promotions should be standardized and under all circumstances transparent and using openly communicated criteria.

The introduction of more formalized PhD proceedings should be considered. This can include the establishment of a thesis advisory committee to ensure that all requirements are met at the time point of graduation. This should be a primary concern of the faculty. Additionally, in the absence of change from above, the panel recommends that PIs discuss from the start what is required and which strategies for publication will be considered. The unit should obviously continue to publish as much of their work as possible in the best journals and to focus on complete studies with deep mechanistic insight—regardless of PhD and docent requirements.

The department/faculty/university should consider covering more of the PhD student's salaries; although it is not standard, it is fairly common for universities (e.g., GU and KI) to cover up to 50% and sometimes 70% of PhD student salary for 4 years.

The space problem needs to be solved to promote growth of this highly successful unit (UoA 4B). A communication channel between unit, department and faculty can be established to support the development of a viable solution.

#### **Publication patterns**

The leaders of UoA 4A and 4B are recommended to develop strategies to increase collaborative work resulting in co-authored publications between both units. The panel was surprised at the low level of interaction between the two units and could only see benefits with increased interactions—at least based on the information provided to us.

The way that the faculty/LU values quantity over quality in publication requirements for docent and PhD is viewed by the panel as a significant problem and we encourage discussions with the Unit on the importance of comprehensive studies with deep mechanistic insight published in higher-impact journals (quality) and the lesser value of chopped-up or incomplete smaller studies (quantity). This is not simply a matter of taste, and this panel believes that this type of strategy benefits the individual scientist, division, department, university, and society.

## The balance between activities in research, education and external engagement

The communication of the needs of UoA 4B to the department and faculty is considered of highest importance to ensure that the needs of UoA 4B are realized.

The faculty should consider restructuring teaching obligations to ensure that all PIs per unit have the option to teach to comply with the teaching obligations required for promotion to lecturer. Also, it is clear that students would benefit greatly from being taught by experts in the field.

To optimize communication between HR, purchasing units and others, we would recommend discontinuing the 'function mailboxes' and instead provide contact via one responsible person. This should facilitate administrative work of the units. The administration should be tailored around the need of the units that perform the core task of the university (research, teaching etc), not the other way around.

Thesis advisory committees (TAC) used to be in place to provide guidance for PhD students. However, they have been discontinued, and perhaps it would be wise to reinstall TACs to increase the support for PhD students.

## The overarching research strategy

To enhance collaborative research within UoA 4B but also with other units (particularly UoA 4A) a stronger integration in the Stem Cell Center could be considered, potentially accompanied by the recruitment of a strong senior leader, who can integrate the interests of all participating units.

## **Recommendations: Collegial culture**

## Opportunities for early-career researchers to develop their originality and independence

The division should continue their aggressive recruitment strategies and the recruitment of junior scientists should also be continued. For this to be viable, the division should have access to additional laboratory space and should be able to manage that space in a dynamic manner depending on each member's requirements.

## Sustainability and renewal of research strengths

It is very important to have a space management freedom because future tensions may arise due to space limitations and because outstanding performance should be acknowledged and rewarded. Moreover, to attract young or more senior faculty members more laboratory space is required. The English language should be used in meetings from the Department and University such that the foreign non-Swedish speaking PIs are not excluded from those directive organizations. A better communication between the members of the division and the Department and the University would benefit all parts involved. The criteria for promotions and the requirements for awarding a PhD should be revised to better adapt to the different paths in basic and clinical careers. It would be important that basic scientists could participate in the decision making of the University and that the University leadership understands the different constraints of medical and basic scientists. To make meaningful change, LU as a whole needs some level of change of direction. The people we interviewed at department and faculty level are excellent scientists

that know very well what is required to build effective research institutions, but just as the Unit 4B is restrained, so is the higher up leadership. It was clear from the interviews that many things that need to be changed, can't be changed due to old barriers and cemented cultures.

The integration of the division in the Department should also be reinforced. The Department of Laboratory Medicine offers the administrative, human resources and financial management. Limited resources and a large number of scientists within the Department results in a suboptimal support of the PIs in their administrative tasks. The increasing administrative burden is threatening the performance of this division due to increasing time spent on administrative tasks. The association of divisions in smaller, more manageable Departments where scientific coherence would also keep the association strong, would be a possible solution. When a leading scientist year after year is forced to perform more and more administrative duties, scientific discoveries and societal gains will eventually stop. Period! This problem should be one of the main tasks of LU's new leadership.

#### Diversity, integrity and ethics

While the communication within the division appears very dynamic, the communication with the University leadership and with the Department appears less harmonious. Divergent opinions as previously mentioned on academic but also administrative issues are mentioned as distracting the PI from their major focus of research. A combined strategy with other divisions that have similar viewpoints could reinforce the representation in the Departmental board or even try to create a new smaller Department.

#### Quality in applications and publications

Although all PI have collaborated to individual high profile grant applications and should continue to do so, hiring a new staff member that would organize these interactions and the bureaucratic load involved in many of these applications would be recommended (grant support function). Making sure all grant proposals that leave LU or the department are top notch in content, composition, wording, images, etc, will over time yield returns.

#### **Recommendations: Quality ecosystems**

## Research strengths and how these are reflected in the educational portfolio

As mentioned in the SWOT analysis, the units sees clear room for improvement in their involvement in undergraduate teaching, with the "access" largely being controlled by the faculty and the panel strongly agrees with this assessment. As a long term effort, it should be ensured that the very relevant area of molecular medicine and thus this unit is more represented as an integral part of undergraduate training. This could also benefit the recruitment of good diploma, PhD and MD students into this environment.

The 4B unit would benefit from becoming more involved into undergraduate teaching. This should be strongly supported by the Faculty, especially as the younger generation needs more teaching hours for career development and promotion. The PIs and scientists would like to more broadly introduce their line of "molecular medicine" research into the undergraduate programs, especially the medical program. This could help to identify suitable candidates for future physician-scientist positions, which could serve to bridge the strong translational interests of the unit and the medical hospital world.

A point that was critically reflected by the PhD students and PIs is the high burden/quantity of publications needed to hand in a PhD thesis (4 publications, thereof one as a single first author). The reviewers would encourage Lund University to look at each thesis on a case-by-case setting and allow some flexibility in the interpretation of this rule, if other quality parameters (e.g. influential paper, medical impact etc.) are met. This is discussed in another section of this report—i.e. it is deemed important to repeat.

# How external research collaborations (with e.g. industry, governments and states, county

councils, municipalities and non-governmental organizations) influence the quality of research As outlined under Observations, a major strength, the unit contains three clinically active PIs and would like to increase collaboration between clinically active and basic researchers to create a win/win scenario. Ideally, the faculty and the hospital should consider to further support this with protected time from hospital duties for those, who undertake the burden of going of working in 2 worlds as physician-scientists, and optionally also assign talented medical students and medical doctors to strategic areas of future interest.

Another strategy, although much more difficult but important to mention for the new leadership, is for the university and hospital to find transparent and effective ways for clinicians to perform basic research that goes beyond forskar-AT and forskar-ST. At a University hospital, it should make sense, and be worth it financially as well as career-wise, for all clinicians who are interested to perform research.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

No main issues identified by the unit or by the panel for this section to warrant specific recommendations. However, similar to the assessment of UoA 4A, we also recommend that all meetings and administrative paperwork should be in English to give international recruitments a chance to participate in them and to shape it accordingly. Some administrative documents obviously have to exist in Swedish first, but the ones that are important and concern the department as a whole, should be translated.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere As outlined under Observations, the unit finds the lack of proper animal facility in their vicinity as troubling and a significant weakness and the panel agrees with this. A well-functioning animal facility is essential for testing the clinical importance of basic research findings and implement them into practice or developing therapies. This should be accommodated by LU and the faculty. Given the enormous investments in other infrastructure at LU, it would make sense to hold regular evaluations by all users at LU to ensure that financial resources are invested into the most rewarding infrastructure (for all users) and benefit strategic goals.

The unit was deemed to have strong goals to strengthen national and international relationships. The panel recommends that the unit spends more time to try to further evolve these interactions. You could also consider sabbaticals for mid-career and senior investigators in key collaborating laboratories which could be a tool to bring in new spirits and technologies. Moreover, the option of visiting professorships could be explored to further support internationalization strategies.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized.

Lund University has 11 SFOs and the panel was impressed with how well unit 4B (and also 4A) interacts with and utilizes the resources of the Stem Therapy SFO. To support this further, the unit should consider to strengthen internationalization strategies to establish further links to other centers of excellence in stem cell biology and therapy and cancer.

An important strategic problem which hampers the visionary development of this unit is that the scientific home of this unit was described to be the Stem Therapy SFO, rather than the department (Laboratory Medicine). The panel believes that the organization of the department and how the decisions on resources and management is divided among its division is far from optimal. See below for additional comments.

## Additional recommendations

## Restructure the department or make the unit head a "linje-chef"

Individual PIs all (legally) report to the Department Head (Department of Laboratory Medicine). While this possibly creates more independence, to develop a joint unit vision it should be discussed whether the Unit Head should be part of this reporting structure. It seems that the Unit head has lots of responsibilities but very little resources and essentially no possibilities to drive a unifying vision for the Unit, which would require deciding on recruitments and other strategic investments. This problem is not unique for Unit 4B, as the entire department seems fragmented and a loosely-held-together collection of heterogeneous units. The department head is far detached from the activities on the floor (scientific goals and visions) yet holds the cards when it comes to the department's finances and personnel responsibilities. For the future, it would be advantageous for the department to have a common theme, where the department. If that is not possible, the Unit head could be made a bona fide linje-chef (e.g., avdelnings), with more responsibilities but also with control over resources and hard-end decision making.

## Departmental vision for itself and for the unit

Building on the above statements, as part of a regular evaluation of the units, there should be a mechanism and ideally a forum, in which joint a joint vision for the future development of the unit is developed. This is especially important, as the composition of the Department is very diverse and as joint overarching topics focusing on the needs and strengths of the researchers should be developed. Furthermore, if restructuring the department is not an option, it should be critically evaluated if the historically chosen/developed assignment to the Department of Laboratory Medicine is the ideal home for this unit to grow and develop. A Department for Molecular Medicine or a Lund Stem Cell Center as overarching structures could be alternative concepts. The leader of the department should be the leader of the scientific vision of the department.

## GAP MAP analysis

The SWOT analysis should be complemented by a GAP MAP analysis. What are the key gaps in terms of research, technologies, infrastructure and human resources (PIs and young scientists with perspective)? How could the unit take appropriate actions to strategically fill these gaps? For example, how should an ideal recruitment look like to complement the research strengths of the unit?

# Blood, Infectious Diseases and Immunology

# Panel overview

## Introduction

This document serves to introduce the research activities and environments of Panel 5 within the Medical Faculty, Lund University. This summary is accompanied by selfevaluation reports from each individual units of assessment (UoA) listed below that documents in detail various research areas associated with blood and defense. The evaluations of each UoA have been conducted by a team of researchers within each UoA representing different constellations and organizational units and chaired by a senior scientist appointed by the RQ20 office at the Medical Faculty. The eight UoA:s are as follows:

- 5A Clinical and molecular infection medicine (Chaired by Professor Bo Åkerström)
- 5B Immunology and virology associated with Department of Experimental Medical Sciences (Chaired by Professor William Agace)

- 5D Clinical and experimental autoimmunity (Chaired by Professor Anders Bengtsson)
- 5E Clinical Chemistry (Chaired by Senior Lecturer Magnus Abrahamsson)
- 5F HIV and clinical virology (Chaired by Senior Lecturer Marianne Jansson)
- 5G Clinical and experimental microbiology (Chaired by Professor Catharina Svanborg)
- 5H Protein chemistry (Chaired by Professor Anna Blom)

## Organization

The research environments within the panel consists of over 60 research groups headed by principal investigators at various levels in their career. The UoA:s also includes individual researches in other positions, many of which are mainly conducting clinical work at the University Hospitals in Lund and Malmö and are either loosely affiliated with research groups at the university or work more independently as adjunct scientist unaffiliated with any specific research entity. Recruitment over the last 5 years have been excellent and several new positions at junior and mid-levels have resulted in the formation of novel research groups within the panel.

## Research quality and output:

*Publications:* The publication record within the panel has remained strong over the last five years, resulting in a total research output in excess of 1,300 of which over 1% are highly cited (top 1% of articles).

*Funding:* Research funding remains strong although several UoA:s sees challenges and threats to the funding as the units are in change and as the funding landscape is shifting (see below). Besides the governmental funding supporting teacher salaries and infrastructures, the panel attracted external funding from Swedish and international funding agencies in excess of 725 million SEK. A substantial and increasing portion of this funding was obtained through larger collaborative grants.

## Collaboration:

Interactions within the formal organizational units and informal networks are emphasized in the evaluations, as is a flourishing national and international network of collaboration with academic scientist in other parts of the world, including traditionally western societies but a global approach to address global health issues is also strong within the panel. Interaction with Industry has also increased over the last 5 years with several academic inventions now transitioning to clinical trials.

# Challenges for the future:

*Gender distribution:* Although the overall gender distribution of personnel is evenly distributed, there is a challenge in retaining successful female scientist that at the moment results in a skewed gender distribution at top levels. This is an important challenge that is being addressed.

*Future funding:* The funding landscape has shifted over the last several years to focus more on collaborative program grants and consortia. Work within the panel will require setting up strategies for people to network and collaborate effectively, which will form a basis for future collaborative grants. Successful examples of informal and formal research environments are SEBRA (The Sepsis and Bacterial Resistance Alliance) a collaborative center with scientist interested in sepsis pathogenesis and antimicrobial resistance and the Virology Center that will be operational in September 2020, and will house virologists, primarily from Panel 5F in close proximity to each other. Other similar collaborative networks have been proposed and will be encouraged.

Σ

*Integration of clinical scientists*: This need to improve further both to improve the organizational challenges of working in two distinct and different environments (at the University hospitals and the University) and to improve collaborative interactions by further harnessing the clinical expertise and provide opportunities for research time in effective teams and constellations.

The aim of this summary was to provide some overall ideas of the organization, activities, productivity, collaborations and potentials future challenges within the panel. I hope this serves as a good introduction to the UoA sub-panel evaluations, where further and more detailed information about the panel's research environments are presented.

## External panel report

## Summary

The Blood and Defense environment is large and somewhat diverse comprising more than 60 research groups. The research focus of these groups range from experimental research in basic immunology, microbiology, and protein chemistry to translational and clinical research in laboratory medicine, infectious medicine, rheumatology, transfusion medicine and blood homeostasis. The eight UoA vary in size and composition and are either loosely affiliated research groups or more integrated research milieus linking experimental and clinical research, some at the campus in Malmö and some in Lund. This is also reflected by the academic and clinical affiliation of the researcher, where some have permanent academic affiliations and others have clinical appointments with Region Skåne. This organizational diversity has to be taken into account when evaluating how the UoAs have formed their leadership, developed their collegial culture and quality ecosystems to foster successful and internationally strong research, and its impact on health care. We have, due to this diversity, chosen to report separately for the different UoA, and also to make some general comments and recommendations.

In 2008 a comprehensive quality review of the research at Lund University (RQ08) was conducted. Several of the issues and challenges highlighted at that time are still unsolved, and they are in fact more relevant and challenging than ever. These include recruitment and carreer building for young PIs and clinical investigators, replacement of retiring leading PIs, imbalance between core funding and external funding, and insufficient translational network and integration of research within the clinics.

The overall scientific quality, output and impact have remained strong over the last five years, with several outstanding publications. It is evident that the success of a UoA is primarily the result of one or several excellent PIs being an attractive hub for recruiting junior scientists and attracting external funding. This, notwithstanding there are some common challenges and issues raised by most of the UoA. These are the limited number of academic career positions making strategic recruitment uncertain and ineffective, imbalance between core and external funding affecting long-term planning, PhD recruitment due to unrealistic financial requirement, and integration of clinical research within the health care system. Several of these challenges require a strong leadership, but several UoA report that they lack influence on recruitment policies, teaching, infrastructure renewal and overarching research strategies.

## **UoA 5A Clinical and Molecular Infection Medicine**

#### Introduction

The self-evaluation report describes work at three organisational entities:

- 1. Division of Infection Medicine in Lund (about 80 publications in 2019)
- 2. Subunits: Experimental Infection Medicine, Malmø (about 8 publications in 2019) and Clinical Infection Medicine, Malmø (about 18 publications in 2019)
- 3. Subunit: Applied Mass Spectrometry in Environmental Medicine (about 19 publications in 2019)

It is evident that this UoA is very diverse. The *Division of Infection Medicine in Lund* (1) is a confederation of 25-30 research groups located in Lund in close proximity sharing core facilities; The subunits of Experimental Infection Medicine, Malmø and Clinical Infection Medicine, Malmö (2) consists of researchers located in Malmö with research focus on microbiology and infections; and the subunit of Applied Mass Spectrometry in Environmental Medicine (3) is a large research group focussing on using mass spectrometry as applied in several areas and microbiology seems to be a minor focus. The self-assessment report is written by the head of 1) and co-workers, and the perspectives and descriptions mainly reflect the situations at 1); although the report does describe overarching themes common for the entire UoA. The publication analysis and the financial information pertains to the entire UoA and is not stratified according to subunits. The report states that the total funding in 2014-2018 amounted to 333 million SEK of which 77% was external and 23% direct government funding. Thus, for each Swedish kronor invested the University seem earn a 300% premium. The publication list reveals that the investments are translated into a high number of high quality research papers. A rapid analysis of the 2019 outputs confirms this conclusion. The self-evaluation report also lists important translational activities as well as out-reach initiatives. From an analysis of investments and outputs, the UoA is functioning well. This conclusion pertains to all of the three entities in the UofA.

At the meetings held with the assessment committee there were only representatives from the Division of Infection Medicine in Lund. Moreover, the organisational analysis in the written self-evaluation report mostly reflect the situation at this Division. *Therefore, the reflections on Leadership,* Collegial *culture and Quality of ecosystem below mainly reflect the situation at the Division of Infection Medicine in Lund.* 

#### Observations

#### Leadership

The Division was created in the early part of this century. The formation of this organisational structure, described as a network between 20-30 research groups working in close proximity at Skånes University Hospital, Lund and at Biomedical Center (BMC) is an example of very successful strategic leadership decision. It has created an environment and infrastructure with a critical mass to undertake research at the highest international level ranging from methods addressing molecular structures to epidemiology describing disease patterns in societies.

Currently, the work is organised in 28 research groups each headed by a principal investigator (PI). Some PIs possess a permanent position at the University, others do not. The funding for conducting the research is largely - if not entirely - funding extramurally and generated on the initiative of each PI. Thus, decisions on research focus and research initiatives rest with the large group of PIs. This creates an organic and flexible structure, which can respond to changes and opportunities. It seems to be working successfully. Dr. Mathias Collin has headed the Division since November 2019. He refers to a section leader (Ar-

tur Schmidtchen), who in turn refers to the Chair (Prefect) of the Department of Clinical Science, Lund (Michael Bodelsson). The Prefect have some influence on how permanent position are divided between sections of the Department, but it appears that neither of these leaders commands strategic research funds or funds for supporting activities. This leaves little room for strategic leadership at any of these levels of the organisation. This is noted in the self-assessment report, which states: "*The environment has been quite successful in recruiting new talent at all levels, but there has not been a well-communicated overarching strategy for recruitment*" and "*The process leading to an open call for an academic position has been less than clear, but we have nevertheless through both formally approaching the Department and the Faculty with requests, and through informal networking been able to secure a number of professorships and lectureships within the UoA*".

The fact that "*a well-communicated overarching strategy for recruitment*" is lacking could make carrier planning for ambitious midlevel scientists difficult. One problem mentioned several times in the self-assessment report pertains to the gender imbalance at the PI level in the Division. With the current organization of staff recruitment this can clearly not be address at the Division level.

The self evaluation report lists two threats: a) a worry that a tendency observed over the the past few years of dwingling research grant income from some of the major funders can lead to more permanet reduction in research budget and b) that the current diversity in research orientation in the longer run could impact on the research quality in key focus areas.

The self evaluation report states that there is a very good balance between "*research activities, educational efforts and external engagement*".

## Collegial culture and Quality ecosystem

The self-evaluation report indicated and this was confirmed by the interview that the collegial structure and the quality of the ecosystem is excellent.

The flat organisation with many PIs and a relatively low-powered Division head could have posed a problem for how the available extended common research infrastructure is shared and maintained. However, this is facilitated in "Infrastructure Groups" and it seems to function very well. There are also weekly meetings open to all employees addressing all aspects of the work environment and monthly meetings with one representative of each research group in attendance discussing research strategies and making decisions committing financial inputs from the research groups. The *modus of operandi* involves decisions making through consensus in rather large fora. This, has clarly fostered a good working environment and a good collegial atmosphere. The Division run weekly internal seminars and a yearly two-day retreat where more than 90% of staff participates and this testifies to the quality of the ecosystem.

#### Recommendations

Overall, the unit functions well. The research environment and the infrastructure have a critical mass to undertake research at the highest international level ranging from methods addressing molecular structures to epidemiology describing disease patterns in societies. The unit attracts very significant research funds and the research out-puts in for of published paper, translational activities and out reach is excellent. The organisation of the leadership at the unit rests with decisions made at many different levels in the organisation of the University. This makes strategic decision making at the unit level difficult and it could in the longer run compromise the success of the unit.

## Short term recommendations (immediate)

- Strengthen the leadership at the unit level by allocating a modest budget for the head of unit.
- Strenghthen the leadership at the group level by allowing PIs to administer and dispose over a small procent of the incoming overhead (e.g. 5-10%)

- The unit should consider alternative funding avenues than VR and other present major funders.
- The unit should consider to establish a group of 5 senior researchers to discus and present strategic plans for research infrastructure development, research focus and recruitment.

# **UoA 5B Immunology**

## Introduction

This UaA is formed around The Section of Immunology and hosts 8 independent research groups, representing a broad range of scientific and technical competence within the immunology field; immune regulation and homeostasis, autoimmunity, inflammation, infection and cancer, with a focus on basic regulatory and functional studies. The section has 4 PIs with permanent positions, all of which are professors and 3 of which are retiring this or next year. The remaining professor, as well as two non-permanent PIs within the section also have joint affiliations with the Technical University of Denmark. Three research groups from other UoAs and departments are located at, and interact closely with the Section of Immunology.

The strength of the UoA is its broad scientific competence forming the basis for scientific collaboration, translational development, PhD training and teaching. Since immune reactions are involved in most major human diseases, the future need for advanced knowledge and training in basic immune mechanisms is apparent. However, this strength also meets a challenge, since several medical research areas develop their own specific immunological knowhow and expertise. The UoA realizes that to sustain and develop their research and training in immunology, the major challenge is to recruit and nurish young competitive research leaders, and form strong collaborative activities. Another major challenge for their future competitiveness is that several professors are retiring and that the younger PIs have not been able to secure more long-term external funding and compete for faculty positions.

## Observations

## Leadership

The UoA is run as a flat transparent organization with regular meetings handling issues on infrastructure, teaching, space allocation, recruitment, seminars, and scientific activities. However, with no common budget and strong imbalance between faculty core funding for permanent teaching and research positions (14%) and external funding (86%), there is little room for common priority setting or long-term strategy. Like most UoAs, the immunology unit has little or no influence on recruitment, promotion and succession, which gives the leadership little room for long-term planning regarding recruitment and replacement of retired permanent PIs and teachers. Most senior and junior PIs are encouraged to secure external funding, and until now the funding situation has been good. However, with fewer PIs, a declining publication output and impact, and lack of state-of-the-art equipment, the competitiveness the coming 5-10 years will be challenging. This situation does not only apply to research, but since immunology is a core subject in all medical educational programs, it is also vital to secure teaching capacity. Today teaching involvement is left to individual PIs commitment.

## Collegial culture and Quality ecosystems

The UoA focuses on fostering strong independent research groups working within a common welcoming atmosphere, sharing common seminars, equipment and decision making. This collegial milieu would form a fruitful basis for early-career building and independence. However, with lack of sufficient faculty

support, this positive culture can only be sustained and flourish with strong external funding. So far, transition from junior to lecturer or professor position has basically been non-existing, due to lack of sufficient long-term funding and that the younger PIs have been unable to compete for faculty positions, which are often announced in broader areas. Since immunology has a strong impact on many medical areas, several PIs have formed networks and collaborations both locally, nationally and internationally, within academia and industry. Due both to economical constrains and scientific opportunities, three PIs have shared appointments and extensive preclinical and clinical collaborations with the Technical University of Denmark. There is an effort to create a common forum for scientific discussion and how to improve applications and publications, both at the senior and junior level. One successful effort is a large excellence grant from KAW, where several of the PIs are involved.

Today's educational system with problem-based learning and central planning, has minimized the role of different core subjects like immunology, pharmacology and microbiology. The expertise is more related to area of research, and the teaching involvement of the UoA is more *ad hoc* and related to the interest and commitment of individual PIs. This does not favour the important link between good research and good teaching.

There are several long-term and short-term collaborations with industry which have provided financial support and broadened the scientific competence. The positive impact on their ability to compete for external funding is however limited.

The UoA defines four critical research infrastructures: animal house and barrier facilities, cell culture and P2 laboratories, state-of-the-art flow cytometry ,and microscopy and imaging facilities. Most of these are up to date and accessable, but there is an urgent need for renewing their flow cytometry equipment. Without this investment, the competitiveness and survival of the unit will be seriously threatened.

### Recommendations

The field of Immunology is broad and dynamic and several successful treatments and diagnostic tools have recently been discovered with strong impact on several diseases. The UaA is a well-managed and transparent entity which has been quite strong and successful over the years. However, with its limited number of academic positions and strong PIs, several measures should be taken to strengthen their research and future impact on postgraduate and graduate education.

- Several junior or established scientist must be recruited to replace the present retirement of senior PIs and professors
- Although bottom-up driven research by individual PIs is essential and preferable, it has resulted in a fragmented and suboptimal research portfolio. Focusing on some common issues and strong themes should enhance their competitiveness and attraction. A good example is their present KAW grant.
- Despite the fact that the unit is run as a flat, transparent and interactive organization, there is a lack of influencial interaction with department and faculty leadership. This is a common issue for most UoAs, which should be addressed and resolved by the faculty leadership.
- As clearly highlighted by the UoA, upgrading and replacement of certain infrastructure equipment is urgently needed
## **UoA 5C Transfusion Medicine and Hemostasis**

#### Introduction

UoA 5C consists of two main topic disciplines: Transfusion Medicine (TM) and Clinical Haematology/ Coagulation (CHC). Clinical Immunology which in the clinic is linked to Transfusion Medicine belongs to another Department and is evaluated in a separate UoA. TM has four PIs; Professors Martin Olsson and John Semple, and Ass Profs Jill Storry and Jens Kjeldsen-Kragh. CHC has at least five PIs with two professors Jan Astermark and Peter Svensson, three associate professors and 16 affiliated physicians. TM is located at SUS and at BMC in Lund, while CHC has their open surgery at SUS (Malmö) while the wards are located at SUS (Lund). Thus, both disciplines are dispersed to the Lund and Malmö campuses.

The two main groups of TM that perform most of the research are internationally well renowned, with focus on erythrocyte and platelet biology in the context of transfusion medicine. Both groups are complemented with younger collaborators Storry (Olsson) and Kragh-Jensen (Semple), respectively. CHC has since early days a very strong international reputation within the haemophilia field particularly the clinical immune therapeutic protocols, with one senior professor Erik Bernstorp, representing this period. Today the research is still focused on hemophilia but with prof Svensson, also on thromboembolism.

#### Observations

#### Leadership

Despite being a clinical specialty, CHC has no real problems finding time for research when such are allocated to colleagues. Also, TM reports that enough time is available for both preclinical and clinical PhD students to fulfill the requirements for a PhD. With this in mind and combined with the large number of clinical colleagues including the Ass Profs the age distribution is favorable for future sustainability for both TM and CHC.

Both TM and CHC publish at a robust publications rate, with reasonable amounts of citations and in renowned journals. This is particularly evident for TM with several publications in Nature and Science derivatives and in Blood.

TM has large external grants from both national and international sources, which allows them to perform high-end research also in the future. The budget of especially CHC, depend to a large extent on the ALF grants, which cover much of the rent and the infrastructure, but the majority of grants come from external sources nationally and internationally. Despite the good funding, the TM groups are not content with the high rent for laboratories at BMC, and the high and compensatory OH for central administration leaving only a minor sum for the units to use for internal initiatives.

#### Collegial culture & Quality ecosystems

A major strength reported by the TM groups, is their extremely collegial nature and ability to communicate to make collaborations very easy to initiate. TM and CHC take part in education without having special academic positions other than the professors. The general sentiment is that research enforce the quality of the education.

TM and CHC have extensive national and international collaborations. Also at the local level interdepartmental collaborations take place. TM collaborates with a number of internal sections including the SFO StemTherapy and hematological research. StemTherapy provides core facilities in the close neighborhood of the BMC laboratory.

Of great importance for CHC is the long-lasting collaboration between CHC and clinical chemistry, where previous internationally renowned researchers have collaborated within the coagulation field. It is

therefore of great significance for the coagulation field that Prof Björn Dahlbäck's professorship will be reinstated, which will help to maintain this network of expertise within basic and clinical coagulation. Another development which both TM and CHC will benefit from is the professorship in transplantation immunology.

Unfortunately, TM and CHC have at the moment only limited interaction, but the evaluation process RQ20 has sparked an interest of collaboration, which has resulted in an initiative to start a common seminar series. As stated in the evaluation form, if communication ties were better, it would become a formidable hematology-focused group in Scandinavia.

#### Recommendations

Both TM and CHC are well-functioning units with many groups in the international forefront. The reported information is a bit scarce especially concerning the information from CHC, but taken together this UoA has no serious problems to perform high quality research and postgraduate training. However, some recommendations may be proposed:

- The lack of collaboration between TM and CHC is somewhat unexpected. CHC's more clinically oriented research with hemophila and thromboembolim field would profit substantially if they collaborated with more preclinic-science research groups within nearby research areas. This is especially of importance when clinical chemistry research is less active.
- TM, like most UoA, is not content with the high rent and how OH is allocated by the department, faculty and university. Dissemination of part of the OH to the units would facilitate recruitment and future strategic planning.
- CHC is dispersed over the LU campuses. A concentration to one site would increase the efficacy and time for research.
- The localities for CHC at the Malmö campus are in poor condition. These buildings need refurbishing or being replaced. A criticism also supported by other Malmö-located UoAs.

# **UoA 5D Experimental and Clinical Autoimmunity**

Only the rheumatology unit in Lund has answered the evaluation request, but there is an additional rheumatology unit in Malmö which is headed by adj Prof Carl Turesson. The two rheumatology units are linked via the LU but have separate SUS administrations in Malmö and Lund. Therefore, only the Lund unit is evaluated in this assessment, despite a strong collaboration between the units. The LU UoA is located at two different sites: Section for Rheumatology, Lunds University Hospital, and at BMC in Lund. Four research groups in arthritis, scleroderma, vasculitis och SLE exist. At present there is one professor (Bengtsson) and since 2019 one adjunct professor (Kapetanovic) with economic support from Region Skåne. In addition, there are six associate professors (docent). Most of the other physicians have a PhD or are in a PhD program.

#### Observations

#### Leadership

Both more senior and young researchers have support allowing them half-time research. There are no problems to recruit new doctors to the unit and there is a favorable age-distribution, and combined with these advantages, most of the physicins choose to perform PhD studies assuring a good sustainability.

Most research groups are funded by the Swedish Rheumatism Association (Reumatikerförbundet),

King Gustav V:s 80-years fund (Stiftelsen Konung Gustaf V:s 80-årsfond) and local funds including funds from SUS (the hospital) and Region Skåne. Only profs Bengtsson and Mohamad are funded by the Swedish Research Council. Another major source is ALF, which includes half-time research positions, salaries for other personal and the rent for lab space at BMC.

#### Collegial Culture & Quality Ecosystems

A major strength is their strong clinical research using patient-cohorts research registers with data on outcome related to disease characteristics and treatment coupled to a large biobank with serum and plasma. This allows excellent possibilities for translational research. Added to this is a supportive infrastructure with biostatistician, data manager and a unit for clinical trials with their own personnel. The UoA has a fairly strong publication rate and quality with several collaborative publications, but the the leadership aims for publishing in higher impact journals.

A weakness in the effort to become more translational is that their strong clinical research is not complemented with equally strong experimental rheumatology. There are no animal models available such as in arthritis, and only a few full-time PhD students at the unit participate in the experimental activities at the BMC laboratories. This underscores the difficulties to perform translational research when experimental rheumatology is not physically at one site.

The clinically-oriented research covers most of the major inflammatory rheumatic diseases, but a possible weakness is that there are still a few conditions without research connections such as inflammatory idiopathic myositis, where there is no on-going research. Since most of researchers are clinicians, it is a challenge to allocate time for research. For economic reasons, there are also difficulties to maintain a clinical trial unit.

#### Recommendations

Overall this UoA seems to be a well-functioning unit with a favorable mixture of clinic, education and research where each part of the unit is benefitting from the others. But as pointed out by the leadership a more translational approach is lacking. The solution to this could be not to add additional projects into the activities, but to focus on a limited number of projects, so that the projects reach an optimal critical mass. Focusing would also improve the economic conditions, since most of the research activities are depending on ALF and more specialist funds such as GV and Reumatikerförbundet. A number of possible initiatives could therefore be taken:

- All research groups within the unit have extensive networks locally, nationally and internationally e.g. Tissues in Motion, Chronic Inflammation Program (ChIP), EULAR and GlobalGout, EUSTAR, Systemic Lupus International Collaborating Clinics (SLICC) etc. These program areas have facilitated new collaborations and some are still ongoing. Such collaborations would provide ample possibilities to apply for money in larger consortia in Sweden, EU and other European organizations.
- More contacts with other UoA could also improve the possibilities to directly perform translational research but also to facilitate applying for grants nationally and internationally. Here, e.g., the UoA Immunology would a be very suitable partner according to this panel's evaluation.
- Although already in operation in some areas, the unique database connected with clinical data is a unique source for collaborations with the industry, particularly diagnostic companies with whom collaborations and unconditioned grants could help to support their translational line of research.

# UoA 5E Clinical Chemistry

#### Introduction

The Clinical Chemistry unit is divided geographically between Lund and Malmö, and belongs to different academic departments: department of laboratory medicine, Lund and department of translational medicine, Malmö. Despite this, there is collegial atmosphere within the unit, both related to a common research history and the research subject clinical chemistry.

The unit is defined by 46 names, but that number also includes past unit members. The active unit members today are slightly under 30 researchers. The unit consists of 6 PIs: professor Malm (Malmö), senior lecturer Persson (Lund) and senior lecturer Abrahamson (Lund). 3 PIs have reached retirement age (professors Dahlbäck, Grubb and Lilja) but they are still active as senior professors. Notably, the research generated from the latter research group's account for one third of the unit's total research publication.

#### Observations

#### Leadership

The research unit is characterized by a flat organisation, where the PIs are independently running their own research projects. However, sharing of equipment's, and related collaborations, take place on a collegial basis.

There are a total of 4 academic positions at the unit, and as it seems, with relativity extensive tasks in undergraduate education (one of the academic positions is solely focused on teaching). It does not seem to be a marked imbalance between teaching and research today, but the unit estimates that the workload related to education will increase in the near future. There is however an imbalance between clinical work and research: many of the unit members are fully occupied with clinical duties. It is emphasized that ST-doctors with allocated research time often are unable to do research due to clinical workload. Taken together, there is a significant research interest within the unit, but this is limited by few academic positions and clinical workload.

#### Collegial Culture & Quality Ecosystems

The unit has had history of excellent research, for example in the area of coagulation, but the main subject of clinical chemistry today, like laboratory medicine in general, no longer have the same strong position in medical research. In 2008 clinical chemistry was evaluated by professors Theodorsson and Stenman ("Utredning av området klinisk kemi vid Medicinska fakulteten, Lunds universitet"), partly in light of the challenging generational shift at the unit. The evaluation highlighted possible future strong research areas within clinical chemistry. During the discussion with the unit's members it emerged that research concerning proteomic and post-translational protein modification could be possible strategic research focus.

#### Recommendations

Despite a long-lasting development towards automated routine analyses, there is still a great need for academic research based on improvement of laboratory analysis and diagnostics. The unit needs to strate-gically strengthen the work with an overall research profile. To take the lead in in next generation of analyses and diagnostic development concerning proteomic could be a potentiallysuccessful area of research. Current strong research projects/areas could be a natural part of such an overall research profile. The unit should, with its excellence in laboratory analyses and in close proximity to the hospital units, be able to play a central role, and be a center for several translational and clinical projects. Current financing of research costs relies to large extent on ALF-funding and the number of externally financed PhD students and Post doc potions have decreased. The unit will need to strengthening and extend the external research funding and the postgraduate training.

# **UoA 5F Virology**

#### Introduction

This unit consists of scientists whose overarching interest is research on virus. There are currently five principal investigators, i.e. group leaders employed at Lund University with broad and complementary expertise in virus biophysics, molecular virology, immunovirology and system virology. The research groups within the UoA have overall a broad and complementary expertise in virology. The strengths of this unit is that all PI run well recognized and excellent research projects financed by VR for the coming years, and that they discuss with the Faculty to form a strategic Virus Research Center (VRC) allowing concentration and increased strengths in virology within the Medical Faculty at the university.

#### Observations

#### Leadership

During the evaluation some challenges were observed. One was that the VRC will be located at premises in Malmö, resulting in movement of several PIs and their research groups. Another is that cost for office and laboratory are not fully covered, and that there is no obvious strategy to attract clinical ALF grants. The PIs of the Unit believe that formation of VRC could facilitate new innovative research projects and thus larger grants. This is probably correct. The PIs were very positive towards and willing to build the VRC and they foresee a positive development in the field of virology. Building a VRC with PIs with different expertise in virology is positive and should be supported. However, some of the challenges identified includes limited number of PI and thus small critical mass.

It was clear that the Unit is flat and no obvious leader could be identified that would take the task to act on administrate and economical issues once VRC is in place. The unit should have an idea as to how this should be established.

#### Collegial culture and quality ecosystem

The level of experience of the PIs is balanced and ranges from associate senior lecturer to professor. The Unit has joint weekly presentations and journal clubs, and they also organise monthly seminars together with the clinical microbiology. It can be anticipated that topics of seminars will be broader once VRC is in place. While the collegial milieu appear to form a positive basis for career building, it is a concern that there are a limited number of permanent positions to sustain the activity. The transition strategy from junior to lecturer or professor position is weak. However, the Unit has organized a workshop on "what is expected from a competitive CV in academia" to address this issue. The unit has rather extensive postgraduate programs with several PhD students. The majority, however, are recruited from abroad, perhaps due to funding conditions. Lack of long-term funding puts a challenge to future recruitment and career building strategies.

As grant proposals these days often focus on common proposals with several research groups applying together, it would have been informative to know if any such joint grant applications are submitted by the PIs. This should have strengthend the added value of building a VRC.

The Unit describes the requirements for BCL-2 and 3 laboratories but does not have any requirement for animal facility. For future recruitments to the VRC, it would have been desirable to plan for an animal facility. At present the PIs appear only to consider short term needs, which could be a drawback for future recruitments.

It is not completely clear how this unit was assembled and on which initiative the VRC was proposed, and if all PIs have contributed to the ideas of building the VRC. Of some concern is the lack of an association to VRC by the virus biophysics group. The group has already received MAX IV and ESS support

Σ

from VR, and the group is currently conducting experiments using the synchrotron. Thus, based on research profile is the physical association of virus biophysics group to VRC unclear.

#### Recommendation

The Unit consists of independent scientists in virology with PIs running projects financed by VR during coming years. Concentration of virology to a VRC will strengthen virology within the medical faculty, and presumably make the individual groups more competitive, in a world when collaboration are more necessary than ever, best illustrated with the ongoing coronavirus pandemic. The virology Unit and VRC should therefore gain more basic support from the faculty to build this collaborative center.

# UoA 5G Clinical and Experimental Microbiology

#### Introducation

This UaA is not a coherent unit with a common organization, but comprises of four individual research groups performing excellent research on different aspects of innate immunity and inflammation in experimental and clinical infectious biology, primarily related to urinary tract infections, tuberculosis and respiratory infections. Cancer biology and new therapeutic strategies are also important areas of research. Two PIs are emeritus professors (Svanborg and Leffler), one (Godaly) in the process to be promoted to professor, and one professor (Riesbäck) has his laboratory at SUS, Malmö and is professor of clinical microbiology, with a clinical affiliation in Lund. Their innovative research is cross disciplinary combining basic technologies and discovery capabilities with translational and clinical studies. Their successful ability to take basic discoveries to the clinic has also resulted in several industrial collaborations and start-up companies. The PIs, particularly Svanborg and Riesbäck, have been very successful in securing external funding both from national agencies and industry. The overall scientific output is excellent with more than 13% of their publications in top impact journals.

## Observations

#### Leadership

This unit is a good example of how strong individual scientific leadership can create successful translational platforms for research. The large research groups of Riesbäck and Svanborg have a balanced mix of doctoral students, postdocs, young scientists and clinical investigators. The groups are supported from extensive external and ALF funding, with short term postdocs, part-time PhD students and few full-time PhD students, and a limited number of career positions. With funding primarily from external sources, relatively few full-time PhD students can be recruited. Although not an immediate issue, a challenge for the future is how to replace two retiring senior professors and PIs. However, being an attractive research mileu for both preclinical and clinical scientists, the future looks bright for developing translational research, patents and clinical applications.

#### Collegial culture and Quality ecosystem

The PIs have over the years built and been able to sustain strong research milieus, within which young scientists and clinicians have been able to collaborate and develop their own line of research. To foster and sustain this development, it is important to establish a translational organization and collaborations, where experimental and clinical studies can be linked to more long-termed perspective studies in different patient populations. However, with funding primarily from external sources, relatively few full-time PhD students can be recruited. A pattern we have observed in most UoA.

Although the UoA does not represent a defined teaching subject, the PIs and junior scientists are actively involved in teaching, stressing the value of exposing students to research and interaction with successful scientists also during their medical and biomedical training.

The UoA has secured successful and extensive national and international collaborations, related to their specific research area. Their laboratories are fully equipped with MALDI, flow cytometry, imaging instruments, molecular biology resources, and access to animal facilities.

#### Recommendations

This UoA comprises of two strong and well-functioning and well-funded research milieus, one in Lund and one in Malmö. Both are at the international forefront and have generated important new concepts for therapy and clinical applications for infectious diseases and cancer. To further develop and sustain their successful research, some initiatives are warranted:

- Involve leading scientists in teaching and tutoring to improve medical education, and attract MD/ PhD students
- Further develop translational research milieus, where complementary expertise and methodologies can be utilized.
- Develop career-building positions to sustain and further develop their research
- There are good examples of clinical collaborations, but to improve and facilitate the translational ecosystem, a closer and more accessible interaction between laboratory and clinical medicine related to microbiology and infectious diseases would be beneficial.

# **UoA 5H Protein Chemistry**

#### Introducation

This UoA consists of two research groups lead by principal investigators professor Anna Blom and professor Henrik Thorlacius in Malmö. These research groups work independently of each other and the formation of this common unit is probably a theoretical construction.

The PIs conduct international leading research in the area of innate immunity (e.g. complements system and neutrophil functions). Ongoing research also highlights on cancer, rheumatology as well as other related areas. The Research covers both explorative, translation and clinical projects.

The strengths of the units are the two internationally recognized PIs with large research groups, solid external funding, and strong publications output in renowned and leading scientific journals. The PIs will remain active for several years and there is no age or obvious gender problems.

#### Observations

#### Leadership

The leadership of the unit is separated and directly related to the two research groups. During the discussion with the PIs it became clear that the OH costs not covered by the funding agencies, are not co-financed by the Faculty and University. It is a serious problem if parts of an OH cost must be covered by other external grants. There is also a need for strengthened administrative support directly to the research group. Prof. Bloms research group consists of more than 30 members supported by several large external grants, which requires extensive administrative work.

Both research leaders raise the problem of few university and career positions, and that the research activities almost entirely depend on external grants and ALF support.

#### Collegial Culture & Quality Ecosystems

It was pointed out that the laboratory facilities in Malmö are in poor condition. Space scarcity has also limited further research expansion. With the unit's strong external funding, the Faculty benefit significantly from the research generated in this research environment.

A potentially threat to the two successful research environments is what happens if one of the PIs leaves Lund University. With no or few career positions and junior Pis, it is quite likely that much of the research will quickly disappear from the university.

#### Recommendations

The laboratories in Malmö are in poor condition, which must be handled by the university and the hospital.

It is important that successful research groups receive both sufficient administrative support and career research positions from the faculty

#### General recommendations

A major issue raised by all UoAs in Blood and Defense is how to build careers, recruit and secure future research positions. With few permanent positions financed by the Faculty, and most scientists, postdocs and postgraduate students supported by short-term external grants and ALF funding, there is no room for strategic planning at the UoA level. There is little doubt that a flexible recruitment system for researchers at the senior level can ensure healthy competition when filling University funded positions. Moreover, the ability of University appointed scientific staff to choose the unit they wish to be attached to, can foster a healthy competition between units. The question is whether these advantages outweigh the problems this strategy cause for implementing strategic leadership at the unit level.

- To develop quality research and teaching, several initiatives should be taken:
  - o Full time PhD positions are only financed from external project grants, which has resulted in a low number of preclinical PhD positions and several part-time clinical MD/PhD. The department and faculty must be responsible for financing long-term and competitive PhD programs.
  - o Develop a Postgraduate school (Forskarskola) for translational research to attract both biomedical and clinical MD/PhD students
  - o Adjunct professors are common as a mean to recruit clinical investigators in a less competitive way. This is however not a sustainable way to replace senior PIs and professors.
  - o A more attractive career-building system for excellent young scientist, both preclinical and clinical, and financed by departments and faculty, should be developed. Today, the UoAs have no influence on this process.
- For the UoA to develop long-term strategies for recruitment, program planning, dissemination of research, and teaching, some core funding should be available at UoA level.
- Aministrative assistance should be available to facilitate and improve efficacy within the UoA.
- OH compensation for external grants, which do not allow full OH applied by LU (KAW, CF, HLF...) should not be paid by the individual PI, but by the department.
- The University and Faculty should consider if the current matrix organisation of research activities is preferable to a system with a more clear definition of leadership roles.
- The University should better define the mechanisms for strategic recruitment.

# Panel overview

#### Research environment

RQ20 Panel 6 consists of five Units of Assessment: 6A Target tissue, 6B Cardiovascular, 6C Islet, 6D Genetics and epidemiology and 6E Type 1 diabetes. This panel comprises most of the 31 PI:s at the Lund University Diabetes Centre (LUDC) – only Karin Berger, Annelie Carlsson, João Duarte, Gustav Smith, Emily Sonestedt and Peter Spégel are in other panels. On the other hand, three Panel 6 researchers (Charlotte Erlanson-Albertsson, Anna Hultgårdh and Sten Ivarsson), are not LUDC members but collaborate with LUDC researchers. In all, this panel covers everything from molecular and cellular studies to clinical research with a focus on the development of diabetes and its micro- and macro-vascular complications. Majority of the groups focuses their research in classical diabetes, such as islets and target tissues. Among the five groups within panel 6 that perform cardiovascular research four belong to LUDC and they work, at least partly, on the cardiovascular complications in diabetes. It should be noted that there are other areas of cardiovascular research at LU will inevitably be fragmented.

LUDC forms the LU portion of the strategic research area EXODIAB (Excellence of Diabetes research in Sweden); 70% of the funding comes to LU while the other 30% go to Uppsala University. During the 2015 evaluation of LU's SRAs, EXODIAB received the highest possible scores from external reviewers in 1) scientific production, 2) societal impact, 3) collaboration, 4) education, and 5) leadership. Evaluators stated that LUDC is "one of the top three diabetes research centres in the world", in line with reports from a scientific advisory board describing the environment as "a powerhouse for diabetes research". One of the main strengths of LUDC is its width in expertise and capacity to approach a scientific question from several angles. LUDC remains open to new developments and the centre has recently expanded its expertise with new recruitments in liver and brain research. EXODIAB and thereby LUDC has every intention to remain a world-leading organisation that contributes to improve life for patients with diabetes.

With an average scientific output of 350 peer-reviewed publications/year in 2014-2018 and total citation count of >44,000, the LUDC researchers are extremely productive (Table 1). They are also very successful in attracting external grants and are (co-)coordinating major international projects, such as EU/ pharma-funded Innovative Medicines Initiative projects on biomarker discovery, diabetes complications, and obesity, and the well-known NIH-supported TEDDY, ASTR1D and POInT studies in children with type 1 diabetes.

	6A	6B	6C	6D	6E	Total/Mean
Scholarly Output	88	524	210	710	222	1754
Citation Count	1073	11661	4190	23590	3875	44389
Citations per Publication*	12.2	22.3	20	33.2	17.5	21.0
Outputs in Top 10 citation percentile (%)*	11.4	23.1	21.4	30	20.3	21.2
Outputs in Top 1 citation percentile (%)	-	6.5	4.3	8.6	5	4.9

Table	1: Scholarl	V Output in	UoAs of	Panel 6	6 in	2014-2018.
10010	n benonan	, output	00,000		• • • •	

\*Citation statistics on low publication frequencies should be interpreted with caution

## Leadership

From its inception in 2006, LUDC has been a joint effort, in which each PI contributed with a distinct expertise, initially with 10 PIs in the lead. The centre's Executive and Governing Boards prepare joint activities and strategies, and these governing bodies are open for suggestions from the rest of the team. In 2016, LUDC had a change in leadership and assigned an internal "Future group" to study and discuss organisational options. One of the outcomes was to shift from a structure of 11 PI:s and associated co-PI:s to a more horizontal organisation in which all PIs are represented equally. This change increased the incentive to actively participate, while giving a more equal voice to younger researchers.

LUDC provides "bridging support" for younger promising researchers without permanent position and supports infrastructures, unique expertise and new techniques to be available to all rather than restricted to certain projects. Thus, there is a continued support for younger scientists and a promotion of equal opportunities in the environment to produce excellent science. Besides bridging support, LUDC actively supports its promising young researchers by nominating them for achievement awards, by encouraging clinicians to proceed with a scientific career and by supporting the early career network, Diabetes Program at LU (DPLU, more below).

LUDC aims to promote gender equality, equal opportunities and diversity, and to foster new generations of leaders. A testimony of efforts invested in these matters during the past 10 years is the current gender balance between male and female PIs at LUDC where 47% are women (43% of PIs in Panel 6)

# Collaboration

"LUDC is the most vibrant and diverse research environment that I have ever been part of. Trust is high and opportunities for collaboration are endless" and "I think there is a certain LUDC spirit that makes people grow and realize that big goals can be achieved as long as we continue the struggle as a team and benefit from mutual platforms" are quotes from LUDC researchers. They reflect the general atmosphere of openness and generosity, and the shared view that collaborating is much more productive and benefits our main stakeholders, the diabetes patients, more than rivalry, yet allowing a healthy level of competition.

As noted above, Panel 6 researchers are much sought-after partners in many national and international collaborations. They have an inclusive attitude: not only do they welcome collaborations, they also open up the centre's infrastructures to outside researchers, when and where possible. LUDC has some of the best characterised diabetes cohorts, which adds to the centre's attractiveness for research projects and industrial collaborations. Building on the success of the Ahlqvist et al. paper (Lancet Diabetes & Endocrinology 2018) on the new sub-classification of diabetes patients, many new collaborations with academia and industry are being initiated. With the increasing size of the ANDIS study, the cohort can be used for genotype-based recall studies, which is of great interest to industrial partners.

# Infrastructure

One of the strengths of LUDC researchers is the philosophy around infrastructures, which is based on an appreciation of the importance of investing in and developing cutting-edge technologies to remain at the scientific forefront. A system for joint investments and maintenance of key infrastructures includes the technical personnel running them to maximize their use, and to help all but especially early career scientists to access otherwise expensive or difficult to establish infrastructures. We continuously renew critical infrastructures, such as computational servers and sequencing robots, as well as invest in new technologies and expertise. Affiliated investigators have access to unique large, deep-phenotyped prospective studies, clinical trials and large sample repositories (including serum/plasma, urine, DNA, tissue biopsies, blood cells) from individuals with and without diabetes. Rich longitudinal clinical and biochemical data that can be linked to health care information as well as genetic, multiomic and morphometric data are available for analysis. Self-sustainable in-house omics platforms, flow cytometry and imaging core facilities are driven at LUDC and open to internal and external users. Gene editing, single cell RNA sequencing and iPS-cell platforms have also been recently established.

Through a defined strategy for industry collaboration and the establishment of an industrial research platform (LUDC-IRC, funded by the Swedish Foundation for Strategic Research), LUDC resources are linked to robust bioinformatic pipelines and are used as platforms for discovery of new targetable pathways and biomarkers, in combination with effective functional validation and investigator-initiated clinical trials (through the Clinical Trial Unit-CTU, TrialNet and the Clinical metabolic Laboratory-CML, headed by LUDC PIs) for rapid translation of results back to the patients.

A unique resource is the Human Tissue Lab (HTL), an unprecedented array of bio-banked biopsies (e.g. pancreatic islets, blood, visceral and subcutaneous fat, lymph nodes, skeletal muscle, liver, intestine) established during the past decade through LUDC investigator-led initiatives. The tissues have been assayed in detail and the data is available for LUDC investigators and collaborators. HTL has received financial support from the Swedish Research Council, Vinnova and Forte, acts in collaboration with the Nordic Transplantation Network, and is currently in transition into a national infrastructure.

Apart from the coordination of infrastructures within the environment, many of the researchers in Panel 6 are involved in supporting and promoting the coordinated use of LU and national infrastructures, including the next-generation synchrotron radiation facility in Lund (MAX IV) and the European Spallation Source (ESS).

#### Research support

LUDC has allocated substantial resources for research support. A communications officer ensures that research results are communicated broadly at regional, national and international level through a variety of channels. Diabetes Portal explains diabetes research in layman's terms and is the most visited patient webpage in Sweden. LUDC is also active in social media (YouTube, Facebook, Twitter, LinkedIn, Instagram) and present in various events to reach specific target groups (e.g. Almedalen).

The LUDC grant management team ensures that the researchers are informed of grant opportunities by updating the LU Grants Calendar with relevant calls and by directly informing the researchers. Grant managers also offer help with grant writing and submission process as well as with scientific and financial reporting.

DPLU offers a variety of training and networking opportunities mainly for PhD students and postdocs. A highlight is a postgraduate course in Diabetology, which is offered every other year and is open to participants from other universities in Sweden and abroad. Other activities include a methodology day, scientific seminars and the yearly Diabetes Research Day, where DPLU scientists present their research alongside prominent guest scientists. The LUDC Bioinformatics unit offers seminars and workshops in biostatistics and -informatics, with special focus on junior staff, allowing them to discuss and plan their approach of scientific questions.

# External panel report

This panel consists of five Units of Assessment (UoAs; 6A-E) within Metabolic and Cardiovascular research. The names and group leaders for each UoA is found below. The panel comprises most of the principal investigators (PIs) at the Lund University Diabetes Centre (LUDC) and covers basic as well as clinical research with a focus on the development of diabetes and its micro- and macrovascular complidiabetes – other areas of cardiovascular research are to be found in other panels. This panel shows an excellent, partly outstanding, scientific productivity. In total, panel 6 has thus

cations. The cardiovascular research within the panel is mainly related to cardiovascular complications in

produced 350 peer-reviewed publications/year in 2014-18 with a total citation count of >44,000. A substantial amount of the articles is published in top journals within the field. The panel as a whole has also been very successful in obtaining external grants, and the included research groups are leading major international projects. Related to the LUDC umbrella, strong interactions exist between research groups including the use of infrastructures, seminars including invited speakers and research training including a postgraduate course in diabetology. The infrastructure resources include unique biobanks and associated registers that forms a basis for important translational research. The panel can thereby make essential contributions to Personalized Medicine within the diabetes area. Several research groups have strong collaborations with non-governmental organisations, including commercial actors as well as entrepreneurship related to own research findings. A strong external engagement is also manifested in the development of the knowledge database "diabetesportalen". There is a need for plans for generation shift in some UoAs. Long- term goals are formulated within the LUDC. We think that specific goals can be considered for each unit/enclosed research groups. A concern from several groups is lack of support for PhD students, ie difficulties in guaranteeing 4-year support for a student, as well as "bridging grants" for non-tenured researchers although the latter is stated to exist in part via LUDC.

#### Introduction

The evaluation for Panel 6 is based on background material provided as self-evaluations, web- based interviews and additional responses to questions after the interviews. The evaluators were Torben Hansen (Copenhagen), Mikael Knip (Helsinki), Karolina Kublickiene (Stockholm), Michael Welsh (Uppsala) and Tommy Olsson (Umeå, chair). A unique feature of this panel is the fact that most researchers are affiliated with Lund University Diabetes Centre (LUDC). This is a well- functioning coordinated organization for promoting diabetes research at Lund University (LU) and enables collaboration and synergy between research groups and individual researchers at several different levels and also scientific training for junior researchers as well as in some cases undergraduate training. LUDC is the LU part of the strategic research area EXODIAB where 70% of the funding comes to LU and the remaining part to Uppsala University. The panel leadership states that they are determined to keep EXODIAB and LUDC as a world-leading organization within diabetes research. A recent evaluation of EXODIAB received excellent scores from external reviewers regarding several aspects of this research environment, and was even called " a powerhouse for diabetes research". This is well in line with the main impression from this panel regarding the quality of the diabetes research that is being performed at LU. In general, we found the background material sufficient to get an overview of the different UoAs. It was however to some extent difficult to understand how some of the different units were put together, ie there were some lack of natural links between the research groups that were designated for the different units. In general, the web-based interviews worked well, although it would have been beneficial to be able to discuss how the interviews could have been structured. We think that some parts could have been given more interview time and some parts could possibly have been omitted.

## **UoA6A** Target tissue

Group leaders: Eva Degerman, Charlotte Erlanson-Albertsson, Olga Göransson, Cecilia Holm Wallenberg, Jens Lagerstedt, Karin Stenkula

#### Observations

#### Leadership:

The research focus is to understand the biology of the target tissues and their role in type 2 diabetes development. The researchers have different technical and biological expertise with specific focus of their research where a common denominator is the clinical need for the research questions that are addressed. The research groups continuously apply for national and international grants. The group sizes within this unit are relatively small that might create a lack of critical mass for specific research topics. A mixed picture regarding recruitment, promotion and succession is described, related to some reported lack of resources in parts of the unit. During 2014-18 86 peer-reviewed articles and 4 review papers were published in international journals, including a few papers in journals with high ranking such as Nature communications. During 2014-16 about 29, 12 and 17% of outputs were in the Top 10 citation percentile; while this was 0% during 2017-18. Four theses were submitted during this time period.

<u>Strengths</u>: The public interest in the performed research with clinical need as a strong driver. The individual researchers develop their 3 to 5-year scientific plans as part of grant proposals and also annually defined milestones as part of LUDC. The unit aims to recruit junior group leaders with independent research projects on related research topics. There is also a plan to strengthen the interaction between the individual research groups as well as with associated technology platforms. Several talented researchers have been recruited to the department, to which the unit belong, with the possibility of new collaborations within the department.

<u>Weaknesses</u>: The output from this unit seems to have had a moderate international impact. Many of the PIs state an imbalance in the relationship between teaching and research, influencing research output. The unit has had problems in getting funding for transdisciplinary research, possibly due to a lack of critical mass. There is a need for an increase in the critical mass of researchers and research groups and to secure funding. Three researchers are close to the end of their careers so a plan for generation shift is needed.

Two researchers are not tenured, indicating a need for career plans.

#### Collegial culture:

<u>Strengths</u>: The impression is, in line with the report from the unit, that the local collegial culture is excellent. The junior researchers are encouraged in different ways to develop an independent career, both within the unit as well as in connection with other labs in Sweden and abroad. Feedback is often given between researchers regarding grant applications and publications. No details on how this is formalized are given. The unit has a strong international network, both in academia and Pharma industry.

<u>Weaknesses</u>: A gender imbalance is described, with a large majority of women in the research leadership. There is a need for recruitment of junior group leaders with independent research projects on related research topics.

#### Quality ecosystem:

<u>Strengths</u>: The PIs teach medical and biomedical students at courses and also supervise bachelor and master theses work, relevant for their expertise. This opens up good possibilities for recruitment of young researchers. Some interactions with pharma industry exist, but this is not described in more detail. The unit links to excellent infrastructures with good collaborations both locally and internationally. Five of the PIs are part of LUDC. This means collaboration in joint projects, integrated research training and arrangement of invited speakers and seminars.

Weaknesses: A lack of time for external engagement and outreach is mentioned.

#### Recommendations

- The unit should consider to increase the group sizes and/or to align research focus among group leaders in order to increase the critical mass of researchers working in specific research areas
- A plan for generation shift is needed. Related to this, recruitment of junior researchers with independent research projects on related research topics is strongly encouraged with development of career paths for young group leaders
- A major challenge in the near future is to secure funding
- Improvement of the interface between campus Lund and campus Malmö is encouraged
- The suggested increased collaboration with clinical researchers in order to be able to increase the amount of transdisciplinary research is encouraged

#### **UoA6B** Cardiovascular

Group leaders: Maria Gomez, Isabel Gonsalves, Anna Hultgårdh, Olle Melander, Jan Nilsson

#### Observations

#### Leadership:

The research strategy presented is to improve cardiovascular health and battle disease and to build evidence for prevention, diagnosis and the development of new approaches that are safe and effective. A specific focus is on development of precision medicine in diabetes and its related cardiovascular complications. The unit covers a broad expertise in this research area with strong experimental and translational approaches. Key registers and databases, that are internationally attractive due to the presence of clinical data and longitudinal follow-ups are available and actively utilized. The PIs have been very successful in achieving major grants including grants for Wallenberg Clinical Scholarship, the Swedish Heart and Lung Foundations Major research grant and the Swedish Foundation for Strategic Research. The publication output is excellent: During 2014-18 485 peer-reviewed articles and 17 review papers were published in international journals. This includes a substantial number of papers in high-ranked journals, 23% of the papers were in the Top 10 citation percentile; 23 theses were submitted during this time period.

<u>Strengths:</u> This unit has a leading position nationally and internationally within the field of cardiovascular research and diabetes. It consists of highly competent clinical and preclinical scientists with complementary expertise. Together with well-developed infrastructures for registers, biobanks and extensive translational research approaches the research groups produce scientific publications in leading scientific journals based on adequate national and international funding support. The developed academic environment ensures the presence of research excellence for the younger generation and continued potential for educational activities and entrepreneurship.

<u>Weaknesses:</u> The visibility for junior researchers in high-impact publications is not clear and can possibly be improved. The unit describes insufficient assistance from the university to deal with administrative and legal matters.

#### Collegial culture:

<u>Strengths:</u> The unit has based their strategy on operation factors: ie "state of the art" experimental knowledge and expertise, interpersonal dynamics ensuring optimal milieu for human resources, including the boost of international and national collaborations, and translation by means of knowledge and innovation/commercialization potential. Seminars, retreats, mentorship and team building are existing and promoted in this environment. There are well established collaborations and networking within the unit

based on specific operational factors. Young investigators are supported, including involvement in organisation of events. The diversity aspects are well addressed in the career development and promotion, as well as ethical issues and GDPR compliance with professional handling of registers and biobanking. This includes transfer and sharing of information regarding procedures and protocols. The unit is well advanced within gender equality issues, with a gender balance in career progression including decision-making positions.

<u>Weaknesses:</u> More young researchers need to be recruited. In this, weak faculty funding for PhD students is reported as an obstacle. The junior researchers could be even more strongly supported including discussions of strategy development.

#### Quality ecosystem:

<u>Strengths:</u> The unit appreciates the importance of knowledge distribution and the PIs are active at teaching at undergraduate level. The research groups are very strong in their external engagement and outreach, reflected by e.g. the comprehensive knowledge data base "diabetesportalen". This provides an excellent environment to combine scientific work with educational activities, including science communications and community engagement. There is a strong tradition for stimulating collaborations with non-governmental organisations including commercial actors, as well as entrepreneurship related to own research findings.

Notably, members of the unit have developed several companies.

Weaknesses: No major weaknesses were identified in this area.

#### Recommendations

- The unit is suggested to increase the number of translational projects between research groups
- Identify and strengthen the role of junior researchers in the strategic discussions and publications
- Strive for recruitment of junior researchers with outstanding scientific merits and future potential for leadership
- Increase strategic work towards development of educational activities at all levels to boost pedagogical portfolio for juniors in their career development

# **UoA6C** Islets

Group leaders: Isabella Artner, Lena Eliasson, Hindrik Mulder, Erik Renström, Albert Salehi, Nils Wierup, Peter Zygmunt

# Observations

## Leadership:

The ultimate goal of this unit is to understand the biology within the pancreatic islets and their role in the development of diabetes. The unit comprises seven PIs with complementary expertise and ample collaborations on a local, national and international level. Group sizes vary between 5-10 persons with an emphasis on postdocs. The research groups have stable funding from several sources including ERC and the Wallenberg Foundation. The unit reports 192 peer-reviewed articles and 13 review papers during 2014-18, with 12 PhD theses submitted as well. Most publications are in journals with an impact factor (IF, ISI) in the range 3-8 with four last-author publications in journals with IF above 10. 21% of the publications were in the Top 10% citation percentile. The members of this unit teach at different levels including a doctoral course within LUDC. Notably, several PIs have important external engagements,

such as being dean of the medical faculty, running core infrastructure units (metabolomics) and assistant head of department. For some the administrative load seems heavy and disruptive to their scientific output but also gains are reported as a consequence of these significant assignments.

<u>Strengths:</u> The unit consists of highly competent scientists with complementary expertise. Productivity is excellent. Scientific independence among junior researchers is strongly encouraged.

<u>Weaknesses:</u> Aims for scientific renewal are modest and are mainly focussed on applying the acquired techniques to biological questions. Certain shortages of infrastructure described. There is no formalized program for career advancement of junior scientists in the unit but a career development program is in place at LUDC.

#### Collegial culture:

<u>Strengths</u>: Excellent history of publications and funding. There is ample collaboration within the unit with excellent synergetic effects. In addition, the research groups collaborate extensively nationally and internationally.

<u>Weaknesses:</u> There is limited recruitment of PhD students, related to weak faculty funding and difficulties in guaranteeing 4-year support.

#### Quality ecosystem:

<u>Strengths</u>: Novel techniques including scRNAseq, iPS, nanotechnology and functional readouts for noncoding RNA were introduced during the previous 6 years. There was also recruitment of two new researchers at the PI level. A mostly functioning infrastructure is described.

<u>Weaknesses:</u> A deteriorating interaction with clinical endocrinology was mentioned. A recruitment of a professor in clinical endocrinology with competence in basic science is strongly needed as well as further recruitments relevant for the novel technological acquisitions. An improved interaction with the metabolic centre at Malmö Hospital would be beneficial.

#### Recommendations

- The unit is suggested to accelerate renewal of research leaders
- Accelerate scientific renewal also by introducing additional techniques and topics of research
- Ascertain good collaboration with clinical endocrinology
- The implementation of structured programs for career development after a postdoc period is suggested, including funding and allowance to develop independence by encouraging them to obtain last author papers for docentship meriting

# **UoA6D Genetics and Epidemiology**

Group leaders: Paul Franks, Leif Groop, Ola Hansson, Charlotte Ling, Holger Luthman, Marju Orho-Melander

## Observations

#### Leadership:

The research groups included for this evaluation describes a focus on understanding the development of genetics from a genetic and epidemiological perspective. The PIs have complementary expertise and therefore individual research programs varies between groups. The investigators have access to unique large, deep-phenotyped prospective studies, clinical trials and large sample repositories from individuals with and without diabetes. The clinical data can be linked to health care information and rich OMICS data. A vast amount of data has been generated in public/private partnerships which is exploited in ongoing research projects. The publication record is outstanding with 642 peer-reviewed articles and 33 review papers during 2014-18 of which 30% are in the top 10% citation percentile. Several papers are published in the highest ranked journals and most PIs have a substantial number of last author papers. 19 theses were submitted during the same time period.

<u>Strengths</u>: The research groups in this unit have an exceptionally strong track record within genomics epidemiology, physiology, and discovery. Furthermore, translational aspects of the unit is a major focus with novel initiatives for patient stratification and precision medicine. The unit includes several top-ranked researchers and young researchers with a large potential. Access to several large biobanks and databanks represent a unique resource and basis for much of the ongoing and future research. The UoA PIs have managed to achieve several major grants.

<u>Weaknesses</u>: No major weaknesses are observed. No clear overarching research goals have been presented. A future threat includes decreased interaction with the clinic (none of the young full professors are active clinicians). There is a tendency to recruit fewer junior investigators, not least because there are very few relevant PhD scholarships available at Lund University or in Sweden *per se*. Recruiting more senior level investigators is likely to remain difficult, as resources are often too limited to provide decent packages. Some groups lack sufficient funding. The unit reports that central funding of PhD positions is lacking making salary expenses a heavy burden on group budgets. Lack of funding/support for permanent positions is also reported as a problem. Core bioinformatic expertise, especially within machine learning and AI is insufficient. Other threats include lack of core expertise to support the research groups and to fully exploit large available data sets. Lack of funding has closed an international exchange program for PhD students. More interactions between groups in the form of action groups could be fruitful.

#### Collegial culture:

<u>Strengths</u>: Members of the unit collaborate in joint projects, have integrated research training, shared lectures with invited speakers and seminars for improvement of the research area. The unit has a shared research infrastructure including detailed readme files of procedures and protocols ensuring that knowledge is easily available for colleagues and not lost when people leave. Young researchers are encouraged to take responsibility and are presented with the opportunity to be the team PI on a paper. Research exchanges are often undertaken in order to bring new expertise into the groups. There are extensive national and international collaborations and team members are recruited from all over the world. The gender balance is fine with 47% female researchers.

<u>Weaknesses</u>: Some groups lack sufficient funding, but no system seems to be in place to interact in writing grants.

#### Quality ecosystem:

<u>Strengths</u>: The researchers have shared infrastructure including access to functional genomics, bio-informatic expertise and computational servers, and the unit has extensive external national and international research collaborations. All PIs frequently lecture on educational modules at LUDC or in stand-alone educational symposia.

<u>Weaknesses</u>: Major challenges in the near future are to secure funding for bioinformatics expertise, and funding/support for permanent positions.

#### Recommendations

• Secure close collaboration with the diabetes clinic to further empower translational research, preferable by recruiting a high-profiled clinical active researcher

- A plan for generation shift securing close collaboration with the clinic is needed
- Encourage senior investigators to undertake sabbaticals at LUDC and creating adjunct appointments may help with recruitments at all levels
- Interaction in writing of grants
- Improvement of the interface between campus Lund and campus Malmö is encouraged

### UoA6E Type 1 diabetes

Group leaders: Daniel Agardh, Corrado Cilio, Helena Elding Larsson, Dan Holmberg, Sten Ivarsson, Åke Lernmark

#### Observations

#### Leadership:

The research focus for the unit is to understand the biology behind the development of autoimmune diseases. The researchers have different technical and biological expertise and therefore distinct specific focus of their research. Linked to LUDC, the research groups within the unit collaborate in joint projects, have integrated research training and arrange lectures with invited speakers and seminars for discussion and improvement of the research area. The PIs consists of a very experienced older generation (e.g. one senior professor and one professor emeritus) and a group of younger investigators. The unit has actively established clinical birth cohorts and has close collaboration with the Clinical Research Unit. The research groups have also engaged in clinical trials aimed at primary or secondary prevention of type 1 diabetes (T1D). The publication record is excellent with 208 peer-reviewed articles and 13 review papers during 2014-18; 20% of the publications were in the Top 10% citation percentile. The publication records of the PIs are notably highly variable, with 105 PubMed publications in the period 2014-18 as the top figure and eight PubMed publications as the lowest number. Several PIs have more than 20 last author publications. Among the peer-reviewed articles listed by the unit there is a respectable number of papers published in very highly ranked journals, such as NEJM, JAMA, Nature and Nature Medicine but most of these do not have authors from this group as senior author.

<u>Strengths:</u> Research and training in dissecting the aetiology and pathogenesis of autoimmune diseases leading to the clinical onset of T1D, coeliac disease (CD), and thyroiditis are definite strengths. Ongoing prospective clinical cohort studies following children at increased genetic risk from birth to reveal the appearance of the first appearing biomarkers for autoimmunity provides an opportunity to identify triggers and drivers of the asymptomatic disease process. The unique birth cohorts and patients have opened the doors to frontline laboratories and novel technologies. Strong national and international support of investigator-initiated clinical studies including both primary and secondary prevention studies.

Longstanding experience and expertise in animal experimentation, mouse genetics, advanced imaging technology and studies of human pancreatic islets.

<u>Weaknesses</u>: The unit runs the risk of becoming an entity that collects biospecimens but does not carry out analyses on the entire cohorts. Research on T1D is scattered in smaller groups, which makes them financially vulnerable especially for senior post docs without permanent positions. The level of innovation and discovery tends to be stifled in an environment that is not able to successfully host young investigators at the level of graduate and postgraduate students. A shortage of administrative support is reported.

#### Collegial culture:

Quality of research is ascertained through experienced principal investigators who themselves perform independent and original research primarily in international and national collaborations. The principal investigators have ample opportunities to discuss science and collaborations. The unit leadership hands out independent research projects to junior researchers and in many cases allows the junior researcher to be the last author on resulting publications. A strong international funding support exists, with active involvement in a series of international studies.

<u>Strengths:</u> The unit PIs collaborate in several joint projects. The T1D research area accepts BMA and Biomedicine students for bachelor, master and PhD programs. The students are encouraged to develop their originality and independence. Scientists and students meet in informal meetings and settings. The seminar culture is strong for junior investigators and research personnel. The T1D research area is open to junior scholars from the EU through the Erasmus programme. The area has a longstanding record of summer students through an initiative of the medical faculty. Each PI engages one to three summer students to carry out a research project over a period of eight or more weeks.

<u>Weaknesses</u>: Research training within the unit is not very well described. The seminar culture is weak for high-level lectures.

#### Quality ecosystem:

<u>Strengths</u>: The researchers contribute to world class papers related to T1D and CD. The investigators have access to unique large prospective studies, clinical trials and large sample repositories from individuals with autoimmune diseases. The clinical data can be linked to health care information and OMICS data. The researchers have shared infrastructure including access to functional genomics, a flow cytometry core facility, bioinformatics expertise and computational servers. The research groups have extensive external national and international research collaborations. The quality of grant applications has improved through review by colleagues before submission. The unit aims at public engagement and outreach by informing publicly about study progress and plans through press releases and TV and radio interviews.

<u>Weaknesses:</u> There is a need to strengthen the bioinformatics expertise.

#### Recommendations

- A plan for generation shift is needed as well as a more clearly defined plan for career development of young scientists who have passed the post-doc level
- Intensify the recruitment of experienced outside investigators in the field of autoimmunity in collaboration with the medical faculty
- Increase the collaboration with the University Hospital and identify common priorities
- Expand the collaboration with research groups at the University of Copenhagen in the area of autoimmunity, T1D in particular
- Look actively for new opportunities in research on autoimmune diseases. This includes expansion of technological platforms and novel approaches to biological questions scientific renewal in short
- Continued follow-up of participants in the TEDDY study beyond 15 years of age should be secured

## General recommendations

We have given specific recommendations for each Unit of Assessment in direct association with the observations for the unit. In addition, we have some overarching recommendations for the units and for the university/medical faculty:

- Plans for generation shift are important for several areas. Importantly, this includes recruitment of a clinical professor in endocrinology/diabetology
- The research groups/units should be encouraged to develop long-term plans (5-year plans are suggested, with annual milestones). This can include percent increase in publication rate/quality/ impact. Specific research questions should be formulated, not general statements
- Consider to establish an external scientific committee to be convened yearly/every second year for the evaluation of plans and results
- Consider to partly change publishing strategy with fewer but larger publications
- The university/faculty is suggested to secure core informatics expertise/structure to support the research groups/UoAs
- The university/faculty is suggested to discuss how to increase the recruitment of junior researchers to the research groups. This includes ways to guarantee 4-year PhD positions
- The university/faculty is also suggested to discuss ways to help with funding for non-tenured researchers for a limited time, ie "bridging grants"
- A gender dimension in research and educational content is important for future planning
- Make sure that those who wish can teach and provide a culture that gives incentives for teaching
- Implement grand rounds that may enforce translational research even more

# Sustainable Health

# Panel overview

Eight Units of Assessment (UoA) are included in the future-oriented theme Sustainable Health:

- A. Occupational and Environmental Medicine
- B. Global Health
- C. Older People, Ageing and Health
- D. EpiHealth, Registers, Epidemiology
- E. Community Medicine
- F. Activity, Participation, Mental Health
- G. Rehabilitation Medicine, Physiotherapy, Sports Science, Health Promotion
- H. Emergency and High-technological Environments

These UoA include numerous research orientations, and do not optimally reflect the actual content. Including independent research groups with different characteristics, research orientations and activities, none of the UoA represents a coherent research environment.

The majority of research orientations (Swedish Standard for Fields of Research, 2011) under Health Sciences are represented, four from Clinical Sciences and one from Social Sciences:

- General Practice
- Geriatrics
- · Gerontology, specialising in Medical and Health Sciences
- Health Care Service and Management, Health Policy and Services and Health Economy
- Nursing
- Occupational Health and Environmental Health
- Occupational Therapy

- Pedagogy
- Psychiatry
- Physiotherapy
- Public Health, Global Health, Social Medicine and Epidemiology
- Rehabilitation Medicine
- Sport and Fitness Sciences

Three of the six departments at the Faculty of Medicine are represented, which reflects the crosscutting nature of *Sustainable Health*. Each Head of group is a formal line manager with responsibilities for staff matters, economy, etc., delegated from the Head of Department. Several groups are affiliated with strong multi-, inter- and transdisciplinary research environments at LU. The research groups have extensive collaboration sometimes within the same UoA but typically across Panel 7 and far beyond, nationally and internationally.

One of the constellations included in Panel 7 - Centre for Teaching and Learning (MedCUL) - is not a research group but a unit organized on the faculty level. MedCUL provides support for educational development on the basic, advanced and research levels at the Faculty of Medicine. As a resource for the faculty to develop evidence-based high quality education within preclinical, clinical and health sciences disciplines, including MedCUL in UoA 7B is a pragmatic and purely administrative matter.

Overviewing the self-evaluations, there are commonalities although with inherent variation. All UoA are producing high quality research and publish frequently in renowned international journals within their fields. Senior researchers are internationally leading in the fields they represent, and there is a promising cadre of junior researchers and PhD students. Researchers are successful in attaining funding, but the dependence on external grants is a potential threat. Several groups, in particular at the Department of Health Sciences, are challenged by the fact that teacher positions have low/no faculty funding for research. Related to this, it is difficult to balance research and teaching responsibilities. Balancing clinical work and research is another challenge, most markedly within the Departments of Clinical Science. Moreover, there are challenges related to the ongoing generation shift, with notable difficulties to recruit professors replacing those transitioning into retirement.

All UoA are experiencing an increasing interest and demand for outreach and collaboration with non-academic partners. There is a strong commitment to contribute to this development, which represents a great opportunity for the future and a concrete manifestation of the relevance of the research within *Sustainable Health*.

# External panel report

Report from review panel 7: Sustainable Health, Medical Faculty, RQ20

## **Executive summary**

RQ20 is intended to support the different research environments, Units of Assessment (UoA) in their aims to develop procedures for high quality and renewal in research and identify their potential through its breadth and interdisciplinary collaboration. The title of subject panel 7 is Sustainable Health, although there are no traces found of sustainable health in the descriptions from the UoAs for their future work. This should be further explored and clarified. In terms of sustainability, several units express concern related to sustainability of research staff, and of research lines since there is a loss of competence.

Subject panel 7 includes eight units of assessments, UoA, and in all 27 research groups. Some units were well composed and with common goals, while others expressed a lack of common research, goals, and collaborations.

Three groups of representatives were interviewed, heads of UoAs, doctoral students and other researchers in units. Also, the medical faculty representatives were interviewed as well as all three heads of departments represented in subject panel 7- Sustainable Health.

It was overall common **not** to have full knowledge of the faculty organization in relation to recruitment of new staff and the balance between research and education within the faculty. The participation in the teaching in the MD school could be increased for several UoAs in subject panel 7.

The research and teaching need a stronger connection (association) with the university hospital and primary care. That perspective is to a large extent absent in most of the UoAs view of their activities. An increased flow of ideas and input from the health care sector would be beneficial for the subject panel 7 research.

Our impression is that the two separate lines funding for teaching and research is contra productive. Research and teaching are often linked together, and a common line would facilitate this coordination.

Connections to the clinic in research and planning research could be given more attention. The clinical environments will to a large extent assist in identifying knowledge gaps of relevance for the present and the challenges of health care in the next decade.

#### Introduction

This review panel had subject panel 7, which included eight Units of Assessments, UoAs, to evaluate. The compositions of the UoAs are diverse and are mainly related to three departments within the medical faculty – health science, clinical sciences, and laboratory medicine.

Our review panel is European, with four participants from Sweden – Umeå, Stockholm, Linköping and Gothenburg and includes one participant from the Netherlands and one from Finland. The expertise of the panel is reflecting the content of the UoAs.

The review panel have had several modes of contact, with a first contact by mail, directly after the RQ20 Panel Chair Meeting in Lund in January. A first Zoom meeting was organized in mid-February, to sort out and allocate specific UoAs to specific competence in the review panel. The chair of the review panel aimed to read all UoAs in preparing for the site visits in May. Due to Covid-19, the site visits were made over Zoom.

Unfortunately, the two international members of the panel had to resign due to unforeseen circumstances. As the panel members first assignment was to each read, summarize and comment two UoAs each, one of the international members was able to do that before resignation. Since our panel now consisted of only Swedish participants during the interviews, the interviews were carried out in Swedish unless any of the interviewee was English speaking.

Together with the panel coordinator (SI) the three days of interviews were scheduled. For each UoA three groups to interview were identified: 1. the chair of the UoA and heads of the research groups; 2. PhD students, and 3. Other researchers within the UoA. In preparation for the interviews, questions/issues to address with all groups were identified. Each UoA was allocated 90 minutes for the interviews. All interviews were recorded and stored in a common platform for the review panel members. The Faculty of Medicine management was also interviewed, as well as heads and assistant heads of the three included departments: Health Sciences, Clinical Sciences Malmö, and Laboratory Medicine.

After the three days of virtual site visits and interviewing, the four review panel members discussed and summarized their overall impressions/findings and together made some concluding remarks. Each panel member was then given the task to write a first draft to summarize the written reports and interviews for two UoAs each. Drafts were ready by June 16, when a Zoom meeting took place. All reports were then read by a second writer and commented by August 3 when a new Zoom meeting took place. During this meeting, some major comments to report were discussed. The chair of the panel then wrote a first draft of the full report which was sent to the review panel for comments and editing during week 33 and further by August 19 and 26, for Zoom meetings. A fourth draft was sent to the panel members for comments on August 28, and the final comments was included and the final version was sent August 31<sup>st</sup>.

## Observations

Among the UoAs in subject panel 7, Sustainable Health, there were those who considered their UoA a meaningful gathering of research environments and those who considered their UoA an arbitrary combination of research groups "only for this RQ20". Similarities and differences within each UoA were also imminent as we read their self-reports. The Medical Faculty management was aware that the UoAs in subject panel 7 (and 8) were more disparate than panels 1 through 6. The hope for the combination of research groups in subject panel 7 (and 8) was that exciting new collaborations would emerge.

Among the heads of departments, and among research leaders there were uncertainties about the faculty organization. This was also found during most interviews with the different group representatives of the UoAs. Research and education as the two main tasks for universities in Sweden, were organized in two different "lines" and this made it difficult for the heads of departments and some research leaders to plan how and when to recruit new staff.

Overall, it does not seem clear what generates money for research back to the research environments from the university. The incentives for faculty funding are not clear.

There needs to be a balance between the two main tasks within the university, although that balance seems to be lacking in several UoAs within subject panel 7. Several researchers expressed a challenge to find this balance. Within the panel there were researchers who had no educational tasks, as well as researchers that hardly had time for research due to a full teaching load. The review panel members acknowledge that there are also all possible different situations between these end points.

Health economics is an important component in a major part of research within this subject panel, although the availability of expertise was not offered, or present for most research groups within panel 7. Some UoAs had members with this competence, while others found this expertise from outside LU, within Region Skåne.

#### Leadership

#### [Priority setting, including goals for external research funding]

Few UoAs within subject panel 7 have common priorities or goals for their unit. This is interpreted to mainly be due to the disparate research groups that were forming the units and the absence of a uniting framework facilitating the identification of the knowledge gaps and enhancing research collaboration at different levels.

#### [Recruitment, promotion, and succession]

Several of the units in subject panel 7 are describing problems in the recruitment process. The head of department is requesting new staff but mostly the number of asked positions are not granted. As a strat-

egy some request for more than they actually need, to maybe receive what they need. Other departments request the exact number of positions that they need and might not get even the minimum number to fulfill their assignments.

One department also had problems with a granted new position, but the advertisement for new staff was put on hold. This was a position within Health Science, and they expressed problems with fulfilling their educational assignments.

The review panel strongly recommend the faculty to facilitate and support more predictable career trajectories in order to maintain succession.

#### [Publication patterns]

Several of the units are expressing a demand to publish in high ranked journals. Some of the UoAs in subject panel 7 are doing research in health science and rehabilitation, fields of research in which the highest ranked journals have comparatively low impact factors. All units intend to publish in the highest ranked journals possible.

#### [The balance between activities in research, education, and external engagement]

There are many dissimilarities between the UoAs in subject panel 7 regarding balance between research and education, mainly. Some units described researchers only committed to their research and did not do any teaching activities. In these units, only a few of the researchers did plan and participate in teaching, mainly in the medical or biomedical programs. Other units within the subject panel have the opposite situation, where all staff, professors, associate professors, lecturers, and doctoral students had mandatory teaching assigned. Some staff members reported that at times they had to put their research on hold to meet their teaching responsibilities.

There were no presentations of any goals, strategies, or visions on how to change these circumstances into teaching assignments allowing for a more balanced relationship between research and teaching throughout the faculty. A balance between research and education specifically, for all UoAs, would benefit both research and education within the faculty and the university. The balance between research and education can vary between the including UoAs but also for individual faculty members. This is also true for those with a clinical assignment. A strategy for an optimal balance between research and education for each member should be prepared to safeguard a good balance. This is a responsibility also for the faculty leadership.

Some groups discussed the need for combined positions where research and education, as well as clinical work, would enhance and enrich all three areas. Combined positions are likely to give a better balance and should to a larger extent be the preferred university employment for all health care professions.

#### [The overarching research strategy]

Not all units in subject panel 7 had an overarching research strategy or focus on Sustainable Health. Those who formulated a common strategy within their UoA, already had close collaborations within the unit. Others presented research strategies more related to their own research group than to other groups within the UoA. The review panel had expected the topic of the subject panel i.e. Sustainable Health to be a prominent and uniting concept in the UoAs, but this was not the case. The concept Sustainable health in subject panel 7 should be more prominently reflected in the research agendas. Surely all panels within the medical faculty, could clarify their view of health. Health, a multifaceted fundamental concept in the area of medical sciences should be infused by all researchers and faculty within medicine, including health science. The vision or view should be reflected in the research agendas of all departments.

The panel was informed that in 2020 the doctoral students at the faculty of medicine have the same subject/topic of their doctoral degree: Doctor of Medicine. However, during the time frame of RQ20 there were four different PhD subjects. Yet, it is unclear to the panel what having four different subjects entailed e.g., requirements, compulsory course work, etc and the plausible implications of the various subjects for research. Hence the panel has no comments to the previous four PhD subjects. Each specific focus of the thesis must be clarified as well as the theoretical framework used.

# Leadership strengths

- Several research groups are strong and show national and international excellence.
- Leadership weaknesses
- Unclear how research funding is generated to the different research groups/units.
- The mandate for the Head of departments is unclear since they cannot press for needed recruitments, being a mid-leader.
- The two lines, one for research and one for education appears unclear to many staff members at all levels

# **Collegial culture**

#### [Opportunities for early-career researchers to develop their originality and independence]

As with most questions related to research in subject panel 7, there are many times diametrically opposite views. Many research groups, most of the time, have a very clear focus, and a very open climate within the research group. The differences are seen within some UoAs or between medical/biomedical science and health science. These differences are also seen with the monetary resource allocations for research between research groups within the medical faculty.

When interviewing the doctoral students in most units of subject panel 7, only a few had had a discussion on their future career. Neither their supervisors nor other mentors had brought up this discussion. Some doctoral students described that they had an opportunity to discuss this during a mandatory doctoral student course. No structure seems available throughout the subject panel 7, for career paths for doctoral students or post-docs.

From the group of other researchers (not head of research groups) in one UoA, we heard that Lund University is not of great help for a research career. Especially for persons holding a position as lecturer, the "lock in" is huge, not being able to pursue research. The research education is imbued with the medical paradigm with a heavy traditional biomedical focus. PhD studies should also give in-depth studies in the paradigm sustainable health.

#### [Sustainability and renewal of research strengths]

Several research groups expressed concerns related to not being able to recruit new staff members as needed. The recruitment process appeared unpredictable and this may hamper a sustainable development of successful research environments. Recruitment within the faculty was also reported to be slow, with a high potential risk that LU will, in a few years, lose researchers with excellent competence. It was also reported in the that LU loses competent staff members to other universities due to not being able to support known excellence and thereby maintaining excellence and quality.

Reports were given that some research groups employed staff on an hourly basis for both research and education, which is not a sustainable solution. Input from clinics and municipalities is needed to benefit

continuity, both research and education. To develop further and renew research strengths it is important to know that staff is available in a five-year long-term planning.

The faculty/university could clarify their policy regarding career development. This is needed for Lund University to assure competence for continued research at excellent level.

#### [Academic networks and collaborations outside the unit]

As mentioned earlier in this summary, not all units have clear connections between the research groups within the same UoA, but the faculty is hoping collaboration will develop as they formed the UoAs. Other units do already have extensive collaborations both within the UoA and outside the unit. Although it is hard to collaborate in a sustainable fashion with staff employed on an hourly basis. Several researchers reported that there were no common meetings for developing new ideas.

#### [Diversity, integrity, and ethics]

Most UoAs did not express anything clearly in these issues.

Most UoAs in subject panel 7 consist of members with different disciplinary backgrounds and many different professions, and the groups have international collaborations. The UoAs in panel 7 have several researchers and students from foreign countries as guest researchers, master students or PhD students. Most of the seminars are in English and English is often the preferred and customary language within research groups. However, the foreign colleagues are encouraged to learn Swedish, so they can be successfully integrated in the research projects. The research process often demands skills in Swedish in contacts with union, authorities, workers, etc.

There seems to be a good sense of integrity in the different UoAs, but there have been some issues causing conflicts related to co-authorships, academic collaborations, and cultural aspects.

The research in all UoAs in subject panel 7 demands constant ethical considerations and this has inherently also lead to a high level of awareness regarding issues of integrity and ethics both generally as well as specifically research ethics. There are continuous discussions on ethics and diversity within specific research projects and in constellations of co-workers, especially regarding user involvement in research and principles for co-authorship. Some unit members are member of the Ethical committee, LU. Senior researchers teach and support PhD students and junior researchers to write ethical applications and develop the projects according to ethical rules. There were no seminars or meetings in which reflections or reasoning on ethical dilemmas were addressed or new insights gained from persons outside the research group.

#### [Quality in applications and publications]

The importance of publications in journals with high impact factor is mentioned by all UoAs. In order to publish high quality publications, many researchers mention collaborations, both in multi-disciplinary groups/teams and with other colleagues. No overall structure or system for seminars or networks between research groups to discuss manuscripts or applications were reported. Availability and number of seminars varied between and within UoAs

Courses and workshops are given to support quality of publications as well as applications for funding. Seminars are held to discuss manuscripts and applications where mostly senior researchers and professors are available to comment.

# Collegial culture strengths

- · Good collaborations within and between UoAs, and within and between research groups
- Most research groups describe an open climate and transparency
- Collegial culture weaknesses
- Lack of clear career paths for young researchers.
- No structure available for career paths for neither doctoral students nor post-docs

# Quality ecosystem

#### [Research strengths and how these are reflected in the educational portfolio]

Several of the UoAs in subject panel 7 have very successful research groups and are well known for their excellence. Although one of the research groups have very limited education assignment leading to poor dissemination of their knowledge, neither to students nor to researchers. On the other hand, other areas within subject panel 7 have rather heavy educational assignments that also hinder dissemination to students at different levels.

# [How external research collaborations (with e.g. industry, governments and states, county councils, municipalities, and non-governmental organizations) influence the quality of research]

There is especially one of the UoAs in subject panel 7 that have extensive external collaboration which is of great benefit for the quality of the research. Collaborations for most units are mainly with the region since most staff are health care professions. Also, the communities/municipalities are collaborators for several research groups.

External collaboration is reported as to Global Health, with WHO. This is of great benefit for research with the international network available in WHO. Also, laboratory medicine has extensive collaborations and are selling their test capacities in order to fund some of their research. This will lessen their time for research, and the quality of research can be questioned. The MoReLab is also very beneficial for the development of research in an experimental health science context.

# [How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration]

Few of the UoAs are mentioning integrity and ethics in any specific manner. This leads the review panel to acknowledge that these issues are not described or organized in clear manner.

# [How the units use and capitalizes on available research infrastructures, in Lund and elsewhere]

Several UoAs in subject panel 7 would benefit from collaboration with Health economics, but this is not a common resource for the units or research groups to use. Some expertise in health economics is present in one unit, but other units will have to find expertise elsewhere. They express connections with Region Skåne that do have that expertise that they will pay for.

Competence in health economics is fundamental to the development and implementation of knowledge-based health care. Adding a health economic perspective to clinical research proposals is crucial. To equally benefit all research groups and units within subject panel 7, a core facility with health economics could be installed for all groups that need this expertise. Access to, and involvement of such competence should be in the interest of most clinical research environments, not only in subject panel 7 but also in other subject panels. The faculty must clarify that competences essential to several UoAs as core facilities e.g., health economics, statistics, epidemiology etc. is available for purchase.

Some doctoral students at different locations from Lund e.g. Kristianstad and Malmö, find it hard to feel as part of the local collaborations at LU.

# [If the unit is aligned with any of the university's strategic research areas (SFO's) or any other strong and broad research area, how opportunities from such connections are utilized]

Several of the units in subject panel 7 do have extensive collaboration and networks due to their research, both as collaboration and as funding from large funds. Prominent examples:

WHO strong research area – Global Health
CASE funding from FORTE
MoReLab benefit from CASE
CPF-center for primary health care – Community Medicine, collaboration between LU and Region Skåne
MultiPark - SFO in neuroscience
Sandoz Europe, The Kind company – industrial collaborations

# Quality ecosystem strengths

• Several research groups have built/established excellent infrastructures to benefit research

# Quality ecosystem weaknesses

• No overall/common balance between research and education in subject panel 7

# Recommendations

General recommendations

- Develop and implement strategies for how to balance research and teaching, and clinical work when appropriate e.g., enable the involvement of undergraduate and graduate students in ongoing research
- Build an infrastructure and supportive organization for PhD students and researchers, on a university basis
- Organize a closer collaboration from the municipalities given that a major part of health care for elderly people is the responsibility of the municipalities. This is a recommendation for the university/ faculty, to approach the government to pursue this issue together with all universities.
- Competence in health economics is fundamental to the development and implementation of knowledge-based health care. Consequently, easy access to and involvement of such competence should be in the interest for all research in all clinically related UoAs, also in other panels. Hence, a unit of health economics in the Medical Faculty organized as a core facility or other options for access to health economic aspects ought to be investigated.
- The faculty/university could clarify their policy regarding career development. The succession is not guaranteed by researchers at all levels, i.e., PhD students, post-doctoral students, associate professors, and full professors.

# 7 A Occupational and Environmental Medicine

- The research areas in this UoA needs more focus.
- Improve the research link to the University Hospital
- Increase the visibility regarding forskar-AT, forskar-ST, and how to use ALF funding
- Engage more in the medical educational program
- Initiate more collaboration in medical student's examination projects

# 7 B Global Health

- Develop strategies for recruitment, promotion, and succession in the long-term
- Involve undergraduate and graduate students in ongoing research
- Establish a strategy regarding publications
- Develop strategies for how to balance research and clinical work.
- Develop strategies on how to maintain and strengthen collaboration with external agencies.

# 7 C Older People, Aging and Health

- Develop collaboration with clinically/practically active researcher to elaborate on problem identification, carrying out research, conducting implementation and facilitating dissemination
- The objective could be to create ideal situations and collaborations on team level, not only rely on individual acknowledgements, to get the highest level of success.
- Acknowledge cross-fertilization between research and teaching
- Develop strategies for post doc career planning.
- Develop strategies for maintaining competency and research at the unit

# 7 D Epihealth, Registers, Epidemiology

- Develop strategies for acknowledging the excellence of the research in this UoA to clinicians and students.
- Organize seminars for doctoral students in a timely manner and include the doctoral students to participate more actively.
- Initiate seminars throughout the year for researchers where discussions and reflections about research issues are in focus.
- Develop strategies for post doc career planning.
- Develop strategies for career planning for doctoral students and this should be initiated preferably by the main supervisor

# 7 E Community Medicine

- Organize a distinct departmental infrastructure for database management both in terms of tools and managers.
- Organize biobank facilities regarding purchase routines and freezers.
- Create full DNA extraction resources and competence within the Medical Faculty

Σ

- Ensure competence in bioinformatics at the department level both in terms of access to this competence and in terms of development of this field, e.g. by cooperation with the mathematics department at Lund University.
- Develop strategies regarding recruitment due to the generational shift
- Use the possibilities of research resources for younger medical doctors through the ALF-system by *yngre-ALF*, *AT-ALF* and *ST-ALF*.
- Develop strategies and collaboration to facilitate clinical research for medical doctors/clinicians with PhDs (clinical postdocs).
- Develop a strategy and a five-year succession plan for the research groups for their sustainability. Include a strategy for recruitment of the next generation research group leaders and new associate professors and PhD students
- Develop strategies and research lines for opportunities to involve other groups than medical doctors in PhD education is recommended. This is highly relevant as there in primary health care and geriatrics are many knowledge gaps that ideally could be addressed by including other academic areas engaged in primary health care and geriatrics e.g., dietetics, nursing, occupational therapy, physiotherapy, social work.
- Consider organizing competences fundamental to several UoA as core facilities e.g. health economics and statistics, available in this UoA, which is imperative for the development and implementation of knowledge-based health care.

# 7 F Activity, Participation, Mental Health

- Develop a common publication strategy that meets both the need to publish within and to promote the status of the research area itself but in addition make the research area and its output known to the research society in general, society and the end users.
- Enhance and strengthen the multi-disciplinary profile by further collaboration outside the UoA within the medical faculty as well as with research environments in other faculties at the university and the society outside the university.
- Develop career trajectories for PhD students and post docs.
- Identify the large knowledge gaps and societal need of the next decade related to the focus area. Develop corresponding multi-disciplinary research programs headed by the UoA in which PhD students and postdocs can have career paths
- Continue to build and expand multidisciplinary research collaborations within and outside the university to apply for and obtain large funding.
- Continue to develop research lines in close collaboration with all stake holders and with end-users.
- Continue to team up with stakeholders outside the university not only to generate research questions but also to fund research e.g., the municipalities.

# 7 G Rehabilitation Medicine

- Make stronger efforts to include the rehabilitation medicine into the medical curriculum, not only the pain management, but also neurological rehabilitation.
- Support efforts for employments with both research, teaching, and clinic for all disciplines within the medical faculty.

- Within physiotherapy try to consolidate small research groups to bigger that might attract more research funding.
- Build collaborative research projects in the UoA based on the available expertise in implementation science.
- Identify knowledge gaps in all areas within the UoA
- The faculty and the leadership need to ascertain that employees at the university can meet both demands i.e., deliver both high quality research and high-quality education. The latter requires that the content is to be continuously updated to current scientific evidence.

# 7 H Emergency and High-technological Environments

- Facilitate more collaboration between research groups and between institutions, making them to a strong unit considering research and education on several levels.
- Build an infrastructure to support the organization for PhD students and researchers, on a university basis. Today, every research group need to have their own infrastructure.
- Define a policy to reach high quality in research, teaching, and clinic with an acceptable balance.
- Develop and organize for combined employment. There is extensive collaboration with relevant target setting for research, the researchers are involved in clinic, teaching, and research.

There is a need for strategies/priorities regarding funding from both the university and the clinic.

# Tissue, Cell and Molecular Biology and Medical Techniques

# Panel overview

Panel 8 constitutes a strong environment for both research and teaching in basic, laboratory and translational medicine with focus on cell/molecular biology, physiology and pharmacology. The research is hypothesis-driven and uses the latest and modern technology to decipher and assess biological mechanisms with importance for human health on a molecular, cellular and organism level. Importantly, our research groups have extensive collaboration with leading national and international labs, and thus we act in many strong academic networks. Furthermore, we act in a translational environment characterized by extensive collaboration with both clinically oriented groups and groups from the pharmaceutical industry. During the assessment-period, researchers of panel 8 produced 672 publications with total citation count 8475 corresponding to 13 citations per publication. We conclude that panel 8's researchers produce a lot of high quality science influencing the scientific community world-wide. Our funding is dependent on both government and external money. For our government funding, the research groups were allocated 136979 kSEK, whereas our external funding amounted to 317080 kSEK. Hence, the external funding represents about 70% of the total funding clearly demonstrating our dependence on external sources. For the future, we identify enhanced, or at least unaltered assignment of government funding, to be a very important cornerstone to build long-term stability for our researchers and prosperous and successful research and educational activities. The researchers of panel 8 are heavily engaged in teaching at many different levels, and our research strengths go hand in hand with our educational commitments allowing for transfer of scientific breakthroughs into both graduate and under graduate teaching. Our research projects are critically dependent on modern technology, and thus we see investments in new infrastructure as an important goal for the future. Besides critical novel efforts to build big infrastructure such as ESS and Max IV, also more local and smaller initiatives are essential. The university provides a number of technical platforms and core facilities which our researchers depend on. From the individual research groups perspective, it is very important that quality and service provided by these platforms are excellent, and that their pricing is affordable. We believe that the research groups of panel 8 will contribute to excellent research and education at the Medical Faculty, Lund University for the years to come.

# External panel report

The four units of assessment (UoA) that compose panel 8 conduct high quality research and the interviews demonstrated both the involvement and motivation of researchers. Research themes are timely, the research is internationally competitive and most research is published in good to excellent journals. As far as the panel has been able to evaluate, the overall balance between research, education and external engagement is good. Research is mostly conducted in small teams, and for various research units the interaction between the research units within and outside the UoA could be improved. The composition of the UoA for RQ20 ranged from rather homogeneous (e.g. 8A and 8D) to highly heterogeneous (8C), which was the result of decisions made by faculty management with little apparent involvement of the research units and not mainly guided by scientific considerations.

Research of the UoA is highly dependent on external funding and most research teams are successful in obtaining such grants. However, long-term planning of research and education, and e.g. entering high-risk/high-gain areas of research, is limited by available resources. Therefore, the process that guides assignment of Faculty positions and acquisition of Faculty budget essential for such long-term planning could be more transparent, and thus enable research teams to better develop long-term research strategies. There appears to be no Faculty strategy that is based on scientific content, and this absence does allow for academic freedom and may appear to stimulate bottom-up initiatives. However, the definition of such a scientific strategy may increase the transparency of the decision-making process to apply for e.g. Faculty funding for replacements or new positions, and may stimulate network formation which is now mainly limited to the Wallenberg Centres and Strategic Research Areas (SFOs). Furthermore, such a Faculty strategy may also be attractive for the national and international position of biomedical research in Lund, since it clarifies the scientific content and focus Lund stands for. Internal redistribution of budget should allow the Departments to develop their own strategy in close collaboration with the research groups.

Overall the panel has witnessed the presence of highly viable and relevant research that is well connected to the rest of the world, and that has the potential for further growth and excellence. In this report, both general as well as UoA-specific recommendations are provided.

## INTRODUCTION

Composition of panel. The panel was composed of the following members:

Chair:

• Prof. dr. Pieter S. Hiemstra, Department of Pulmonology, Leiden University Medical Center, Leiden, The Netherlands

Members:

• UoA 8A: Lena Palmberg, MD, PhD, Professor, Head of Integrative Toxicology, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden

- UoA 8B: Ulf Simonsen, MD, PhD, Professor of Pharmacology, Department of Biomedicine, Pulmonary and Cardiovascular Pharmacology, Aarhus University, Aarhus, Denmark
- UoA 8C: Werner Müller-Esterl, MD, PhD, Professor of Biochemistry, Goethe University School of Medicine, Frankfurt, Germany
- UoA 8D: John R. Couchman, PhD, CBiol, FRSB, Professor Emeritus, Biotech Research & Innovation Centre, University of Copenhagen, Denmark

*Mode of operation:* The panel had discussions via Zoom with Department heads, Faculty management, and representatives of the UoA. For each interview, the questions to be addressed were discussed by the panel members. Each interview started with a brief introduction of those involved. After the interview sessions, the panel discussed the content of the report and discussed points relevant for the general part of the report. Each panel member wrote the draft of the report for the individual UoA assigned to the panel member, and the drafts were discussed in a Zoom meeting by all panel members. The chair combined the final version of these individual reports, and finalized the general parts of the report. The draft of this complete version of the report was sent for review to all panel members, and based on their input a final version was prepared.

*Formation of UoA:* The UoA were formed without obvious input from the research groups, resulting in substantial variance between the various UoA: some were homogeneous and others had a very heterogeneous composition. Some UoA have a history of collaboration, others do not, or the collaboration is restricted to some Principal Investigators (PIs).

*Background material*: The background material provided was good, but the panel asked for additional information regarding CV and funding of individual PIs. The panel also noted that some publication lists contained publications in which none of the PIs of the UoA were involved, and/or publications were included that did not appear to be related to the theme of the UoA. Finally, the panel noted that an overview of the members of the research team per PI was missing. The SWOT analysis performed by the UoA was very helpful, both for the panel members, as well as for the UoA (as indicated during the discussions).

# **OBSERVATIONS INDIVIDUAL UNITS OF ASSESSMENT**

#### 2.1 Unit of Assessment (UoA) 8A – Respiratory Research

#### 8A Observations

The UoA 8A comprises of four research groups, ie Lung biology, Airway inflammation and immunology, Respiratory immunopharmacology and Respiratory cell biology. They share interest in translational respiratory research including chronic lung diseases like asthma and chronic obstructive pulmonary disease (COPD), interstitial lung diseases like idiopathic pulmonary fibrosis, bacterial and viral infections, lung regeneration and repair, lung transplantation and lung cancer. This UoA has a long track record of collaboration between the units: since as long as 20 years for Gunilla Westergren-Thorsson and Jonas Erjefält, over 12 years for Lena Uller and 2 years for Cecilia Andersson. Both Lena Uller and Cecilia Andersson are former PhD students of Prof Jonas Erjefält and have returned after postdoc periods in the United Kingdom. This increases the sustainability and renewal of research strengths within the Unit. Lena Uller was awarded a permanent senior lecturer position and has been supported as junior scientist with a postdoc grant from the Swedish research council and as senior scientist by a position from the Swedish Heart & Lung Foundation. Cecilia Andersson was awarded an associate lecturer position and received a start-up grant from The Swedish Research Council of 6M SEK. She is also an honorary research fellow at Imperial College, London, England since 2016. All four groups are located closely to each other at the BioMedical Centre (BMC) and next to the Respiratory clinic at Skånes University Hospital which facilitates the existing strong collaboration both within the unit and with the clinic. They have built up a strong methodological platform which they share. All four research groups in UoA 8A belong to Department of Experimental Medical Science. The four research groups have in total published an impressive 104 original articles between 2014-1018 in medium and high-ranking journals, despite the fact that the unit is relatively small. The total number of citations is 1897 and approximately 20% are in the top 10 citation percentile, which has increased from 3.7% 2014 to 22.7% in 2018, which can be interpreted as a rough indicator of increased scientific quality.

Professor Gunilla Westergren-Thorsson (GWT) was head of the Department of Experimental Medical Science between 2007-2011 and Dean of the Faculty of Medicine between 2012-2017. Since 2018, GWT is director of both the Wallenberg Centre for Molecular Medicine and Bio Imaging Center. This gives the unit insight into how the Faculty works and information on how to access core facilities and methodological platforms, and opportunities for financial support. The Future Faculty organisation for postdocs is highly appreciated, organizes a.o. training on how to write applications and give career seminars, and is represented in the Faculty board. There are also monthly meetings for associate senior lecturers and a mentoring program is offered. Members of the unit are also taking part in the LMK foundation, which is a translational foundation that facilitate collaboration between different faculties. The Faculty of Medicine offers various courses in leadership that are free of charge and important in preparing young scientist for coming duties. Leadership courses are also organized at the university and departmental level, but not always free of charge which might limit the possibility to attend for young scientists. The Lund Respiratory Network (LURN) was established 17 years ago to facilitate collaborations within respiratory research between pre-clinical and clinical researchers and pharmaceutical industry. Another example of collaborations nationally, internationally and with pharma industry is an EU Interreg Grant, which is a consortium with a total budget of 70.000K SEK of which 35.000K SEK are financed by EU and 12.000K SEK by larger pharmaceutical companies; Jonas Erjefält (JE) is PI for this EU Interreg Grant from Lund university. JE has extensive experience administrating and coordinating other multiple collaborative industrial projects related to inflammatory diseases.

#### **8A** Conclusions

The UoA 8A is a strong unit with long history of collaboration. They share a unique translational research interest within the lung field with strong collaboration with the respiratory clinic, local biotech companies, and Big pharma industry. They have a good balance between research, education, and external engagement. The unit has collaborations with the Lund Stem Cell Centre (SCC), which is one of the SFOs at the university. Researchers found it difficult to be included into the other SFOs, and to get access to important platforms. The groups have identified a lack of (funding of) tenure track positions allowing young research leaders to further progress their careers. The unit leaders have fixed positions, but only the Unit of Lung biology has 45% personnel with a fixed or tenured position; none of the other units have any of those positions. It is important for the UoA to have research positions for clinical doctors to ensure that their unique translational research can continue and for young scientists to ensure growth and career progression. It is important to establish a replacement for the very strong and research active clinical collaborator Prof Leif Bjermer, who now has started his retiring process. All research groups within the unit strongly depend on this collaboration with the clinic and this position need to be filled to continue their strong and unique translational research.

## 8A Recommendations

General

- 1. Faculty-funded position to enable long-term planning
- 2. Improved possibilities and clearer procedures for acquiring budget from the Faculty for positions, grants, and methodological platforms
- 3. Better and more visible support from the Faculty regarding innovation, communication, and IT.
- 4. The faculty should have a more defined and visible plan for future investments
- 5. The infrastructure must be more visible and more available for everyone and not just depend on personal contacts within a SFO.

## Specific

- 1. Organize within and between units opportunities for big investment in expensive cutting-edge techniques.
- 2. Organize within and between units opportunities for junior faculty support, like grant application and writing and getting articles published, to improve tenure track for young scientists.
- 3. Acquisition of imaging equipment, live-cell imaging system, for which the unit has applied; if not successful in this round, this is important equipment for the unit to obtain.
- 4. Purchase of a Light Sheet Microscopy for visualizing cell-cell and cell-matrix interaction in 3D in collaboration with Lund university BioImaging Center (LBIC). This is possibly something that could be done together with UoA 8D.
- 5. Conducting more mechanistic research projects and aiming for publications in journals with higher impact. This could also reduce the need of fresh human samples, which are obviously limited.

# 2.2 Unit of Assessment (UoA) 8B – The Physiology Unit

# 8B Observations

*General.* UoA 8B has a common interest in physiology and clinical physiology. It comprises of six research groups, i.e., Molecular Vascular Physiology, Medical microspectroscopy, Vascular Biology, Vascular Physiology, Cellular Biomechanics, and Clinical Physiology. Five of the research groups are at the Department of Experimental Medical Science, BMC, and one research group at the Department of Translational Medicine, Skåne University Hospital. Several of the PIs (Karl Swärd, Sebastian Albinsson, Bengt-Olof Nilsson) of UoA 8B have a long track record of collaboration. In contrast, other PIs (Oxana Klementieva and Anja Meissner) have been recruited recently. The Clinical Physiology group lead by Per Wollmer studies cardiovascular and respiratory systems, but there is currently no co-authored papers or collaborations with the other PIs. Per Wollmer will retire in 2021 but will remain as senior/emeritus professor. Several of the PIs at BMC have other clinical collaborations or, in the case of Anja Meissner, been matched with a clinical colleague, increasing the translational aspects of the research.

The structure of the research groups is variable and includes, in addition to the PIs, tenured assistant researchers at lecture level, postdocs, and PhD students. The role of the tenured assistant researchers (Johan Holmberg, Ander Engdahl, Frank Matthes, Catarina Rippe) in the research groups is not described or defined in the self-evaluation. The number of PhD students varies from 0 to 5 in the research groups, and the same is the case with postdocs, probably reflecting different strategies and needs.

The six research groups have in total published an impressive 168 original articles between 2014-1018 in medium and high-ranking journals. The citation frequency is in total 3231 during this period, with

19.2 citations per publication. Many of the publications are published in good journals with impact factor 3-7. There are 10 publications in high impact journals belonging to the top 10 citation percentile. No patents or spinoffs are mentioned for the period.

The public funding is unaltered during the period, but due to external funding, the total funding has increased from 14.631K SEK for 2016 to 19.257K SEK in 2019. Calculated in publications, the cost per publication has decreased during the period. The funding includes major funding from the Swedish Research Council, the Wallenberg Foundation, and some network EU funding, but there are apparently no major EU grants. In addition, there is funding from a series of different private foundations. It is mentioned that inadequate financing of non-clinical PhD students from the Faculty is a threat to the research groups. One of the central research lines is using bioinformatics approaches and tests these experimentally using among other transgenic methods in mice. The animal stable is a core facility and financed by the PIs. The same is the case with several other core units, and this may represent bottlenecks in the development of the research projects. The core units, e.g., MAX-IV, Bioimaging Centre, and Bioinformatics, are used by the PIs.

The scientific network of all PIs is extensive both at national and international level and includes national as well as collaborations in the EU and the USA. In contrast, collaborations with other parts of the world, e.g., China, Japan, Australia, are not mentioned. There is an exchange of PhD students and postdocs with international collaborators. Some of the PIs also have collaborations with local industrial partners, e.g. AstraZeneca and SciLifeLab.

The PIs participate in the leadership of the Department. Prof. Bengt-Olof Nilsson is Deputy-head, responsible for PhD education, at the Department of Experimental Medical Science. Prof. Karl Swärd is Deputy-Head at the Department of Experimental Medical Science, while Sebastian Albinsson is the leader of the UoA 8B and organizes meetings. This provides the UoA 8B information at the Department and Faculty level and an option to influence decisions. Based on counselling advice, the Dean decides and allocates permanent positions within the Faculty.

#### **8B** Conclusions

The UoA 8B is a strong unit within vascular physiology. The unit is in a transition after recruitment of two new international PIs. Anja Meissner is an example of successful recruitment involving the Wallenberg Foundation and a clear strategy for near-future development. Despite an impressive series of international publications, the potential for reaching even higher levels is present. UoA 8B has a good balance between research, education, and external engagement. It is essential to ensure a replacement for Prof Per Wollmer at the clinic, who will soon start his retiring process.

#### **8B** Recommendations

General

- 1. Faculty-funded position to allow for long-term planning.
- 2. Improved possibilities and clearer procedures for acquiring budget from the Faculty for positions, grants, and methodological platforms.
- 3. Better and more visible support from Faculty regarding innovation, communication, and IT.
- 4. The Faculty should have a more defined and visible plan for future investments.

#### Specific

1. Organize within and between units opportunities for junior faculty support for e.g. training in grant application and writing and getting articles published, to improve the track records of young scientists.
- 2. All research lines in the UoA 8B are translational and involve the use of human material. Therefore, taking into account the current financing, the research groups should strengthen the collaboration with local clinical colleagues to recruit PhD students for translational research.
- 3. The role of assistant researchers should be more clearly defined. Are they mainly lab managers? The PIs are recommended to evaluate whether this is an optimal investment of resources compared to postdocs, PhD students, or an additional PI.
- 4. The plans and granting strategies for each research group are exciting and involve in some cases application for EU funding. Taking into account the fields covered by the research groups, development of an overall funding strategy for the major funding in the UoA 8B could be an advantage.
- 5. The potential application of the scientific results for patents and innovation should be considered before making the results publicly available. In this context, it is recommended that interested partners from industry and investors are consulted for the potential of development and future funding.

#### 2.3 UNIT OF ASSESSMENT (UoA) 8C – Structural Biology, Bioinformatics, Pharmacology & Medical Technology

#### 8C Observations

General: The UoA 8C comprises four main areas, i.e. Structural Biology, Bioinformatics, Molecular Pharmacology and Medical Technology. Each area has its own raison d'être, yet it was difficult for the scientists involved and the reviewers to find a common link between these very different subfields. On the positive side, the individual areas, each on its own, have very similar quality standards. If one takes the publication record as a surrogate for the quality of the UoA, then one finds that the scholarly output by the Structural Biology, Bioinformatics and Pharmacology groups in the 2014-2018 period is quite impressive: Out of a total of 180 peer-reviewed publications, more than 20 articles have been published in top ranking journals, and out of them 10 articles made in into the top 10% percentile, and 2 even into the top 1% percentile of frequently cited articles. Notwithstanding these respectable successes, it cannot be overlooked that UoA 8C represents a great heterogeneity of research groups, a fact that was confirmed by the scientists themselves. Presently, there is almost no established collaboration between the four research groups of the unit. It was not evident to the panel that the composition of UoA 8C would reflect content-related, collaborative and/or spatial proximity aspects. An inquiry with the Dean revealed that criteria other than sole scientific were predominant in the composition of the UoA 8C, which was viewed critically by the reviewers. Concerning the leadership, the self-assessment report reads: "UoA does not have any influence over leadership in the unit" and "The faculty and university provide very limited guidance and support regarding management and leadership". The collegial structure seems to be well established on the level of the subunits, e.g. in Structural Biology where three PIs work along the same lines with a common strategy. Concerning the quality ecosystem, the panel found that all PIs were very quality-oriented with regard to their own work; on the other hand, a comprehensive quality control system that would focus on the UoA as such was not apparent.

**Specifics**: The **Structural Biology** unit (3 professors, 6 PhD students, 2 postdocs) has brought together different expertise such as X-Ray crystallography, cryo-EM, and Cell Biology, represented by Pål Stenmark (tenured), Karin Lundkvist (tenured) and Pontus Gourdan (non-tenured). This splendid blend has led to a cross-fertilization. The perspectives for the Structural Biology Group appear quite favourable in view of the advanced establishment of MAX IV and the (less advanced) development of the European

high-power neutron spallation source ESS. What is still desperately missing are screening microscopes that allow a rapid and reliable on-site assessment of preparations. With the recruitment of Markel Martinez an outstanding young researcher has joined the group, who has the potential to strengthen new research lines in booming field of cryo-EM that provides a very useful complementation to "classic" X-ray crystallography. It remained unclear whether NMR expertise is wanted in order to better study dynamic aspects of proteins.

The Bioinformatics unit (1 professor, 1 PhD student, no post-doc) appeared to be very cohesive and influential due to its interdisciplinary field of research and activity. Mauno Vihinen (tenured) explained in some detail that his research unit had (and still has) a pivotal role in the set-up of the bioinformatics core facility LUBI-LSGA. Upon request, he was confirmed that access to high-performance computers of the latest generation is secured by LUNARC. The extensive use of artificial intelligence is a natural desideratum of a bioinformatics subunit. Also, the medium-term challenges in the current times of corona, where an expansion of the genome-wide sequencing studies can be expected, are considered manageable by Mauno Vihinen. What is missing are sufficient funds at his hands to quickly expand novel research lines.

The Pharmacology unit (1 professor, 1 PhD student, 1 post-doc) appeared to have shrunk to a personnel minimum, not least through the passing away of two representatives of this research field of research Lund, as Fredrik Leeb-Lundberg (tenured) explained. In addition, the representative of clinical pharmacology, Lars Grundemar (non-tenured), has only a 20% share of his time for university research and no co-worker whatsoever. The subunit has made every effort to compensate for this lack in person power by collaborating with *external* academic and industrial partners. It remained unclear why the long-term down-spiralling of pharmacology in Lund has occurred, and why the faculty has not yet refilled the two vacant professorships (see above). When asked, the Dean explained that he has set-up a task force to rebuild a molecular, cellular and/or clinical pharmacology unit in the future; however, concrete measures to address this deficit have not yet been taken. The reviewers consider a modern pharmacology unit focusing on disease-related topics, structural and cell-biological methodology and targeted co-operations with spin-offs as an asset for a future-oriented medical faculty. As a side effect, extensive collaborations with pharma industry help to mitigate the budgetary constraints of the subunit.

The Medical Technology unit (1 professor, no PhD student, 1.5 post-docs, 1 docent) is apparently a relatively small group that is very much concerned with a meaningful combination of engineering sciences and medicine, but still has insufficient resources to achieve spectacular success, as was explained by principal investigator Tomas Jansson (tenured). He confirmed that his subunit has access to stateof-the-art, cutting-edge technologies in his field, and that he and his co-workers have a "core" facility which supports other groups with ultrasound scanners and other, top-notch spectroscopy equipment. In addition, there are ongoing collaborations with spin-offs in the Greater Skåna area. Unfortunately, the Bioimplantation Research Subgroup was not represented during the meeting.

#### **8C** Conclusions

The remit of the panel was "to assess the **preconditions for high-quality research** [....], to determine if resources are adequate, if the balance between education, research and outreach is viable, and if the strategic direction and scientific [...] networks are sufficient and conducive to quality" (Guideline of Panels and Panel Reports, Version 5 of November 12, 2019). Against this backdrop, the reviewers felt that a major flaw of the self-assessment report provided by UoA 8C was the **lack of scientific concepts and content-driven perspectives** for the future of the unit. E.g. which comprehensive questions and challenges does the UoA want to tackle in the future within the existing framework? At which point does the UoA need structural support and technical extensions to tackle novel topics and hop on emerging research fields? An important reason for this lack of forward-directed strategies is undoubtedly the great

heterogeneity of the UoA, as mentioned above. Another may be the fragmentation of the departments involved, some of which have more than 70 research groups which makes it difficult, if not impossible to find common ground in fundamental issues.

With regard to the adequacy of resources, the unanimous opinion of the researchers interviewed was that the existing funds are just sufficient to finance ongoing research activities, but certainly not enough to open up new research projects and fields. The evaluators had the impression that a high percentage of external funding comes from national sources, while only a small fraction comes from the EU or other international research funding organizations. This seems all the more pressing as the aforementioned heterogeneity and fragmentation severely limits the chances of UoA 8C to attract e.g. a major consortium grant.

Given the limited time available for discussions with the researchers, it was difficult for the panel to make a fair assessment of the **balance between research**, **teaching and outreach** on the basis of the self-assessment reports alone. It should be added, however, that all participants were clearly in favour of a strong involvement in teaching and were very much open to collaborations with industrial partners.

#### **8C** Recommendations

General

- 1. Dissolve UoAs and form units on a scientific, content-driven basis, which are able to develop common perspectives and long-term plans that might offer a chance to be successful in Programme Grants or to recruit individual ERC Grants. The panel considers targeted incentives and funding from the faculty essential to improve the success rate.
- 2. Either disband the small micro research units or merge them into larger units to form more effective teams that ideally have increased chances to play at the research front, to win programme grants and to attract external researchers for collaboration or integration.
- 3. Redeploy existing human resources, e.g. after researchers have left or retired, into flexible positions that can be used to put together attractive packages for the appointment of external scientists or to further round off and strengthen existing units with an exceptional record.
- 4. Provide legal and organizational support for the individual research groups by the Dean's Office in order to make the units more successful in the competition for Wallenberg grants.
- 5. The Dean's Office should launch an initiative to develop with the top researchers of the Faculty a comprehensive, content-driven development plan with clear priorities, which may serve as a guideline for young and/or newly-acquired researchers

#### Specific

- 1. Re-establish a modern pharmacology unit with a molecular, cell biological and/or structural biological orientation; for this purpose, two "dormant" professorships should to be opened as soon as possible.
- 2. Provide adequate funds or at least substantial financial support of the faculty for the expansion of the cryo-EM facility with high-end microscopes and detectors; for the access to up-to-date mass spectroscopy; and/or for the usage of centralized animal facilities.
- 3. Develop clever strategies to attract and equip highly talented junior researchers ideally from all over the world to the faculty with substantial offers and recruitment packages, transient reduction of teaching load, and early involvement of faculty-wide activities.
- 4. Find ways and means to include principal investigators into the conceptual developments of the Departments and Faculty, e.g. by setting-up internal advisory boards that help define the overarching strategies, set priorities and suggest allocations.

5. We encourage the faculty and departments to allow for hierarchical structures that are distinguished by competence alone (and not by seniority); to appoint outstanding scientists who can lead an entire scientific field, as has been the case in the extracellular matrix area; and to invest into emerging research fields at the expense of micro units.

#### 2.4 UNIT OF ASSESSMENT (UoA) 8D - Extracellular matrix and cell-matrix research

#### 8D Observations

*General.* The majority of researchers in this unit are involved in extracellular matrix and developmental biology research. Nine principal investigators were included from this research area, but in addition, two additional principal investigators were included in this UoA although a survey of their publications would indicate that they are not matrix biologists and have not collaborated with this group. Discussions with the Dean and others indicated that the UoAs were largely constructed for the purpose of the assessment exercise and were formulated partly on scientific commonalities but also with financial considerations. Therefore, UoA 8D, while having a major focus on matrix and developmental biology is nevertheless a somewhat artificial construct. It is also clear that matrix biology is a significant feature of research included in UoA 8A, where approximately 25% of the listed publications are related to this area. There are also some related publications arising from UoA 8B and in addition, other matrix researchers are located outside UoA 8.

The quality of matrix research in UoA 8D has been consistently high, and there have been many successful collaborations, in the area of pulmonary research (with investigators from UoA 8A) for example. There are also clear and important connections with clinical science. The resultant peer-reviewed publications, in leading and specialist journals, is a mark of the success of this unit. Moreover, it is clear from the publications that the investigators in this unit have benefitted from national and international collaborations external to Lund University. Matrix biology in Lund is internationally known and has been recognised for several decades. This high-quality research area continues and has been reinforced by recent recruitment. Nevertheless, despite having one of the largest concentrations of matrix biologists in Europe, perhaps second only to the Cell-Matrix Centre at the University of Manchester, there is no clear umbrella entity that includes the researchers, students and collaborators beyond a successful seminar programme. The spread of research interests within the matrix biology area in UoA 8D and the fact that some of the UoA 8D researchers are located in physical proximity to foster communication, while others are not, is also reflected in the current funding status. While mostly well-funded, the researchers rely on individual investigator-based, mostly national, grants rather than programmatic or international (e.g. EU) funding sources.

*Specifics.* Matrix biology has its origins in the study of skeletal tissues, and some of the pioneering work originated in Lund and elsewhere in Sweden. It is now appreciated that matrix and its constituents are highly influential in almost all cell and tissue processes, and alterations in mechanical and chemical properties have impact on development (for example the stem cell niche) and many diseases. Reflecting the diversity of areas where matrix biology is now known to be important, there are groups in the UoA with research foci in vertebrate and invertebrate development, musculoskeletal diseases, lung biology and molecular structure/function/synthesis analysis. There are clear connections to UoA 8A and there are also linkages to the SFO in stem cell biology. However, there is no SFO directly related to matrix biology and it is clear that being inside one of the SFO research programmes can be highly beneficial in terms of funding, notably for younger researchers. However it was mentioned that there can also be impact on accessibility to core facilities that lie within an SFO, with those inside the SFO having easier access. For

those outside, therefore, this can be a potential impediment to progress. On the other hand, discussions also indicated that overhead costs would be higher in the absence of the SFO funding mechanism.

Overall, the principal investigators were satisfied with the core facilities available although it was noted that it can be difficult to implement and maintain facilities. However, recruitment in the areas of molecular imaging and bioimaging will be highly beneficial for the effective running of relevant core facilities. The former position is linked to Max IV/ESS for which there is significant enthusiasm and support. Max IV/ESS promises to be a leading and major facility in Europe with significant benefits for many researchers at Lund University, including those of the matrix field. The areas of mechanobiology and light sheet microscopy were identified as possible future core facility development.

Over the past 4 years there have been senior retirements and the loss of a world-leading researcher (Prof. Dick Heinegård). The issue of recruitment and the ability to rebuild and reinforce the area was discussed. There is no automatic replacement strategy, but the lack of a defined research strategy at the Faculty level in turn means that the process of decision-making in recruitment can appear opaque. It is unclear to many how the decisions on recruitment are made, other than they are made at the Faculty level. Our discussions would indicate that gaps in regard to teaching at the undergraduate level are an important consideration. Financial packages available for recruitment was raised as an issue, and it was apparent that some past recruitment attempts had been frustrated by the lack of necessary funds, leading to loss of candidates to other institutions. On the other hand the matrix area has been boosted by the recent recruitment of Dr. Darcy Wagner, who has obtained a Wallenberg Fellowship and an ERC starting grant. She has built a substantial group with the aid of this significant funding. A junior new appointment in the cell-matrix area has also been made (Gopal) who has received a Swedish Research Council starting grant. He has yet to move to Lund.

Of approximately 1200 PhD students at the Faculty level, 80% are clinical, and 20% are non-clinical. A recurring feature of our discussions was the concern over the difficulties of funding these fellowships. Some indicated that it was the most pressing issue. The costs per student are significant, but only a small proportion (3 months salary) is provided by the Faculty, the remainder must be found from external sources. It was suggested that re-balancing the differential between clinical and non-clinical PhDs along with financial support re-alignment could be a major benefit for the researchers in UoA 8D and other units.

#### **8D** Recommendations

1. It would serve the matrix researchers of unit 8D and other units well if an umbrella organisation were instituted. This could be virtual and need not have cost centre requirements. The formation of an organisational structure would not only raise the visibility of matrix biology within the University of Lund but also outside. Such an entity would facilitate interactions with local and national or international pharmaceutical and biotech companies, and be a recognisable platform for promoting the research excellence of matrix biology in Lund. As such, a centre renowned for, and capitalising on, decades of leading research in matrix and development biology would present an imprimatur of quality that would aid in recruitment at all levels. Research environments are a key criterion for some funding bodies, and a visible organisational structure highlighting the strength and depth of research in the area in research and education could be highly beneficial.

At the same time, such an organisation would facilitate student and postdoctoral researcher interactions with organised events that bring together researchers who may be geographically dispersed. This may bring about new interactions and collaborations, including those with clinical partners, with potential for new external funding. A PhD course in matrix biology may also bring increased awareness of the area. It is noted that there may be little financial incentive to provide an elective course at the PhD student level, an issue that deserves to be re-examined. A possibility is to combine with a nearby institution (e.g. Copenhagen University) to provide an elective course.

It is recognised that bringing matrix researchers together as an organisation entity requires time, effort and leadership. Support from the relevant departments and at Faculty level will be essential and the appointment of a senior leader for this development will be needed.

- 2. Provide a system of mentorship and advisory capacity to aid in the preparation of grant applications. This can be particularly important and beneficial for consortia where familiarity with, for example, EU requirements and regulations, is required.
- 3. Rebalance the ratio of clinical versus non-clinical PhD positions, with a concomitant financial reorganisation to provide some much-needed increased support to investigators.
- 4. Recruitment and retention are key issues. Increased clarity in the development and implementation of strategies in this area is needed. Investigators should, through their departments, be able to feel enfranchised in the process. Packages for recruitment are an essential component that should be addressed, optimising, where appropriate, applications for Wallenberg, ERC and other funding sources.
- 5. Core facilities are an essential component of current and future biomedical research. While overall satisfaction with the range of facilities was evident, the point was made that access to facilities inside an SFO could be difficult for those investigators outside this structure. While there may have to be priorities in the access and use of core facilities, every effort should be made to streamline and maximise access. The success of these platforms also relies on the availability of technical expertise. The funding and provision of this support should be re-examined, including cost recovery, user fees, faculty support etc.

#### **GENERAL OBSERVATIONS**

The self-evaluation and the interviews with the various UoAs by the panel members demonstrated that the research performed within the UoAs is in general of high-quality and is conducted by motivated researchers. **Research infrastructure and facilities** are good to excellent, and especially the MAX IV facility and ESS offer important advantages for the local research community and serve as a strong selling point. Research does appear to be somewhat scattered and focused within individual small teams (except for the SFO and Wallenberg Centres). Being part of an SFO brings important advantages, such as getting SFO-related PhD students and postdocs, and access to specific core facilities and platforms. Yet, the SFO appear to be rigid (predefined topics that appear to be set in stone) and act as a rather closed system, that is not fully open to the local research community.

**PhD students** are essential in research conducted by the various UoA. There appears to be an imbalance between clinical and basic science PhD students, in favour of clinical PhD students. Whereas this may be favourable for implementation into clinical practice, this imbalance may also possibly hamper innovation and translational science. PhD courses are organised for training of young researchers. These PhD courses take up a substantial amount of time for the students; the curriculum is however mainly composed of mandatory general courses, with very few PhD courses in specialized areas. This may limit the formation of critical mass, and creation of a young research community. One of the reasons for the relative absence of specialized PhD courses appears to be the absence of an incentive, because available budget cannot be used for salary.

When attracting new researchers, the package that can be offered differs very much depending on where the recruitment is coming from. Researchers such as Anja Meissner (UoA 8B) and Darcy Wagner

(UoA 8D) recruited by the Wallenberg Centre for Molecular Medicine obtained an attractive package allowing them to build up a group, which has a very positive impact on the local environment. Such packages are not available for faculty-recruited scientists.

Research is highly dependent on external **funding**. Research grants are mainly individual, and (with exceptions) there are relatively few EU grants. Dependence on external grant money and insufficient compensation for increased costs by governmental budget is considered as a threat, and this is likely to increase as a result of the current COVID-19 crisis. Teaching involvement offers opportunities for tenured positions within the UoA. The system appears rather rigid with limited flexibility in the budget to stimulate areas of research and individuals. The need to revive Pharmacology is widely recognized at different levels in the organization, but how this will be achieved is less clear. Departments do not have a budget that is sufficient to develop a strategy of their own. The apparent absence of a Faculty strategy based on scientific content, as explained by the Dean, allows for academic freedom and may stimulate bottom-up initiatives. On the other hand, the definition of such a scientific strategy may increase the transparency of the decision-making process to apply for e.g. Faculty funding for replacements or new positions. Furthermore, availability of such a strategy also appears attractive for the national and international position of (bio)medical research in Lund, since it clarifies the scientific content and focus Lund stands for.

## General recommendations

- 1. Encourage formation of networks of researchers, e.g. by stimulating applications with the Wallenberg Foundation, as well as by creating internal incentives for collaboration.
- 2. Include scientific content into the Faculty strategy to make clear where the Faculty is heading, increase transparency and make it less opaque.
- 3. Take the necessary actions to revive Pharmacology within the Medical Faculty in Lund by recruiting scientists.
- 4. Alter the balance between clinical and basic science PhDs, by e.g. providing longer co-funding of a basic science PhD than for a clinical PhD. This may increase innovation and scientific excellence and translational science. The current Faculty support is 3 months, irrespective of clinical or basic science PhD; this could be reconsidered. In addition, performing basic research by clinical PhD students should be encouraged.
- 5. Streamline the administrative process for PhD students.
- 6. Provide support for young scientists by improving packages for (young) scientists recruited by the Faculty from inside or outside Lund allowing them to build up a research team. Also make sure that high quality leadership courses offered by the University are free of charge, just like the ones offered by the Faculty. Pay attention to creation of teaching opportunities for young staff.
- 7. Encourage EU grant applications, e.g. by a reward system for those acquiring ERC funding, and increase professional help in obtaining such grants. Solve issues concerning the inability to include renting space and overhead into the EU grant by providing tailored solutions.
- 8. Increase budget of the Department at the expense of central budget to allow development of local strategies.

402

Σ

# Highly Specialised Clinical Science

# Panel overview

Panel 9 is big and diversified. It spans research from psychiatry to surgical topics and medical radiation physics. Many of the research groups are in the international frontline, publish in top ranked scientific journals and obtain large grants in national and international competition. In spite of the diversity, the research environments in this panel have a lot in common. They are all integrated with the clinical services and most of the researchers are employed in the health care system or have shared employment between the university and health care. Many researchers perform research in both experimental, clinical and health science direction, thus a truely translational approach. In addition they have obligations with regard to undergraduate education of various health care professions and specialist training. This complex integration with health care has both positive and potentially negative consequences for the possibilities to pursue high quality research. In particular, high quality clinical research is dependent on high quality health care.

The highly specialized clinical science environments can base their research upon large patient cohorts and randomised trials with long follow up. External networks and personal contacts within the clinical departments facilitate identification of patients and recruitment to studies. Biobanking is common and many patient cohorts are included in national patient registries, often coordinated from Lund University. Many of the research environments are interdisciplinary or even transdisciplinary and integrated in large cooperative networks. Some infrastructure related to highly advanced and costly equipment, for example imaging, is shared with the health care system. This is also true for clinical trial units. The close connection to education at different levels offers opportunities to identify candidates with an interest for research. It also helps to form identity and to maintain a high level of subject knowledge.

In spite of these favourable prerequisites for clinical research, the pressure on time for clinical service constantly competes with time for research, and often has priority. Apart from the obvious consequence that clinicians are less involved in research, this carries a risk for long lead-times from idea to publication and thus untimely publishing. The geographic and administrative separation of some research groups between Lund and Malmö could be negative for collaboration on a daily basis within research groups. Furthermore many groups are both small and vulnerable and the seminar culture is weak. Small size is also a limiting factor in terms of administrative support and short term funding.

Retirement of many senior researchers within the next five year period is a serious threat to many environments. In addition there are too few 70 % positions for research for clinicians, which again has consequences in relation to pressing clinical duties, but also for PhD education. This means that long-term aspects on recruitment and leadership should attract more attention, and support from the medical faculty. Finally, the present requisites for registering PhD students are mainly constructed with full-time experimental students in mind, and are less suitable for candidates that are active clinicians and basically employed within the health care system.

# External panel report

#### December 2020

#### Final assessment after comments from the UoA for the final report The Panel has received no further comments. This is the final assessment

The units that this panel assessed are mostly involved in clinical research and the work is divided at the three hospitals that provide teaching of the medical students at Lund University, namely Lund, Malmö and Helsingborg hospitals. These units were quite different from each other but there were some com-

mon themes that were highlighted by many of the UoA. These are indicated below and more details can be found in the assessments of the individual units.

- 1. A discrepancy between the hospital organization and the university organization. Many clinical departments at Skåne University Hospital (SUS) have been combined into single clinical departments. At the same time clinical scientists from these can belong to two different university institutions, mostly clinical sciences/Malmö (IKVM) and clinical sciences/Lund (IKVL). This creates difficulties in strategic planning of academic positions and research resources. Further, the development and execution of a common long-term research strategy can be very difficult to create in such a setting. The panel believes the university should consider whether this is a fruitful way to divide research and teaching resources within specialities that are located at the different teaching hospitals.
- 2. The difficulty in combing clinical work and creating competitive clinical research unit. Many of the units describe a lack of a common strategic plan for clinical research between Skåne Universitets Sykehus (SUS) and Lund University. Is there room for research and clinical trials at SUS?
- 3. Lack of incentives to maintain a career in science after a PhD. Many of the assessed units describe a skewed age distribution among the academic leadership and a difficulty in fostering the next-generation of clinical research leaders. There seems to be a lack of incentives beyond obtaining the position of a consultant, academic positions for young faculty and a clear tenure track system. This needs to be focused on as many units describe themselves as fostering PIs for other Swedish and international Universities. Can Lund university afford losing these future PIs?
- 4. Lack of collaboration with or knowledge of SFOs. Many describe that they know of these but quite few actually work within them. How are research units invited to the SFOs or how are SFOs initiated, is it through open calls? In a university/-hospital setting there may be significant options for synergy between research units but are all stake holders invited? There seems to be room for improvement regarding this.
- 5. Lack of support for academic activities. It is recommended that there is increased focus from the faculty and university to support researchers in all aspects of administrative burdens for research. This includes improved access and help regarding funding applications and accounting, support for legal advice and collaboration agreements, support for ethics approval, establishment of central biobank facilities, GCP monitoring etc.

Many units would need more administrative support to be able to grow and to go for larger national and international collaborations including grants on the EU level. The increasing burden of bureaucratic obstacles put on researchers is the main threat for an easy, smooth, and fast track of research succession from idea to publication and patenting.

## Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

	Name	Primary Assignment	Secondary assignment
Chair	Henning Grønbæk	9A: Gastrointestinal	9B: Heart lung
Reviewer 1	liris Hovatta	9E: Psychiatry	9D: Audiology-Speech
			9I: Eye Ear Nose
Reviewer 2	Jes Lauritzen	9C: Ortopedics_Handsurgery	9G: Medical imaging
			9K: Medical radiation Physics
Reviewer 3	Nils Gilhus	9D: Audiology-Speech	9E: Psychiatry
		9I: Eye Ear Nose	
Reviewer 4	Rolf Hultcrantz	9B: Heart_lung	9A: Gastrointestinal
		9J: Dermatology_venerology	
Reviewer 5	Malin Sund	9F: Surgery	9H: Pediatric obstetrics
			9C: Ortopedics_Handsurgery
Reviewer 6	Lars-Gunnar Månsson	9K: Medical radiation Physics	9J: Dermatology_venerology
		9G Medical imaging	
Reviewer 7	Karl Lemström	9H: Pediatric obstetrics	9F: Surgery

## 9A RQ20 Report - Gastrointestinal

#### **Executive summary**

The UoA consists of the department of gastroenterology with two units, one in Lund and one in Malmø. There is a senior professor overall responsible for research and education. The two units are separated geographically but have good collaborations in research.

The main strength of the UoA is the close contact with large patient groups and also close contact to medical students to secure recruitment of residents and PhD students within gastroenterology. Further, there are a number of external engagements, however weakly described in the selfassessment.

Their main complaint regarding research weaknesses is heavy clinical duties with lack of time for research and lack of funding and a weak seminar structure. As described in the self-evaluation the research is second to clinical work – it should be considered equal and prioritized at the same level. This should be discussed with the clinical leader of the departments in Lund and Malmø.

The research is broad and covers the major themes in gastroenterology with focus on IBD, endoscopy, motility, and inflammatory liver diseases. This follows very much the patient populations seen in both Lund and Malmø, and has the benefit of high numbers of patient groups to be included in clinical studies.

However, there seem to be no over-all research strategy either for research areas, funding or publications and new research areas are mainly taken up by interest by researchers. Regarding clinical research there is a lack of support from the Faculty to ease the way through the increasing demands of bureaucracy with approvals for ethics, legal support, approvements, funding, etc.

It is recommended that the UoA define the current and future research plan including funding and a publication strategy with mission and vision for the next 5 and 10 years. This should also include a plan for recruitment and succession of senior researchers retiring within the next 5-10 years.

#### Introduction

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two

made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Stefan Lindgren senior professor Gastroenterology, Lund
- Klas Sjöberg, associate professor, Lund
- Jan Marsal, associate professor, Lund
- Olof Grip, associate professor, Lund
- Erwin Toth, head of gastroenterology, Malmø
- Viktoria Bergqvist PhD student, Lund

#### Leadership:

#### Priority setting, including goals for external research funding

In the self-assessment the UoA define their research as an integrated part of the clinical activities but also state that clinic has first priority and research is a part time activity. This seem to be a cultural theme that should be discussed with the clinical head of the departments in Malmø and Lund, and research should be prioritized similarly to clinical work.

They state there is no high need for funding for facilities etc. on the other hand there is a need for funding for equipment and especially dedicated research time. However, there is no specific plan for funding and applications, which are mainly by individual initiative. Further, they lack faculty support for research applications.

#### Recruitment, promotion and succession

There are 2 professors and 5 associate professors, where 1 professor retired 2019. There is no description on a recruitment plan for the successors. The UoA recognize that recruitment is mainly based on exposure to medical students in clinical practice and project works and to graduated physicians and find a high level of interest for research in gastroenterology with more potential candidates than available positions.

However, the UoA defines a lack of middle-age researchers exposing a gap between an elderly group of academics and young upcoming researchers and academic gastroenterologists. It is recommended that a specific plan for overcoming these issues is discussed internally but also at the Faculty level.

#### **Publication patterns**

The panel questioned the validity of the output as there seemed to be a number of publications that are not directly related to the UoA and where authors are from Clinical Institute, Lund University. Based on the initial output and bibliometric analysis there has been a decline in scholarly output from a max of 198 publications in 2015 to 140 in 2018. This is also reflected in a decline in papers present in Top 10 and Top 1 percentile citations from 16.4/3.5 to 15.7/1.4; however, with some variation in the period. A positive development is a steady increase in number of doctoral thesis from 3 in 2014 to 11 I 2018. However, this is expected to be accompanied by an increase in number of publications.

The panel have received an updated publication list after the interview but without evaluation reg. Top 10 and Top 1 percentile citations. In this list the number of publications was on average 47 (2019: 26; 2018: 43; 2017: 91; 2016: 35; 2015 43) with some duplicates and unsure if all are in peer reviewed journals.

#### The balance between activities in research, education and external engagement

A theme in the self-assessment is the mentioning of an imbalance between activities related to clinical service and research activities where clinics have the highest priority. However, there seem to be a good balance between research, education and external engagement and it is prioritized and acknowledged to be highly relevant for further collaborations and establishment of networks.

The external engagement is very briefly described regarding research collaborations, but during the interview national collaborations and international collaborations were mentioned; and after the interview the panel received a list with the following collaborations: Gastroenterology (Edinburgh and Köge), SweHep (Clinical liver research), SOIBD (Clinical Research on inflammatory Bowel Disease), SOREG (Registry of patients operated with gastric bypass), SWIBREG (Swedish Registry for IBD), International cancer agency (WHO). In addition, regarding endoscopy a significant number of international centres in Scandinavia, Europe, US, Canada are mentioned as well as with industry (Olympus, Fujinon, Pentax, Medtronic, Norgine, Boston Scientific).

The UoA should work out a strategy of research having the same priority as clinical work to improve the research quality and output including a plan or strategy for external engagement also focused on national and international research collaborations.

#### The overarching research strategy

There is a lack of a well described overall research strategy. The UoA find that "since clinical gastroenterology involves research deeply integrated with clinical service the main challenge is the need of time free from clinical duties, access to equipment and basic support to perform their research. They are less dependent on big grants for laboratories, salaries or offices as most research is within the clinical setting even for networks and often in multicentre format."

The UoA need a plan to face this challenge leaving more time open for research and have research prioritized at the same level as clinical work. This demands dedicated leadership at both the clinical department and research level as well from the faculty and university.

#### **Collegial culture:**

#### Opportunities for early-career researchers to develop their originality and independence

In the SWOT analysis there is a "positive interest for gastroenterology among young physicians and medical students and with a strong recruitment base and comparatively young PhD students with connection to basic research and also integrated, cross-border research. There is even possibility to recruit more PhD students from other health care professions." Further, after PhD graduation there is good opportunities for clinical positions where the candidate can pursue their own original research.

However, the use of post doc positions is missing and there is no plan for funding for these positions, which are very important for building up the next generation of academic gastroenterologists.

It is recommended to have a plan for recruitment and succession of senior researchers which needs to be combined with a better structure for funding as mentioned above.

#### Sustainability and renewal of research strengths

There is a focus and knowledge on the potential of education as a mean to attract students and PhD candidates and it seem to be supported also from the clinical leadership. However, there seem to be divergencies between research and the clinical department to solve these issues and a plan for the sustainability and renewal of research strengths seem to be under prioritized but focused on the primary research interests of inflammatory bowel disease, endoscopy, motility, and chronic liver disease, the latter expanding into NAFLD.

Renewal of research areas is based on the personal initiative more than an overall research strategy. However, the UoA are open for new possibilities and look into collaborations with basic research and related departments.

#### Academic networks and collaborations outside the unit

There seem to be a number of collaborations with related disciplines outside the clinical unit, particularly in immunology, cardiovascular research, diabetes, nutrition and odontology, but only weakly described. However, endoscopy has international collaboration networks. Further, other external engagements are of high priority to further enable establishment of networks and collaborations, however, this is only weakly described.

#### Diversity, integrity and ethics

Diversity and integrity are not directly mentioned in the self-assessment and a plan for diversity should be part of both the UoA and University policy. Ethics is well taken care of in clinical trials.

#### Quality in applications and publications

From the self-assessment publications are "mainly in medium ranked gastroenterology journals", and it is stated that the number of publications yearly is increasing. This is not supported by the original bibliometric analysis nor from the updated publication list; and there is no strategy to aim for publications in high-impact journals.

Applications is not mentioned specifically in the self-assessment; however, one of the researchers is a national coordinator for a Horizon-2020 financed project in IBD from Belgium, and the use of biological therapy. No other major funding is reported and there seem to be no specific plan for obtaining funding though lack of finances is mentioned as a weakness and threat for the UoA. Further, since researchers are primarily part time researchers this has consequences to the overall quality of applications especially in competitive fields. There is no mentioning of applications or obtained funding from VR or Cancer Foundation or other major Foundations.

#### Quality ecosystem:

# Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research

The UoA is very positive towards external engagement and outreach and they see it as a prerequisite for future collaborations and other contacts. The UoA prioritize this and hold several positions where researchers are involved in professional, governmental and regulatory organizations to develop health care, research and education in general and produce state of the art documents, guidelines and recommendations within our area of competence. However, this is most likely transferred back to the educational portfolio.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

Ethics is well taken care of in clinical trials and the UoA is part of program and protocols and have access to all data for analysis. It is assumed that a collaboration agreement is signed by the Lund University legal office TTO in relation to external collaborations to reduce risk of conflicts.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere The UoA is provided support for the economic administration of research by both the Hospital and Lund University and there is also support for infrastructure and formal leadership by the university. However, there is a request for more support in relation to applications, statistics, informatics etc. It is mentioned there is a lack for support for seminars which is considered a prerequisite for further development.

It is mentioned as a strength that the existing geographic proximity between hospital and university is a benefit and there are no significant issues having two departments, one in Lund and one in Malmø. There is no description on how the UoA reach out to strategic research areas or research groups at LU.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised. Clinical gastroenterology does currently not use benchmarking with other institutions and from the self-assessment there is no relation to LU SFOs however, there are close collaborations with other departments e.g. cardiology and diabetes research (Malmø) and immunology (Lund University)

#### Recommendations

#### Recommended focus points for the UoA

The main issue for this UoA is the lack of a clear plan, strategy, and priorities for their research including funding and publications. This must also include a plan for succession of senior researchers and recruitment of the next generation of academic gastroenterologists. The UoA is recommended to define their research mission and vision in close collaboration with the clinical leadership of the department in order to have research and clinic prioritized to the same extent; also, the Faculty and IKVL/M should be part of this planning. Finally, a plan for increased number of national and international collaborations is recommended as well as approaching specific strategic research areas (SFO) at LU where relevant.

#### Highlights from the self-assessment

Is a significant strength and advantage that the clinical department is large and with access to a significant number of patients for inclusion in clinical studies - both pharma initiated and investigator-initiated studies. Further, the UoA has a clinical strong base in IBD/immunology, endoscopy, motility and chronic liver disease which holds promise for improvement in quantity and quality of future research, funding applications and scientific output. This will also be highly relevant for education of medical students, PhD students as well as post-graduate teaching to secure the next generation of academic gastroenterologists.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

It is recommended that there is increased focus from the faculty and university to support researchers in all aspects of administrative burdens for research. This includes improved access and help regarding funding applications and accounting, support for legal advice and collaboration agreements, support for ethics approval, establishment of central biobank facilities. etc.

The increasing burden of bureaucratic obstacles put on researchers is the main threat for an easy, smooth, and fast track of research succession from idea to publication and patenting.

#### Missing material

During the evaluation process we asked for further information, which was provided for the final assessment (publications and external engagements).

#### 9B RQ20 Report - Cardiology Lung

#### Executive summary

The UoA consists of Cardiology, Respiratory medicine and Thoracic surgery. Cardiology and Respiratory medicine are located in both Lund and Malmö, Thoracic surgery in Lund only. All three units are strong in research, teaching and development.

Cardiology have several successful groups focusing on ischemic heart disease, arrhythmia and heart failure, with excellent research with good funding, publications and outreach. Leading in many fields. They deny that they have a central structure for research priorities but seem to succeed anyway. They report many big grants both national and internationally funded. Their publications are excellent. Their collegial structure is also good with very little room for improvement, and succession seems not to be a problem. They are utilizing the regions new infrastructure.

Respiratory medicine and allergology is also strong with good funding, publication in medium high ranked journals, they focus in allergies and COPD and a smaller portion of alfa-1-antitrypsin deficiency. There seems to be a problem with succession since formal decision has been made for a new professorship. They have good plans for research and funding priorities and a good structure for sustainability and work in ecosystems.

Thoracic surgery has national responsibility for heart transplantation and child heart surgery together with Gothenburg and their research is focused in these areas. They have a good structure for leadership and collegiality with good representation at all levels. They publish many good papers in excellent journals as a result of good research both clinically and experimentally. They have many national and international collaborations and work well in the newly developed infrastructure in the region.

#### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- David Erlinge- head and professor cardiology, Lund
- Pyotr Platonov professor cardiology, Lund
- Gudrun Oskarsdottir associate professor respiratory medicine, Lund

- Magnus Esktröm associate professor respiratory medicine, Lund
- Arne Egesten head of respiratory medicine & allergology, Lund

#### Observations

This UoA is big and contains three specialties of which all have organs located in the chest but otherwise are quite separate in both the clinical setting and in research. Only one of them is located at one site, whereas the others are divided between Lund and Mølmø; however, this is not brought up as a problem.

The Cardiology unit is located at both sites but most of the academic work is carried out in Lund. It is very successful and are quote: world leading in cardiology across the entire spectrum of translational cardiovascular research from molecular biology and integrative omics analysis to population studies and clinical trials. Their research base is a large number of patients from the region and this is well organized, they use local and national registries as well as biobanked material, also well organized in the regional biobank. They have experimental laboratories in the BMC and CRC laboratories.

*Respiratory medicine and allergy* (RMA) is located at both sites and feel they have a strong position in translational and clinical research in asthma and COPD. It is stated as a weakness with two sites hampering research interactions, but this is not expressed during the final interview. The two clinics have different research strategies.

*Thoracic surgery* (TS) is a prominent academic unit with Riks-sjukvård-status both for child heart surgery and for transplantation, which means they have patients for research available. They have been leader in its field for many years. It is only located in Lund. According to their publications they must have good laboratory research facilities.

The three units have a publication rate of 165 papers 2014 to 201 papers in 2018. Total citations 12977, Outputs in top 10 citation percentile (%) is 20.2 and Outputs in top 1 citation percentile (%) is 3.3. Citations per publication 15.

#### Leadership

#### Priority setting, including goals for external research funding

All three UoAs seems very active in searching for external funding. It is not well described on an annual basis, type of grant or trends. However, there are many examples and the grants mentioned are achieved in strong competition, which indicates that the units are successful in achieving grants. None of the groups seems worried about succession or a risk of a decline in activity. Cardiology denies that they have common goal for research in the department, but based on their current results they do not lack from it. The other two seem to have working priorities.

#### Recruitment, promotion and succession

All units seem well organized and have three dept chairs (one each in the three departments in the UoA.

5 full time professors
full time lector-ship
5 senior professors
guest professors
10 senior researchers
20 associate professors (docent)
36 PhD students
4 nurse/BMA PhD
40 medical doctors/physicians that actively participate in research

Although this is based on all three departments it does not seem to be a problem at least on a shortterm basis. It was not completely clear for the long term.

# Publication patterns

They report 772 peer reviewed articles in the text and 980 in the excel sheet. Even though it is difficult to evaluate for each department, the amount and quality of the publications are very good, as they are in many cases published in high ranked journals both in their field and in over-arching journals such the New England journal of Medicine.

# The balance between activities in research, education and external engagement

All units seem to be deeply involved in all areas, research being the most prominent field. Teaching outside the university is common as well as other external engagement. As in other parts of the evaluation the UoA as a whole is well represented in all these fields both nationally and internationally, thus we do not find reasons to suspect it is a problem.

# The overarching research strategy

The research seems to be well focused but the UoA do not claim to have a strategy, but rather adjust to the possibility to be able to choose area of interests. But in reported publications and reported grants there seem to be well focused research.

All three units have clear goals in their research even though one of them (Cardiology) denies the presence of one. However, as we can judge the UoA is driving their present research in a distinct direction, based on work with ideas and analyses of upcoming results from their own and other research groups.

# Collegial culture:

# Opportunities for early-career researchers to develop their originality and independence

All young physicians and also other staff such as nurses and physiotherapists are encouraged to start research, and they enroll in groups to their own choice. The three depts. in the UoA seem to be well focused on introducing newly employed doctors, nurses and other staff to start research early on in their career. They had 33 PhDs during the five years ranging from 4 to 11/year. They have a good balance between number of PhD students and the examinations.

# Sustainability and renewal of research strengths

Also, here the UoA seem eager to follow up on new possible candidates to continue the ongoing or possibility to start new areas of research. There is a need for better funding from the university for researcher after the post-doc level in order not to lose excellent researcher to other universities or other jobs.

# Academic networks and collaborations outside the unit

All three separate units do have multiple ongoing research networks both nationally and internationally. The whole UoA is very active and successful also outside the university.

# Diversity, integrity and ethics

All three units claim they have no ethnic or gender discrimination and a zero-tolerance strategy for such discrimination.

# Quality in applications and publications

It is difficult to evaluate applications for grants based on the report, since they report a number of funding institutions but not very specific, which year or how big the grant is, only in some cases. Although the received grants are often big and approved from the major national and international funding institutions.

All three units report a good series of publications often published in highly ranked journals.

#### Quality ecosystem

# Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research

This is not well described, only that they take part in education outside the hospital. However, the UoA seem all very active in research outside the university in big collaborative tasks with industry, other universities and also county councils. This is also accompanied by excellent funding.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

This is also very briefly described. They have several large size collaborations with biomedical and biotech industry.

#### How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere.

They are well involved in the university infrastructure on many levels such as laboratory facilities although they fear that infrastructural costs may in the future suffocate other research due to high costs. They lack infrastructure for clinical trials and help with legal agreements. They also work in the surrounding structures such as Medicon village.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized.

The UoA are involved in several of the SFOs, which they claim they are thanks to a good structure in the university planning for these applications.

#### Recommendations

#### Recommended focus points for the UoA

The UoA has a strong track record of research and funding achievements and should keep the strategy and focus for the next 5-10 years period. However, this UoA is depending of their status as national referral center for surgical treatment of certain heart and lung disorders, a status which is of importance for their research. Thus, it is of importance for the university that they can maintain this status.

#### Highlights from the self-assessment

The assessment group feel that this is a high class UoA with good progress and a good strategy, leading to excellent results in important areas of research. They cover both major communal health issues such as common heart and lung disorders and more specific genetic disorders and important treatment research of important disorders such as heart infarction, chronic obstructive lung disorder and technical issues during heart and lung transplantation. They are depending on their status as national referral center for surgical treatment of heart disorders, a status which has to supported in the future.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have complied this in the general recommendations for the faculty and university.

As in most clinical research it is a big problem with salary during research and high cost for renting laboratory space and certainly also university over-head.

#### Missing material

All material was provided and minor issues discussed at the zoom interview. However, the UoA is very big compared to some of the others and it could have been of value to be able to get more information on the different areas of research within the UoA.

The UoA seem to do high quality research and in light of this it does not seem necessary to go into more detail than we were given in the report and during the interview. We feel that the impression we got is sufficient to evaluate this UoA. Thus, the recommendations given are only to support and develop these areas of research according to the above comments.

## 9C RQ20 Report - Orthopedics Handsurgery

#### Final assessment after comments from the UoA for the final report

The Panel thanks for the received comments.

The panel has evaluated the UoA based on the self-reported evaluation of the UoA where orthopedic surgery and hand surgery is assessed together. We acknowledge that these units are separated with hand surgery organized and located to a) another department at the hospital and b) in another department at the university. We have revised the assessment accordingly (Changes in Italics below)

#### **Executive summary**

The department of Orthopedics SUS is member of the International Society of Orthopaedic Centers Ltd (ISOC), a society including 21 of the most prominent orthopedic hospital in the world. The UoA have about ten research groups, and based on present bibliometric analyses on peer reviewed articles, PhDs the UoA certainly deserves this high ranked position. The research funding doubled within the period 2014 to 2018 (total 130 mill SEK), and EC funding in 2018 by 7 mill SEK.

The SciVal increased in outputs in Top 1 citation percentile (%) from 1.8 to 8.7 during 2014 to 2018. The orthopedic surgery has in 2009 reorganized to one organizational structure under Region Skåne and Skåne University Hospitals (SUS). The panel has been given the impression that there is a feeling of being one clinical department. This is in contrast to the organization of the research departments of the two hospitals, as the site in Malmö and Lund belong to different organizations at the faculty (Clinical Sciences/Lund and Faculty of Medicine/Malmö). This division does not appear functional.

The UoA has no written research strategy.

Recruitment and retainment of researches may be challenged in the future, and postdoc positions exists, but should like other positions in the hospital be double affiliated to both hospital and faculty to preserve the function as University Hospital.

Establishment and replenishment of professors has been described as a cumbersome process by the faculty, that also must focus on the gender balance.

The Ortopedic Center and Handsurgery at SUS are highly esteemed international research centers. The area of orthopedic research at SUS is world leading. Due to the rather weak position of orthopedic research compared with other research heavy medical fields, this area of research is important and highly commendable.

The medical research at SUS is strong compared to the world average, and the orthopedic research is a beacon. This orthopedic research makes the relative importance of medical research of pivotal importance for the grand achievements of Skåne University.

#### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå Uni-

versity (Department of Surgical and Perioperative Sciences), Associate Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed all material February 2020 and have access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with one person being primary responsible for a Unit of Assessment (UoA) and another person being secondary as indicated in the table on page 403. These two made the initial draft of the assessment with final input from all panel members. During the process specific questions have been forwarded to the Lund RQ20 panel for further information when needed to finalize the final report, which also included new information from discussions with key persons from the individual UoA during the week of May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Mattias Rydberg Research student at Hand Surgery, Malmö
- Magnus Karlsson, Professor at Orthopedics Clinical and Molecular Osteoporosis Research
- Björn Rosengren. Professor at Orthopedics Clinical and Molecular Osteoporosis Research
- Amma Jobory, PhD Student, at Orthopedics Clinical and Molecular Osteoporosis Research
- Cecilia Rogmark Associate professor at Orthopedics Clinical and Molecular Osteoporosis Research
- Missing: Lars Dahlin, professor and head of Hand-surgery, absent due to clinical work.

#### Leadership:

#### Priority setting, including goals for external research funding

A systematic presentation of organization of research application is presented. The senior researchers review and control the applications.

The clinical orthopedic department consists of two sites, one in Lund and one in Malmö with one clinical head of department, whereas the research at each site has their own research leader, except for Lund, where the position has been free for at least one year.

Generally, the clinical coordination between hospitals after merging has been linked with very few critical comments and the panel is given the impression that there is a feeling of being one clinical department. This is in contrast to the organization of the research.

There are different administrative structures at the two different units of research in orthopedics – Institution of Clinical Research Lund (IKVL) and Institution of Clinical Research Malmö (IKVM). At IKVL there is one head of all research groups with economic responsibility. *The Hand-surgery has its own organization and affiliation to another Institute.* The UoA has a yearbook in the department of orthopedics Lund/Malmö where all research groups have updated the annual progress. Each research group may within the home page of the medical faculty present their research group with progress. The UoA invites all to common research seminars, to half time oppositions, the UoA summarize all dissertations in the weekly meetings for all doctors at the department of orthopedics and all are finally invited to all PhD-exams.

This division does not appear functional in the setting of one clinical department and a revision seems needed.

The external funding for the period 2014 to 2018 account for 108 mill SEK. There is no information about overhead. Governmental funding accounts for 22 mill SEK. The funding in total has doubled from 2014-2018.

It is worth mentioning the EC funding by 7 mill SEK in the year 2018.

#### Recruitment, promotion and succession

In the year 2018 a total of 9 professors were employed. In addition, there were 7 professors emeritae. One senior lecturer, 19 associate professors (docent). 69 had a PhD, and 48 PhD students were active. The responsibility of the senior researchers for recruitment and succession is stressed.

The PhDs that will continue as postdoc researchers average 10 %. Several of the PhDs may seek other specialties than orthopedic surgery. More non-medical academic researches will join the PhD programs, which is considered to be an expected development.

#### **Publication patterns**

The UoA published 76 PhDs during the observation period 2014 - 2018. The number of PhDs increased during the same period. It is stated, that the PhDs are with principal supervisor from the UoA. The contribution of peer reviewed articles per year was between 146 to 165, staying stable. Unfortunately, there is no data on patents. Probably because it has not been requested.

Citations, when it relates to clinical research is often slowly growing. A total count of citations for the period was 18,612. The prominent finding within SciVal is the steady increase in Outputs in Top 1 citation percentile (%) from 1.8 to 8.7 during 2014 to 2018.

#### The balance between activities in research, education and external engagement

*The academic orthopedic surgeons and hand surgeons have responsibility* for shared research, education and clinical work, but there is no settled strategy, although this set up is very effective in relation to research outcome.

Currently in the UoA it is not possible to receive senior consultant positions without having presented a Doctoral Thesis. This may however be changed in the future due to extensive shortage of skilled clinicians with a Doctoral Thesis, which may be a threat to the university status in the future. This may indicate, that incentives to research may be weakened.

There seem to be a low level of cooperation between research groups between the hospitals. But the research groups within the hospital may not interact in a systematic way. Opposite, there seems to be a clear and active and strong connection from the research groups to other international research institutions.

Plan for succession of retired fulltime/associate professors is lacking, and is highly needed. It is a weakness to be without a head of research position for a longer time period. This has been highlighted for the position at Clinical Sciences, Lunds University and Hospital.

#### The overarching research strategy

The UoA predominantly perform clinical research, but there are also research groups with more preclinical research in projects that run with Clinical Research Centre (CRC) and the Wallenberg Centre for Molecular Medicine in Malmö, Biomedical Research Centre (BMC) Lund and the large Max IV in Lund.

The UoA have more than 10 research centers; Traumatic and diabetic nerve injuries, arthritic and fracture epidemiology, health economy, distal forearm fracture treatment, pharmacological bone healing, orthopedic tumours, cerebral palsy in children, hip and knee arthroplasties, skeletal growth in childhood, surgical outcome in the degenerative lumbar spine, osteoporosis with fracture liaison chains, hip fracture treatments, the degenerated ankle joint, surgical outcome in foot diseases.

Within the orthopedic clinical research as well as in the hand-surgery unit in Lund/Malmö, the UoA have a board with both clinicians and researchers that meet two times per semester to discuss common

questions within research and education. There is an overlap in research between the groups, and it is mentioned, that there are direct co-operation between the research groups within specific projects.

In spite of these efforts, it seems that the UoA does not have a coordinated overarching research strategy.

#### **Collegial culture:**

#### Opportunities for early-career researchers to develop their originality and independence

There is no formal plan for junior scholars to develop their originality and independence. There is a possibility to apply for a government funded 3-years 50% research position, which when ended with success may be extended for a next three-year period. These later postdoc positions are very research productive, and are many times more cost-effective compared with PhDs.

#### Sustainability and renewal of research strengths

The UoA present a description of the supervision given to younger researchers, which appears well organized. The PhD students sign contracts and present continuously for the seniors. Several academic researchers possess professor qualifications, but no positions are established, and economy has been mentioned as a limiting factor. It is important to retain these academic researchers, who may otherwise leave the SUS and Lund University.

Moreover, the university hospitals (SUS Malmö and Lund) have researches employed, who may have international impact, but do not have any university affiliation. The university hospitals may have only a limited number of academic researchers compared with the total numbers of employees. There should be a possibility to include these non-academic researchers, doctors, physicist, nurses, physiotherapist, occupational therapists, biologists etc. to the university.

### Academic networks and collaborations outside the unit

The UoA is member of the International Society of Orthopaedic Centers, among Hospital for Special Surgery NY, The Mayo Clinic, Royal Orthopedic Hospital, London.

## The hand surgery unit is accreditated as a European Trauma Center according to the FESSH (European Hand Surgery Organisation).

Five academics are national/international registry holders.

Due to size and limited number of researchers at the department of Hand Surgery, the colleagues at that department need to have an extensive collaboration with other departments regionally, nationally and internationally. A broad informal international network exists.

#### Diversity, integrity and ethics

The UoA are guided by the policy on diversity, integrity and ethics of the Faculty of Medicine and Lund University, a paper which is described as a well written and a detailed document. The UoA follows these guidelines. Even though, very few women are having the highest academic positions, and there is a clear gender imbalance. There are no described incentives to relieve this issue and the panel is given the impression that this imbalance will resolve with time.

The new national ethical committee structure in Sweden has led to challenges for the UoA, and clinical trials including epidemiological research have to follow the rules for GDPR, which has shown to be definitely bothersome for the clinical and epidemiological research. Both of these changes have led to more bureaucracy.

## Quality in applications and publications

There is no formalized organized application system within the UoA. The university web-based system includes all grants, and when to apply for these. All ALF and PhD applications are reviewed and approved by senior academics.

#### Quality ecosystem:

#### Research strengths and how these are reflected in the educational portfolio

The UoAs describe themselves as a strong research unit with good possibility to offer excellent research projects within musculoskeletal and neurological research fields. The recruitment of students and PhD students is described.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research

There is collaboration for some research groups within the UoA, for example with industrial partners concerning novel techniques to detect diabetic neuropathy. Such a collaboration, which consists of partners in university, the health sector and a small company (SME), has been successful in several aspects: e.g. financial, generation of research ideas within and outside the specific project, production of articles as well as development of novel technique. The collaboration is secured through a legal document signed by representatives from all partners. *The UoA collaborates with the national Swedish orthopedic registries and the hand surgery registry HAKIR, but also with the Nordic arthroplasty registry (NARA) and International society of arthroplasty registry (ISAR).* 

How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The UoA follows the guidelines from the Faculty and University as regard potential conflicts of interests. This accounts for both when conducting research as when being reviewer of attending boards for different evaluation.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere The UoA do not specify this issue directly. There is a good support when it concerns administration of overhead cost. They mention that some researchers are a part of the Epi SFO and that perhaps more utilization of the available infrastructures could be explored.

The UoA emphasizes one severe problem in the relation to the University, and this is when replacing key persons that retire. Several positions have not been replaced (one professorship in Clinical Sciences/Lund), leading to significant problem for the future strategic planning and work.

Another issue seems to be that the two hospital clinics, one in Lund and one in Malmö, with one clinical leader have become a well-integrated unit. At the same time these sites belong to two different departments at the university (Clinical Sciences/Malmö and Clinical Sciences/Lund) with a discrepancy in terms of academic positions and leaders. *This is presented as an important dilemma, except for hand surgery This academic structure seems to be challenged by the unit.* 

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

One research group within the UoA is a member within the strong and strategic research areas epidemiology (SFO EpiHealth) that span several different departments within the Lund University but also other Swedish universities.

Furthermore, one research group has also a researcher appointed as a clinical researcher at the Wallenberg center for Molecular Medicine (WCMM).

The UoA is involved in the PhD-school.

UoA has also been a part of the national Clinical Osteoporosis Research School (CORS). As such, there is no written research strategy collectively for the field in the UoA.

#### Recommendations

#### Recommended focus points for the UoA

The panel expresses a strong recommendation for preserving efforts in research in the clinical setting for the coming years.

A collective plan and research strategy developed by the UoA is suggested by the panel within the next years. This is most important taking into account the diverse organization at the hospital and university including research areas.

This would include a head of research at Clinical Sciences/Lund, which would secure an academic leader at each hospital in Lund and Malmö within next year.

Inclusion of non-LU-affiliated researches (mainly employed by SUS/Region Skåne) to the LU would be beneficial.

Retainment of potential highly qualified professor candidates are needed. Unfortunately, only few women are at the highest academic level in contrast to an equality among the PhD students and perhaps more active measures are needed to boost the process making a more diverse academic leadership.

Generally, the clinical coordination between the two hospitals sites (Malmö and Lund) after merging has been linked with very few critical comments. In contrast, the organization of the two sites belonging to two different university departments (Clinical Sciences/Malmö and Clinical Sciences/Lund) generates differences in the organizational scheme at the faculty and makes strategic work very difficult. *Hand surgery is an exception*. A revision seems needed for a coordinated collaboration between the SUS and LU within the next years.

#### Highlights from the self-assessment

*Orthopedic surgery and hand surgery in Lund, Malmö and Hälsingborg* has a glorious history since the cofounding of Nordic Orthopaedic Foundation 101 years ago. They also have the editorial head office of Acta Orthopedica, and they were founders of Bone and Joint Decade worldwide and later The Global Fracture Fragility Network. The research activity has been internationally recognized for clinical research, fracture surgery, implants, bone biology, laboratory research, osteoporosis, bone densitometry, osteoar-thritis, arthritis, tumour surgery, children orthopedics, epidemiology, bone substitutes, bone cement, biomaterials, hand surgery, nerve regeneration, rehabilitation, orthogeriatric service and the many registers, national and international. In addition, patents and spin outs have been documented. A long list of orthopedic celebrities has been fostered in Lund and Malmö. The orthopedic surgery has now been reorganized to one organizational structure under Region Skåne and the Skåne University Hospitals (SUS). The department of Orthopedics SUS is member of the International Society of Orthopaedic Centers Ltd (ISOC), a society including 21 of the most prominent orthopedic hospitals in the world.

# If relevant, please indicate issues that should be addressed and resolved at other levels of the University, such as at the faculty level and/or by the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

The epidemiological research including databases and big data seem challenged by the new rules of GDPR, which has stalled the progress in this field. It is suggested, that the faculty of medicine focuses on improvements on governmental and local level to reduce friction to get permission to handle research data.

Medical research accounts for the biggest part of research in society. Research is also competitive and ambitious and the risk of misconduct and conflicts may exist. The faculty of medicine both run courses of this issue, and they have recently created an independent Ombudsmand.

419

Finally, please indicate if the panel was missing any relevant material to make observations and recommendations, or if any other relevant matter was omitted None

# 9D RQ20 Report - Ear, nose and throat diseases and head and neck surgery (ENT); and Logopedics, Phoniatrics and Audiology (LPA)

#### Final assessment after comments from the UoA for the final report

The Panel thanks for the received comments which in part are general reflections which we have dealt with in the specific assessment of the UoA and in our common themes. No further changes are made in this context

The panel suggest that the UoA carefully consider our recommendations regarding structure, organization and priorities for their research since the combination with the university clinic makes this even more important. We have added a sentence in the Executive summary (Changes in Italics below)

#### **Executive summary**

The unit is complex, with two separate sections; ENT and LPA. It is not completely clear if the unit is organized in research groups, according to medical field, education or geography. They state "a flat and non-hierarchical structure". The structure reflects that most researchers are clinicians working also at a university hospital. The number of research projects listed is very high as compared to research output. This means less focus, small research groups, and less ability to pursue their main research questions. We suggest that the unit evaluates their research priorities. The responsibilities for external funding are divided between university, faculty, unit and research group in an unclear way. The unit should establish specific and formal routines for grant applications. Active recruitment of PhD candidates is recommended and should further support the cooperation between university and health institutions. Ways to better combine PhD-work and clinical specialization should be developed. Seed money should be available to support clinicians in the start-up phase of their PhDwork. Young researchers should be enlisted in the PhD-program as early as possible. The unit has published 31 - 41 peer-reviewed articles per year 2014-2018. Some research groups have a high publication rate, whereas the output from others merely merits a separate research group. The Cognitive Language and Hearing Science research group has been formed based on sound strategic thinking. Formal research cooperation between the university and the relevant health institutions should be supported at all levels.

#### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of

Σ

the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Måns Magnusson Head of office at Otorhinolaryngology (Lund) and Professor at Otorhinolaryngology (Lund).
- Johan Mårtensson Head of office at Logopedics, Phoniatrics and Audiology (Lund)
- Ann Hermansson Senior lecturer at Otorhinolaryngology (Lund) ·
- Jonas Brännström Senior lecturer at Logopedics, Phoniatrics and Audiology.
- Sebastian Waechter PhD student

#### Leadership:

As part of the leadership evaluation of this group, we find it pertinent to comment on the internal structure of the unit. The unit is complex, with two separate sections; ENT and LPA. ENT does not comprise a similar research group on ear, nose and throat in unit 9I. From the self-assessment, it is not clear if the unit is organized in research groups, according to medical field, education or something else. They state "a flat and non-hierarchical structure", but it would have been interesting to know how they organize their activities. A group of four have performed the self-assessment. Does that represent a leader group with some responsibilities? ENT and LPA are similar in size regarding budget, positions and scientific output.

#### Priority setting, including goals for external research funding

The number of research projects listed is very high as compared to research output. The diversity of interests and education fields within the department is reflected in this high number. It seems to be an aim that all areas where they teach and where they have clinical activities should also have ongoing and active research projects. In a clinical and in an educational setting, that is probably an advantage. However, in a research setting, this means less focus, small research groups, and less ability to pursue their main research questions.

In the self-assessment, we do not find any clear priority settings. They list all ongoing research activities. The unit does not align with any of the University's strategic areas, but aligns with several of the areas of importance. It is not clear if the unit itself has any main research priorities, nor is it clear who at the unit should be responsible for setting such priorities. We suggest that the unit critically evaluates the basis of their priorities. Should they come from research quality, ability to obtain external funding, clinical importance, importance for education, quality of research plans, other strategic measures?

The LPA section has received five external grants totaling 22 million SEK 2014-2018. This is impressive. No similar information is given for the ENT section in their written report. They informed in the interview that they have ALF funding and some external grants, and also that they have applied unsuccessfully for EU-grants. No goals are set for external funding, but such funding has been listed as important and necessary. No structures within the unit has been described to improve and support applications. However, they emphasize how the Cognitive Language and Hearing Science research group has been successful due to their quality and interprofessional character. The rest of the unit might learn from that group. The responsibilities regarding goals for external funding seems to be divided between university, faculty, unit and research group. In the interview they confirm that they receive good administrative support from the faculty for applications. The unit and its two sections do not seem to be the ones that inform, stimulate, push and secure the final quality of such applications.

#### Recruitment, promotion and succession

The unit focuses on these aspects and seems fully aware of their importance. They face retirement of some key, senior researchers and are worried that they from funding reasons will be unable to replace them. The recruitment challenges are also linked to the organization of the health care system in the area. Combined positions at the university and in clinical units are of the highest importance for clinical research. Thus, joint activities and initiatives from the university and health care institutions need to be fully supported.

Recruitment of new PhD-candidates is reported to be hampered by university regulations. We recommend that active researchers in clinical positions at the relevant health institutions can be registered as PhD-students at this university unit. The unit shows clearly in their self-evaluation that this is necessary to improve recruitment and active research. An active recruitment process might further support the cooperation between the institutions. Seed money should be available to support clinicians in the start-up phase of their PhD-work.

The unit focuses on a specific problem related to recruitment of PhD-students in some health disciplines, and in audiology in particular. Master programs are definitely important for recruitment to the universities. Thus, it is recommended that the master programs relevant for this unit are adapted so that they will attract candidates that can be further recruited to the PhDprogram. Both the university, the unit itself and the relevant research groups should try to find optimal ways for recruitment within the present framework, and at the same time try to adapt and change this framework to further improve recruitment of potential researchers.

The unit has strong ongoing collaboration both nationally and internationally, and many groups participate in active networks. This should be an advantage also in recruitment. Their strategies for this type of national, and especially international, recruitment are not clear. Are they competitive regarding recruitment of the best young researchers in Lund, Sweden, Scandinavia, Europe, World? What kind of ambitions do they have for recruitment at the junior, young senior, and senior level?

#### Publication patterns

The unit has published between 31 and 41 peer-reviewed articles per year in the period 20142018. 14% of the articles have been published in journals in the top 10% citation profile, and 2% in the top 1% percentile. They highlight several publications in Nature Scientific Reports regarding balance and regarding head and neck cancer.

The number of publications is difficult to judge without knowing the exact number of positions and the degree of external funding. However, it might seem relatively modest for a department with so many "lines of research" listed in the self-evaluation. Some research groups are active with a high publication rate, whereas others may have an output that merely merits a separate group of research.

The quality of the publications as judged from the publication channels is good and satisfactory. In clinical research, it should be a balance between publications in top-ranking journals, and useful publications that do not necessarily have the same originality. However, the unit should aim to have at least a few publications within the field-specific top-ranking journals for all research groups, as well as a few publications in the general top-ranking journals for the unit as a whole.

We recommend that the unit undertakes a more detailed examination of their own publication pattern. That should be done for the two main sections, and also for the authorized research groups within the unit. This pattern should include number of publications, journal impact factor, citations, first and last authorships. The results should be viewed together with the available research resources, and probably with a separation between the basic funding from the institution and funding obtained after competition (external and internal).

### The balance between activities in research, education and external engagement

This balance is crucial for a unit in clinical medicine. In their self-revaluation, they clearly illustrate the importance of their education, their clinical work at health institutions, and other external engagements. Our recommendation is that most researchers in permanent positions at the university should at least have 30% of their time for research, and some should have at least 50%.

For some master students, the unit seems to have been able to link them to active research projects. That might be an aim also for other student groups, not least students in health professions such as medicine. Through their education programs, the unit has access to a large number of clever and motivated young professionals who should be seen as potential researchers.

#### The overarching research strategy

No overarching research strategy has been listed in the self-assessment. That may be difficult in a heterogeneous clinical department. Still we recommend that the unit and the two sections should have a more focused strategy. That should help also in difficult but important priority questions. It seems that the Cognitive Language and Hearing Science research group has been formed on the basis of such strategic thinking. We recommend that the other parts of the unit should find similar ways to establish more formal structures with a mandatory strategy. That means moving on from "meetings discussing the common research interests" to establish and give priority to such projects.

#### **Collegial culture:**

#### Opportunities for early-career researchers to develop their originality and independence

The unit lists adequate measures to support and develop junior researchers. They are also aware of the importance of and challenges regarding the parallel clinical specialization for many of the young researchers. The unit obviously try to further improve this double qualification by pushing both the university and the health institutions. The unit should be fully supported in this important task.

Young researchers should be enlisted in the PhD-program as early as possible. We fully support the unit in this. Young clinicians should become full members of the PhD-program from the beginning of their research work when they have a confirmed research plan with supervisors, support from their department, supervisors, and dedication for research.

#### Sustainability and renewal of research strengths

The unit is well aware of current and future challenges.

#### Academic networks and collaborations outside the unit

The unit lists an impressive research network. They have been able to combine international cooperation in research and education, which is excellent. PhD-candidates have formal cosupervisors also from abroad. It is not clear if the unit takes part in international research projects with substantial funding, such as EU-projects and NIH-projects. In the interview, they informed about unsuccessful EU-applications. Their international collaboration should have as an additional aim to be partners in further improved applications for such funding. It is a sign of quality that they are partners in international consortia.

#### Diversity, integrity and ethics

These aspects are well described.

#### Quality in applications and publications See "Publication patterns" above.

We have not received any material that makes it possible to evaluate quality in applications. The proof of such quality lies in the success rate. We would recommend that the unit establishes specific and formal routines regarding applications for grants, at least for substantial grants. That should include stimuli for making a draft application, and then routines for improving that draft, including input from experts also outside the research group in that process. From the selfassessment, the responsibilities of the individual researcher, the research group, the section, the unit, the faculty and the university regarding applications and quality of the applications is not clear. At the hearing, they informed about participation as partners in international applications, but so far without success. They also informed about administrative support from the faculty for applications. From the self-assessment and from the interview, it was not clear at which level there are set expectations and aims regarding applications. Nor was it clear which level should secure the quality of such applications. We recommend that the research groups should be both pushed and supported during the whole application process. The responsibilities at the level of the section, the unit, the department and the faculty should be clarified. These two sections did not seem to have adequate routines for making optimal applications for research funding at present.

### Quality ecosystem:

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research The cooperation with the health institutions is crucial for a unit in clinical medicine. This is for research as well as for education. The unit is well aware of this importance. However, a better understanding of and support for such cooperation is needed both from the institutions and from the society and relevant governing bodies. This cooperation between real-life clinical medicine and research units represents a unique strength. Such cooperation should secure research relevance, recruitment of researchers, recruitment of research material (patients, patient material), and understanding of the need for research.

How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The unit seems to manage this well and in accordance with accepted procedures, regulations and guidelines.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere The unit seems to be well equipped and with access to relevant infrastructure.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized.

The unit performs research in an area that ought to have the highest strategic priority from the University. The research aligns with several areas of importance in the SFOs.

## Recommendations

#### Recommended focus points for the UoA

- Formal research groups approved by the unit should be established and supported. Minimal requirements for approved groups should be defined.
- Routines for promoting applications for research funding and improving application quality should be formalized, and responsibilities determined.
- Publication results should be assessed at the section and research group level.
- They should find optimal ways to recruit PhD-students and support their start-up.

## Highlights from the self-assessment

- ENT should appear as an even stronger joint unit at the University. The division between two university hospital locations is understandable, but strategically a joint unit would be seen as much stronger both within the university and towards external partners.

- Research groups should have a minimum requirement for member size, publications, external applications etc. Each research group should have well-defined scientific aims. The priorities of the University and Faculty should be considered in this process.
- The research group on Cognitive Language and Hearing Science might be a model for similar joint research groups. This group should probably be further developed and supported.
- Scientific publications represent the core research output. The ENT and LPA units should both undertake a more detailed assessment of their publication achievements. This should include an assessment within all the individual research groups.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

- Master programmes in health should be adapted so that they support recruitment to the PhD level.
- Dedicated candidates in clinical medicine should be enlisted early into the PhD-program, also when they are not doing full-time research.
- Ways to better combine PhD-work and clinical specialization should be developed.
- Financial support for start-up of clinicians in the PhD-program should be available.
- Formal research cooperation between the university and the relevant health institutions should be supported at all levels.

Missing material None

# 9E RQ20 Report - Psychiatry

#### Final assessment after comments from the UoA for the final report

The Panel thanks for the received comments and have revised accordingly (Changes in Italics below). The webpage (https://www.medicinhistoria.lu.se/) suggested has not been part of the material we have had access to.

#### **Executive summary**

The organization of this UoA is complex. Of the four sections, Psychiatry is located in two departments, Clinical Sciences Lund and Clinical Sciences Malmö (altogether 6 units in Lund, Malmö and Helsingborg), Child & Adolescent Psychiatry is located in Clinical Sciences Lund. Medical Ethics is located to multiple units due to its multidisciplinary research but belongs administratively to Clinical Sciences Lund, and History of Medicine is located in Clinical Sciences Lund. In case of the clinical units, Psychiatry and Child & Adolescent Psychiatry, the situation is further complicated by an additional layer of administration provided by the health care system. Despite the spread to several administrative units and geographical locations, clinical collaboration between the units works well. During the interview it became clear that simplification of the organization at the Lund University site could be beneficial in terms of general flow of information and recruitment.

The UoA has both national and international external funding, but they recognize a need to increase especially international longer-term funding. Therefore, the panel recommends putting together practices that support grant writing and enhance the level of applications. Bibliometric analysis revealed that the total number of peer-reviewed articles of the UoA ranged from 46 to 59 per year in 2014-2018. There

has been a decrease in the % of publications in Top 10 citation percentile from 25 (in 2014) to 12.2 (in 2018). The % of publications in Top 1 citation percentile has remained constant over the five-year period (average 2.3%). The quality of publications is generally very good in the Medical Ethics section and good in Psychiatry, Child & Adolescent Psychiatry and History of Medicine. The clinical fields should aim to publish some of their articles in higher impact general medical journals and in the top research field-specific journals.

Psychiatry and Child & Adolescent Psychiatry are well-connected with the local health care system where most of their research questions arise. Due to the current trend of increasing psychiatric burden in the society, it is essential that the University supports their clinical researchers in this field in every possible way. The best researchers should have enough protected time for research, and there should be enough tenure track positions to make academic career an attractive option for young psychiatrists.

#### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Åsa Westrin Professor psychiatry and directory manager, Department Automatic Control
- Peter Nilsson Professor at Internal Medicine Epidemiology and Head of History of medicine
- Nils-Eric Sahlin Professor and Chair of Medical Ethics
- Peik Gustafsson Head of office at Child and Adolescent Psychiatry
- Anders Håkansson Professor at Psychiatry (Lund) and Project manager at Clinical addiction research unit, Malmø
- Niroshani Broman PhD student, Clinical addiction research unit, Malmø

#### Leadership

#### Priority setting, including goals for external research funding

<u>Psychiatry.</u> According to the self-evaluation report, priority areas follow those of the research interests of the professors and associate professors. These priority research ideas originate in a bottom-up manner

from identified clinical research gaps or from research gaps and needs for improvement identified by national/international policy makers. This close association with the clinic is a strength of the section. Researchers at the section have both national and international funding. The goal of the section is to compete for major grants from the European Research Council and other international research funding from e.g. the NIH in collaboration with their international research partners. The unit recognizes the need for improvement regarding external funding especially by better coordination in order to be able to compete for large-scale, external grants covering longer time periods.

<u>Child and adolescent psychiatry.</u> The section is mainly externally funded and they state in the self-assessment that less than 5% of the total funding comes from the government. Government funding is mostly used for rents and salary of the senior lecturer. The strength of the unit is the clinical nature of the research and the applicability of the results in clinical work. Several projects concern clinical assessment and treatment. However, it remains unclear how priorities are set.

<u>Medical Ethics.</u> The section reports that currently the direct government funding only consists of a fraction of the total funding but they would like it to be increased to about 50% of the budget to guarantee independent, basic research, and to be the backbone of long-term, high-quality research. At the moment the unit relies primarily on external research funding and they have more offers to collaborate than they can accept because of the lack of personnel. Their goal is to retain the same level of funding in the future, principally by strengthening international collaborations but they do not mention any specific priorities.

<u>History of Medicine</u>. The unit reports in their self-evaluation that they have prioritized the use of the direct government funding for salaries and support of permanent staff involved in research and teaching, but also for seminars, symposia and publications. No specific goals or priorities regarding external funding are mentioned.

The panel heard during the meetings that the University provides support for researchers in applying for external grants. However, this does not seem to be clear to all researchers, and the University should communicate more clearly what kind of support and to whom it is available.

Each section should also put in place practices that support grant writing. For example, one successful model is forming of internal grant review panels composed of 2-3 senior researchers of the section who jointly meet with the grant applicant and discuss the proposal and how it could be improved. The key to the success of these panels is that all members of the panel meet together at least a month before the deadline, to ensure that all issues are discussed together and that there is enough time to improve the application.

#### Recruitment, promotion and succession

Overall, the strategies of the four different sections regarding recruitment, promotion and succession have been described in varying details. Each section has their own specific issues, and Psychiatry, likely as the largest section, has the clearest strategy.

<u>Psychiatry.</u> This unit has three professors working within diverse fields of psychiatry. They also have associate professors, not employed by the faculty, within complementary fields of psychiatry. One senior professor and three emeritus professors are still active. A senior lecturer in neuropsychology, specialized in neuroimaging will be recruited in 2020 funded by the Region Skåne. The section sees this as a strategic recruitment due to increased need for experience in neuroimaging techniques in the future, not only for research projects, but also in the clinic. Overall, the coverage of expertise in different fields of psychiatry is good and serves teaching especially well. For research, this may be a disadvantage due to lack of critical mass in these diverse areas.

There are many junior scholars interested in research, and therefore recruitment of PhD students is not difficult. The section has recruited PhD students (currently N=18), other junior research collaborators and post doc collaborators who are nurses, social workers, psychologists or physicians. A large proportion of researchers continue carrying out research after obtaining their PhD. Several post doc fellows actively work on becoming associate professors.

Recognized weaknesses include 1) too few senior researchers at the associate professor level to meet the need of PhD students and to build new research programs that can generate external funding. 2) Dependence on external resources to employ PhD students and supply researchers leading to a difficulty to accept PhD students who are not employed by the health care system and to keep researchers not employed by Region Skåne. As a solution, the section suggests increasing the number of tenure track positions ("Universitetslektor") to allow junior faculty to combine research and clinical work. This would facilitate mentoring of younger PhD-students to secure future regrowth for the section in areas identified as major future healthcare challenges.

The unit hopes to get the possibility to recruit a new senior lecturer in psychiatry within the next two years, since they see a very clear need for this type of position to strengthen the competitiveness for external research funding, to recruit new PhD students and to ensure regrowth of the section.

<u>Child and adolescent psychiatry.</u> The department has only one university employed researcher. During the evaluation period a senior lecturer has been recruited. One professor has retired and has become senior professor. A new professor in child and adolescent psychiatry is needed and recruitment is in process. The number of doctoral students has increased to 10.

<u>Medical ethics.</u> The University has decided to promote research ethics and has made a course in research ethics compulsory for all post-graduate students. *The unit has recently appointed a university lecturer in research ethics. They also aim to promote two lecturers (adjunkter) to the status of university lecturers within the next few years.* The present Professor of Medical Ethics will retire within a couple of years, and the unit finds it important for their sustainability that this vacancy is then filled, but they do not seem to have a specific succession plan. The unit recognizes that their limited size makes them vulnerable. There are no junior scholars because the funds supporting their research require them to hire researchers at the level of associate professor (docent) and no lower.

<u>History of Medicine</u>. The unit is very small and consists of a Head of Unit (20%), a part-time secretary (20%) and a few PhD-students or undergraduates. They try to recruit undergraduate students to write papers and to become PhD students. This has so far resulted in four PhD students (three with dissertations) belonging to the unit. The unit will face a period of transition as the current Head of Unit is going to retire in 2021 and they need to plan for a successor among the few people available with a suitable background (PhD).

Our general recommendation to the University administration is to clarify and develop the career path of researchers with clear instructions of what is expected at each stage and for the promotion to the next stage. Feedback from several units during the interviews was that University-paid PhD student positions would be instrumental to promote small fields and clinical researchers. Especially important issue for Psychiatry and Child & Adolescent Psychiatry is how to support clinical researchers in combining research and clinical work at PhD and postdoc stages. This is also in the interest of the University to retain the best clinical scientists. One of the issues seems to be how to identify the future leaders and retain them in an environment with limited tenure track positions. The sections should develop promotion and succession strategies together with the University administration and seek additional funding instruments for this purpose (e.g. ALF funding for clinical researchers and other sources for non-clinicians).

#### **Publication patterns**

The bibliometric analysis was provided for the entire UoA, while each section provided their own self-assessment. The panel realizes that a combined bibliometric analysis may not be representative given the very different cultures of publishing in Medical Ethics and History of Medicine compared to Psychiatry & Child and Adolescent Psychiatry.

The total number of peer-reviewed articles ranges from 46 to 59 per year in 2014-2018. There has been a decrease in the % of publications in Top 10 citation percentile from 25 (in 2014) to 12.2 (in 2018). The % of publications in Top 1 citation percentile has remained constant over the fiveyear period (average 2.3%). It was unclear how many of these publications are primary publications of the unit (first or last author from the unit) and how many are from collaborations.

<u>Psychiatry</u>. According to the self-evaluation, the main publication channel is peer-reviewed original research papers in international psychiatric journals. They report an increased number of publications during the last year. While they have published in some of the major high-impact journals of the field, their goal for the future is to publish a greater proportion of their papers in such journals.

<u>Child and adolescent psychiatry.</u> They report that about 25 papers have been published in international scientific journals during the period. A book-chapter has been published in a Swedish textbook of child and adolescent psychiatry.

<u>Medical ethics.</u> The unit reports that they publish in international and national journals, all of which are either good or excellent quality. They also write book chapters and publish books in Swedish. Judging from the bibliography, their list of publications is extensive, and of all sections, they seem to have the largest number of publications in the leading general medical journals. They point out that the RQ20 does not recognize all their research. Some of the papers published in the program VBE, Vetenskap och Beprövad Erfarenhet (Science and Proven Experience), is credited to other departments and faculties at Lund University, or universities abroad. One reason for this is that they adhere to the Vancouver Rules and the rules of RQ20 rigorously. They also disseminate and make their research more widely available via other channels, such as podcasts.

<u>History of medicine</u>. The unit describes that until now they have mostly published in a Swedish academic journal with peer-review (Svensk Medicinhistorisk Tidskrift), but more and more in international journals with peer-review, for example J Med Biography, Medical Humanities and Soc Hist Medicine. The panel saw this as a commendable direction.

As a whole, the unit should put in place practices that encourage publishing in leading journals of the field(s). What often makes a difference is an additional funding for 6-12 months to complete the required experiments/analyses. The unit could think of ways to provide such bridge funding for the most promising projects if the external funding of the project has run out.

The number of doctoral thesis varies from 2 to 5 per year. This seems a low number given the size of the unit. None of the sections seems to have difficulties in recruiting PhD students.

Attention should be paid to their timely graduation by giving clinical researchers enough time to devote on research.

#### The balance between activities in research, education and external engagement

The balance between these activities is very different in the clinical and non-clinical sections.

Regarding the clinical fields, the senior lecturer in child and adolescent psychiatry spends about half of the time in education and half of the time in research. It is unclear how this balance is in psychiatry, but they do teach at several different levels from medical students to residents. They see teaching activities as an important recruitment channel and in this regard, they want to also be more actively engaged in

429

Master projects at the Medical School. Psychiatry section has a very high degree of external engagements with authorities, policy makers and stakeholders within the civic society and business. Although they admit that these activities are time-consuming, they strongly feel that such engagements are important in dissemination and implementation of research findings. The panel agrees with this, but also suggests that key researchers can spend at least 50% of their time for research and supervision of doctoral students.

Medical Ethics has a very good balance between research, education, and external engagements. All of these areas are critical in this field and the unit seems to be successful in all of them.

History of Medicine provides very little information on the division of their time in these activities, but they do teach courses in medical humanities and tutor student papers.

#### The overarching research strategy

<u>Psychiatry & Child and Adolescent Psychiatry</u> have a clear joint research strategy that they have formed together with the clinical divisions of psychiatry and research in Region Skåne. This strategy has been successful in resulting of funding (~3.5 M SEK/year) for several research projects from the Board of Region of Skåne. Another strategy they have is to strengthen national and international collaborations, and this has led to a Marie Curie International Career grant and plans are in place for international researcher exchange. Their third strategy is to fill research gaps of clinical and societal relevance, e.g. in addictive disorders. These initiatives are laudable and should be continued and developed further.

<u>History of Medicine</u> has a somewhat vaguer strategy to link up with Departments for History of Science and Comparative Literature at Lund University to add the medical perspective on history, its actors and events.

<u>Medical Ethics</u> states that they are too small to have a research strategy. The panel sees that although the two non-clinical units are smaller than the clinical units, they would benefit from putting together more detailed strategies to advance their most important research goals effectively.

#### Summarizing list of strengths and weaknesses for Leadership:

#### Strengths:

- The research priorities of Psychiatry and Child & Adolescent Psychiatry mainly come from clinical needs and they support health care and societal needs
- The joint research strategy of Psychiatry and Child & Adolescent Psychiatry with the Region Skåne health care system
- Majority of the clinical scientists continue research after obtaining a PhD
- Medical Ethics has published several articles in leading general medical journals

#### Weaknesses:

- Complicated administrative structure of Psychiatry and Child & Adolescent Psychiatry
- No clear goals or strategies for obtaining external funding
- Psychiatry and Child & Adolescent Psychiatry: difficulty to accept PhD students who are not employed by the health care system and to keep researchers not employed by Region Skåne
- Psychiatry and Child & Adolescent Psychiatry: too few tenure track positions to meet the supervisory needs of the PhD students
- Medical Ethics and History of Medicine: small size of the units and lack of succession strategies make them vulnerable for the retirement of the key professors within the next years

#### **Collegial culture:**

#### Opportunities for early-career researchers to develop their originality and independence

These opportunities and practices differ between the sections. Medical Ethics does not have any junior scholars due to their funding structure, and they consider this a problem. The other sections encourage junior scholars to participate in national and international meetings, and Psychiatry Region Skåne has joint research seminars for junior scientists. Thus, the early-career researchers have ample opportunities to develop their originality and critical thinking. The unit has been very successful in recruiting PhD students. The main concern is their adequate supervision because of the lack of senior researchers in Psychiatry & Child and Adolescent Psychiatry.

#### Sustainability and renewal of research strengths

Psychiatry and Child & Adolescent Psychiatry realize their research strategy needs improvement and suggest that all researchers at the section should be involved in the development of sustainable and effective research strategy to maintain and develop current and new research areas.

The strategy of the History of Medicine is to expand into the area of Medical Humanities, an initiative started in 2015, and which has so far resulted in one PhD dissertation.

The panel suggests that all sections pay more attention to the identification and renewal of research strengths. They could, for example, organize specific events, such as 1-day retreats 1-2 times per year to devote on this theme.

#### Academic networks and collaborations outside the unit

The unit has wide academic networks and collaborations. Psychiatry & Child and Adolescent Psychiatry collaborate with other Lund University departments (IKVL, Psychology, Mental Health at Department of Health Sciences, LBIC, Neurology, Radiology, Internal medicine, Surgery and Pharmacology, Oto-rhino-laryngology, Cognitive science and Environmental medicine) and Region Skåne. They also list national and international collaborations with institutes in Europe and the USA. Besides the Region Skåne and collaboration with the UCSF, which has resulted in one Marie Curie fellowship funding, these collaborations do not seem to have influenced participation in nationally and internationally funded research projects.

Medical Ethics have extensive and excellent research network both nationally and internationally including e.g. Carnegie Mellon University, Harvard Medical School, Leeds University, Columbia University, Cambridge University, the University of Vienna, the University of Geneva, Copenhagen University, the Karolinska Institutet and Linköping University. They collaborate with e.g. Region Skåne, VR, AL-LEA, EGE, SAPEA and Smer.

History of Medicine collaborates with local departments at the Lund University, but also with other institutions around the Baltic Sea, most importantly with the Heinrich-Heine University, Dusseldorf, Germany.

The unit should consider how these national and international networks could be further used in providing junior scholars possibilities for international mobility to learn new skills, and to attract more international funding (e.g. from the EU).

#### Diversity, integrity and ethics

The unit describes several measures how these issues are taken care of, and they adhere to the rules and regulations of the Lund University. Importantly, they have frequent discussions about research ethics and active discussions and collaborations around applications for ethical permission.
## Quality in applications and publications

It is difficult to assess the quality of applications because no information on applications or existing external funding was provided for the panel, except in the form of self-evaluation. We can therefore only comment on the listed external funding, not how successful applications have been in general. Psychiatry has obtained external funding from the Swedish Research Council and the EU Marie Curie Program. Child & Adolescent Psychiatry has received a grant from the Royal Academy of Sciences, and Medical History from private foundations. Medical Ethics has been extremely successful in obtaining external funding based on self-assessment (several grants from the EU Horizon 2020 program, the Swedish Research Council, and private foundations).

The other sections should put together a strategy for increasing the success of applications (see our comments "goals for external research funding").

See "publication patterns" above for quality of publications.

## Summarizing list of strengths and weaknesses of Collegial culture:

### Strengths:

- Based on the interview, the unit has highly collaborative and collegial culture
- Joint research seminars for junior scientists of Psychiatry and Child & Adolescent Psychiatry
- Wide academic networks and collaboration

#### Weaknesses:

- Due to their funding structure, Medical Ethics does not have any junior scholars
- Identification of research strengths and strategies for renewal needs more attention

### Quality ecosystem:

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research. The clinical sections have very broad research focus incorporating biological, epidemiological, psychosocial, and treatment-oriented research. The unit realizes this as a strength for education since they are able to cover very broadly different topics of psychiatry. Collaborations with business partners and governmental bodies in Sweden have given access to unique research data and thereby research studies which otherwise would not have been possible. Also, participation in external research collaborations with the health care system has resulted in research projects that stem from true clinical needs. This is seen as a major strength of the clinical sections by the panel. The nature of the external governmental collaborations in Medical Ethics has been instrumental in devising ethical guidelines within Sweden and the EU.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The different sections have their own practices with regard to dealing with integrity and ethics. All of them follow local and national ethical rules.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere The research activities at the Psychiatry & Child and Adolescent Psychiatry are dependent on the infrastructures at the psychiatric clinic, laboratory, and brain imaging environments. They have worked towards integrating such infrastructures better but still have several challenges including the physical separation between the psychiatry unit and other medical sciences where most of this infrastructure is

Σ

located. In the long run, they see a probable need for more research facilities in Malmö, but still in close association with the existing clinical setting.

Medical Ethics and History of Medicine have the needed infrastructures, but they stress the importance of having their own seminar room and access to the Lund University Library services, respectively, for their research.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised. *The head of Medical History has been the chair of EpiHealth SRA in 2010-2019, and Psychiatry would like to be more involved in this SRA.* Psychiatry is also planning to strengthen connections with the Lund University Bioimaging Center and Centre for Evidence Based Psychosocial Interventions. Medical Ethics is planning to get involved in AI and robotics. The panel sees this as an important future investment, although they are not the SRA's of the Lund University. Medical History also recognizes the existence of an SRA for Middle East research that could be a potential link to historical studies on ancient Arabic medicine that also influenced Western medicine. These SRAs form clear links with the research carried out at the unit but it is unclear how opportunities from these SRAs are utilized. These connections could be strengthened in the future if feasible and if they are seen to provide possibilities for new collaborations and funding.

# Summarizing list of strengths and weaknesses of Quality ecosystem:

## Strengths:

- Psychiatry and Child & Adolescent Psychiatry: collaborations with business partners and governmental bodies in Sweden have given access to unique research data
- The external governmental collaborations in Medical Ethics have been instrumental in devising ethical guidelines within Sweden and the EU.

## Weaknesses:

- Challenges due to physical separation of infrastructure between Psychiatry and other medical sciences where infrastructure is located

# Recommendations

# Recommended focus points for the UoA

**Research strategy.** All sections should develop long-term research strategies and visions regarding where they want their research to be in 5 and 10 years. This strategy should define and build on current strengths. Potential for existing and new collaboration should then be considered based on this strategy.

**Publications.** The bibliometric analysis shows a downward trend in papers published in top 10 citation percentile. Researchers especially in Psychiatry & Child and Adolescent Psychiatry should try, whenever possible, to publish their work in higher impact journals. Often doing so requires some internal funding, to allow generation of additional data. Special attention should be paid to articles originating from the unit (first and last authors from the unit).

**External funding.** Besides Medical Ethics, the other sections mention a need for additional external funding. The sections should develop and implement practices to support grant writing. Use of internal grant review panels are highly recommended to increase success rate of external grant applications. The unit has wide national and international networks that could be used more effectively to obtain national, Nordic, EU, and other international funding.

**PhD training.** Although the students seem to be in general satisfied with their training, the number of PhD degrees per year seems low. The unit should, together with the University administration, develop practices that support PhD training and timely graduation. It was unclear to us how the progress of PhD students is monitored. This should be done on a yearly basis in a meeting that includes all supervisors.

The unit should consider how their wide national and international networks could be further used in providing junior scholars possibilities for international mobility to learn new skills.

**Promotion and succession.** There is a lack of senior researchers that can supervise junior researchers in Psychiatry & Child and Adolescent Psychiatry. The best practices to tackle this issue should be discussed with the University administration. Possible solutions could be recruitment of associate professors or making sure that the senior researchers have enough time from teaching and clinical duties for supervision of students. The tenure track possibilities should be developed using also external funding (e.g. ALF or donations).

Medical Ethics and History of Medicine should, together with the Department and Faculty, put together a succession plan to prepare for the retirement of key professors, which will take place in the next few years.

Strategic Research Areas (SRAs). If seen feasible, the unit should put together a plan how to align their research with the University's SRAs to optimally benefit from connections with other departments working on the same SRAs.

### Highlights from the self-assessment

Psychiatry & Child and Adolescent Psychiatry has ongoing research projects with potential high and immediate clinical impact and large interest from society facilitating implementation and dissemination of research findings. Psychiatry Research Skåne seems to have an important role in this by bringing together a larger group of researchers and health care professionals and this cooperation should be maintained and developed further.

The Medical Ethics section seems to be functioning very well in terms of external grants, publications, service to the community, and education.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

PhD training and Promotion and succession. These issues should be discussed together with the sections, see above.

Many units voiced a wish for direct funding to pay for PhD student salaries, especially at the beginning of their studies. This would be especially beneficial for clinical scientists who are combining specialization and research, and PhD students of small fields, like History of Medicine. *Also, Medical Ethics does not currently have any university-funded PhD students.* 

**Protected research time for clinicians.** The University should work together with the health care system to allow protected research time for clinicians and clinical PhD students.

**Support for external grant applications.** The panel understood from the discussion with Faculties that support for external grant applications is available for researchers. These instruments should be made more visible to the researchers. To support large international collaborations, e.g. EU funding consortia, it is essential that especially the coordinator of a consortium has significant administrative help. The use of grant writers is also encouraged.

Administrative structure of Psychiatry and Child & Adolescent Psychiatry. The structure of these sections is complex, involving two Departments and three geographical sites. Additional complexity is provided by the essential cooperation with the health care system. Despite the spread to several administrative units and geographical locations, clinical collaboration between the units works well. Simplification of the organization at the Lund University site could be beneficial in terms of general flow of information and recruitment.

**Support for statistical analysis.** Researchers at Psychiatry & Child and Adolescent Psychiatry are in need for more support in statistical analysis and the ways to best provide it should be discussed with the University administration.

### Missing material

It would have been useful to have bibliometric analysis and the number of doctoral thesis per section, not for the entire UoA combined, due to the very different culture of publishing in Medical Ethics, History of Medicine and Psychiatry. *In Medical History three theses has been completed and is included in the evaluation.* 

To assess success in applications, we would have needed information on the amount of research funding per research group and success rate of the applications.

It was difficult to evaluate the UoA without knowing the personnel structure of the UoA (number of faculty and students). The Lund University website was not very useful for this purpose. We strongly recommend the University to update the website and include description of each unit and list of personnel.

# 9F RQ20 Report - Surgery

Final assessment after comments from the UoA for the final report The Panel has received no further comments. This is the final assessment

### **Executive summary**

The UoA 9F/Surgery consists of two separate units namely neurosurgery and vascular disease research. These units have submitted two separate self-evaluations and are by no means connected to each other in terms of research, teaching or administration. They will be discussed in this report under separate subsections. Both of these units represent highly specialized subsections within surgical disciplines and they are only located at one site within the SUS hospital organization and within a single Departments (Department of clinical sciences/Lund for neurosurgery and Department of clinical sciences/Malmö for vascular surgery). Both units highlight the difficulties in combining a demanding clinical speciality with *academic aspirations*. Moreover, these units could likely aim for more strategic collaboration within the university. Most importantly however the units would be in need of a common research and education strategy with the hospital organization in order to create a common vision and reasonable aims can be set up for the coming 5 and 10 years. The *difficulty has been to evaluate the scientific output* as the review panel has neither received clear information on the number and sums of external grants, nor is the bibliometric output separated between these two completely independent units. Less than 50% of the provided bibliometric data is actually related to these two units and the list includes publications and theses from general surgery, gastrointestinal benign and oncological surgery, paediatric surgery, paediatric oncology, plastic surgery and benign and malignant breast surgery. The provided data is therefore impossible to use for analysis of these two units this per unit in a meaningful way.

## Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (De-

partment of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Henrietta Redebrant Nittby Postdoctoral fellow and junior PI, Neurosurgery
- Linus Réen Doctoral student Specialty registrar Neurosurgery
- Niklas Marklund Professor and Head of office, Neurosurgery
- Stefan Acosta Professor at Vascular Diseases, Malmø

### Leadership:

- Priority setting, including goals for external research funding
- Recruitment, promotion and succession
- Publication patterns
- The balance between activities in research, education and external engagement
- The overarching research strategy

#### Neurosurgery

The Department of Clinical Sciences/Neurosurgery is based in Lund with research activities in many central research areas within the speciality such as traumatic brain injury, ischemic stroke research and experimental/translational neuro-oncology. The unit belongs to the Department of clinical sciences/Lund. The research is led by five PIs that are clinically active neurosurgeons. This is a strength in terms of clinical relevance of the research priorities, but a challenge in terms of finding the time for research. There are 13 on-going PhD projects. Most of the PhD students are also clinicians and there are time allocation strains on project progression. The biggest challenge of the unit is to balance research against clinical work. There is one full professor (academic chair), two adjunct professors and two associate professors. The time allocated for research within these positions is not clearly described and is therefore difficult to evaluate. Five of the PIs are between 53-64 years, and with only one younger PI there is a need for a strategy to recruit and promote future academic leads. This in also discussed during the panel interview but there is no strategic plan for succession presented besides securing an academic position for the younger PI.

The PIs have large international networks and take part in collaborative international and national studies but also run their own academic clinical trials. The unit describes research grants from the ALF

Σ

system that are mainly used to "buy research time"; regional research grants (Jeppson, Craafoord, BioCare) and some PIs have also been successful in obtaining grants in national competition (Swedish Research Council, Swedish Cancer Society, Swedish Childhood Cancer Fund, Hjärnfonden and CIF).

The level of funding is not given in detail so whether there is an up- nor downward trend cannot be evaluated. During the interview it became clear that the unit has been without an academic chair for some years and that this might have led to a declining output in terms of research that however now is reversed with the new academic chair in place. There are no research grants obtained in international competition, but the unit describes being part of EU level grants and also applications to the Wallenberg foundation are planned. In terms of research platforms, the unit lists active prospective biobanking initiatives and good infrastructure platforms such as the 7TMR, MAXIV, research labs allowing translational studies and platforms for behavioural science. A position within the MultiPark SFO is highlighted as a strength. However, at the same time the unit recognizes that they are but a small player in such SFOs and that sometimes it can be hard to get one's voice heard in these constellations.

The unit has an aim to publish in the best journals within the discipline but recognizes that being a small speciality is problematic as IFs tend to be low. Bearing in mind the problems in the bibliometric output files received (see above) the output cannot be easily evaluated but according to the unit there is an increasing trend in the last two years.

The unit describes the research structure with four different translational/experimental labs (Lubin, GIT, Lund Stem Cell Center and Rausing) plus "other research areas" as a fifth path. Three of the translational labs are listed as working with neuro-oncology, but these are located on different sites on the campus. During the interview it was however clarified that there is discussion and collaboration between these translational/experimental labs although no details were given how this is done and the unit recognizes that they could increase formal meetings such as common lab meetings, journal clubs and other common scientific activities. One can wonder whether it is strategically good to divide such a small field into three different labs and not seek to develop a larger neurosurgery lab with a critical mass of researchers?

## Vascular disease research

The second unit in this UoA is vascular disease research, a multidisciplinary research environment with researchers from several different fields such as vascular surgery, vascular physicians (angiologists), radiology and nursing that have collaborated within the Department of clinical sciences/Malmö. This appears to be a growing research constellation and its output has steadily increased in the recent years. The focus is on vascular surgery and specifically in endovascular therapy and complex endovascular aortic surgery; and it is within these fields the national lead. The unit runs multi-centre RCTs and has also finalized such studies. The unit obtained a larger research grant from the Swedish Research Council in 2019, and this has further boosted the development. The work is largely lead by the academic lead. There are 20 PhD students and an average of two dissertations per year. PhD students are also recruited from the nursing discipline thus increasing the diversity of the unit. The unit has submitted their own data on research bibliometric output due to the above described errors in the one provided by RQ20. This shows that the number of publications on average is 43 (based on numbers 2016-October 2019) and with a clear increase in research grants obtained during the same time period. The unit publishes mainly in journals within the fields of vascular surgery and these have a medium high IF.

The major threats to the unit are the lack of good research facilities within the Malmö campus that prevents further expansion of the research projects. The unit currently works in facilities that belong to the hospital (Region Skåne) and these do not allow for expansion. The unit expresses its frustration over this situation and there are requests made to the department of Clinical Sciences/Malmö to provide more facilities. The issue is not the ability to pay for more facilities as the unit is well funded but the lack of facilities that can be provided by the university. Another weakness is the physical separation from the cardiothoracic unit in Lund (part of Clinical Sciences/Lund), since there are many common research themes for these two units. There have been some aspirations to increase collaboration but this has not yet led to more activities.

As was the case for neurosurgery, this unit also reports difficulties in combining clinical work with research. This prevents building a good research environment and fostering clinician-scientists. A forum for PhD students with invited lectures has not been possible to implement due to difficulties in fitting this into the demanding clinical activities.

A common goal and strategy for Region Skåne and Lund University in terms of high-quality clinical research is needed. The unit has established fruitful collaborations with Malmö University and also has collaborations with other units of vascular surgery nationally

#### Collegial culture:

- Opportunities for early-career researchers to develop their originality and independence
- Sustainability and renewal of research strengths
- Academic networks and collaborations outside the unit
- Diversity, integrity and ethics
- Quality in applications and publications

#### Neurosurgery

The unit is in need of fostering the next generation of PIs and recruiting already established PIs due to the somewhat skewed age distribution among the PIs. Young clinicians and medical students are encouraged to take part in research, but the harsh reality in how research time can be allocated perhaps requires a strategic plan with clear milestones for both future PIs, but also on PhD level in order to raise the academic output? There are plenty of national and international networks that the unit takes part in and hopefully also junior researchers are exposed to these networks. The unit reports very good infrastructures for high level of experimental/translational research but perhaps need to work in larger constellations and closer together in order to achieve a critical mass for the neurosurgical discipline. Due to the male dominance of the field the PIs are mostly men but among the more junior researchers this is now balanced. The unit does not describe the educational diversity of their researchers and most of them appear to be medical doctors? The translational/experimental environments also require basic scientists and in the others fields researchers from behavioural and nursing sciences could perhaps increase the diversity. For quality of publications and applications see text in previous section.

#### Vascular disease research

The research work appears to be heavily concentrated around the academic lead and thus the unit should plan for an expansion of personnel with academic posts and more PIs in order to allow for growth of the unit. This is also highlighted in the self-evaluation. The unit describes three academic professors and one post-doctoral researcher to be the seniority of the unit and these supervise the 20 PhD students. No further details are given regarding the age profile of the professors. The lack of functional facilities to conduct research seems to be the most serious threat to this up-and-coming unit and should be urgently resolved.

A strategic plan for how to combine clinical work with research is needed, as it appears that most of the PhD students are clinicians. By expanding the number of PIs the number of external research grants can be expanded. Currently the unit has one larger research grant (Swedish Research Council) and besides

this grant through the ALF system and smaller foundations (Hulda Almroth foundation). This appears low if there are three professors connected to the unit and thus more activity is needed in applying for external funds. No applications for international research grants are mentioned nor are plans for applying for such mentioned in the self-evaluation. The academic lead also appears to perform a lot of the teaching and takes part in many external academic engagements. In terms of sharing this workload it would be important to recruit more PIs to the unit. Thus, help is needed to structure applications in order to increase external funding and perhaps a function of grants office for these busy clinical departments could be of value.

## Quality ecosystem:

- Research strengths and how these are reflected in the educational portfolioHow external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research
- How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration
- How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere
- If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

## Neurosurgery

The unit is quite well connected within the Lund research infrastructures and good collaborations are described. The unit is connected and has a board position in the MultiPark SFO. This is listed as a great strength but without any more detail and it became clear that the major advantage was the possibility to network with larger units although the problem of being a small player in such constellation is raised. The previous questions regarding how the experimental/translational labs within the unit are set up remain as the self-evaluation gives the impression that these appear to work quite independently from each other and a critical mass could be obtained by consolidation. There are multiple research collaborations described but these are mainly with other academic units in Sweden and internationally, although also collaboration with industry is ongoing (PolarCool, Novartis, ABCDx, Idorsia and Lantmännen). The latter collaborations are preceded by clear written agreements to avoid COIs.

### Vascular disease research

The unit does not describe that well how they can utilize the infrastructures of Lund university nor is a SFO mentioned clearly. There is some interaction with EpiHealth and the unit leader thinks this could be further increased. The collaboration with Malmö university appears fruitful as are the national collaborations and common RCTs. There are also international networks that members of the unit are active within. The weakness of being a small unit is recognized in the self-evaluation and plans for alignment with researches in the fields of other CVDs and diabetes are highlighted in order to obtain a critical mass. This could be of value since the diabetes related research network is strong in Malmö and there are several interesting common pathways in vascular disease and diabetes. The unit is cautious for industry funded research due to the risk of COIs although having many fruitful such collaborations especially with a focus on medical devices and stents.

For infrastructure there is a firm request from the unit leadership to secure workspace, rooms for PhD students and post-doctoral researchers, and this is a critical aspect for the department/faculty to provide a solution for as soon as possible.

## Recommendations

## Recommended focus points for the UoA

## Neurosurgery

- 1. Fostering next-generation PIs. This needs to start immediately and be guided by clear milestones for the next 5 and 10 years.
- 2. Create larger critical mass of the experimental/translational research environment (merge labs physically?) with a focus on neurosurgical aspects of the research within the next 5 years.
- 3. Create plan to allow clinician-scientists to both become competitive at research and good clinicians. Create a common strategic plan with the clinical leadership with clear plans for each clinician with academic aspirations. To be in place within 5 years.
- 4. Increase the number of grants in national competition and obtain a grant in international competition. The unit should have an international grant within 10 years.
- 5. Aim at increasing scientific output with clearly set milestones for the unit. As indicated above it should be done in collaboration with the clinical leadership. The milestones should be evaluated yearly.
- 6. Increase diversity among the scientific leadership.

# Vascular disease research

- 1. To urgently solve the problem with facilities. This should be within 1 year as the unit cannot continue expanding without suitable facilities in place.
- 2. To expand the unit with more PIs and increase applications for external research grants. The aim should be to have 1-2 junior PIs in place within 5 years. This can be achieved by building from PhD students within the unit or external recruitment.
- 3. The unit has impressive numbers of PhD students and it is important that the training given to these will pay back in the future by identification of the future research leaders already at this stage and mentor them carefully. This is a strategy linked to point 2. above.
- 4. Create plan to allow clinician-scientists to both become good at research and good clinicians. Create a common strategic plan with the clinical leadership with clear plans for each clinician with academic aspirations. To be in place within 5 years.
- 5. Since the distance to allow for more collaboration with the cardiothoracic surgery unit in Lund seems too long to overcome the unit should increase its networking towards the diabetes and CVD networks in Malmö so that a critical mass of academic input can be provided for the unit. Both tracks are good to pursue and then make a decision on one of these within 5 years.

# Highlights from the self-assessment

# Neurosurgery

The unit has been without academic leadership for a time period and that in combination with being a clinically highly demanding field had led to some decline in scientific output. The recruitment of new leadership has clearly reversed this and there appears to be an open and good discussion about the way forward. There are many PIs with external grants obtained in national competition. The unit has impressive resources in terms of experimental/translational labs and this could likely be further improved by working more closely together and perhaps running a translational unit together. The unit attracts good junior clinical scientists and thus these PhD students are a good source for future clinical scientists. Due to the age-distribution of the academic leadership a focus should be on fostering the next generation of academic leaders.

### Vascular disease research

This is an academically expanding unit and it has an impressive number of PhD students and the academic lead of the unit has recently obtained a research grant in national competition. The unit is known for clinical excellence within the area of endovascular aortic surgery. There are good collaborations with Malmö University and the environment has nice diversity with PhD students from different disciplines. There is potential to increase collaboration within the strong diabetes and CVD networks in Malmö. The major obstacle preventing further expansion is the lack of functional facilities for the unit as highlighted above but according to the leadership of the Department of Clinical Sciences/Malmö there are enough research facilities in Malmö so here the requests of the unit should be possible to be solved.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

The problems with functional research facilities in Malmö need to be urgently solved and since the panel received discrepant information from the unit and the leadership at the Departmental level regarding the availability of facilities for research this might be something for the Faculty to also look into i.e. can clinical research groups in Malmö expand?

The Departments of Clinical Sciences in Malmö and Lund should also together with these units make a clear plan for a strategy in terms of academic positions. In the neurosurgery unit a generational translation will soon occur and many PIs will retire within the next 5-10 years. These positions should be discussed together with the hospital organization since it is important for SUS to maintain the regional highly specialized care. In terms of vascular surgery, the current academic lead is still young but the group needs addition of more PIs and a position of junior faculty should be considered.

Both units also indicated that there is not that much administrative support in place to help with applying for larger grants and perhaps this is something especially demanding to organize within smaller units for clinical research.

#### Missing material

The *difficulty has been to evaluate the scientific output* as the review panel has neither received clear information on the number and sums of external grants, nor is the bibliometric output separated between these two completely independent units. *Less than 50% of the provided bibliometric data is actually related to these two units* and the list includes publications and theses from general surgery, gastrointestinal benign and oncological surgery, paediatric surgery, paediatric oncology, plastic surgery and benign and malignant breast surgery. The *provided data was therefore impossible to use for analysis of these two units in a meaningful way*. Moreover, these publications likely should have been linked to the units assessed within the field of clinical cancer research and the paediatric publications listed for the UoA 9H.

# 9G RQ20 Report - Medical Imaging

Final assessment after comments from the UoA for the final report

The Panel thanks for the received comments. We have revised the report accordingly (Changes in Italicsvbelow).

The panel acknowledge that the UoA is represented by five separate departments working with different strategies and therefore an overarching research strategy may be a challenge. However, for the individual departments and research groups this is recommended.

#### Executive summary

Unit 9G consists of five groups; Cardiac MR group, Medical Radiation Physics, Diagnostic Radiology Lund, Diagnostic Radiology Malmö and Nuclear Medicine. The external funding for unit 9G is today dominated by few sources, mostly national. The number of publications in terms of papers and abstracts indicates high research activity within the unit. The unit works hard towards more permanent positions within the medical faculty in order to secure future research work. More permanent positions within the Medical Faculty to be able to welcome post-docs back are needed. Developing originality and independence for junior scholars seem to be well taken care of in the unit. However, an overarching research strategy should be a part of every group's planning, and a pronounced strategy for allocating adequate research time to group members with clinical work is recommended.

A considerable advantage for unit 9G is its access to state-of-the-art imaging infrastructure. It is thus of high importance to maintain this access. Therefore, a better alignment between the Medical Faculty and Skåne University Hospital (SUS) is desired to secure access to machines and staff over time. In general, it would be desirable if the Medical Faculty and SUS coordinated the contents of their strategy plans.

Regarding relations to higher university levels, better contacts are requested with the leadership of the university level. The need for the Medical Faculty to establish an overarching strategy to recruit, develop and keep the best talents, is crucial.

### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Associate Professor Lars Gunnar Månsson, University of Gothenburg (Department of Medical Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Lars E. Olsson Professor, Medical Radiation Physics, Malmö.
- Pia Sundgren Professor at Neuroradiology and Head of office at Diagnostic Radiology, Lund
- Sophia Zackrisson Professor and manager, Radiology Diagnostics, Malmö
- Håkan Arheden Professor Clinical physiology, Lund
- Elin Trägårdh, Associate Professor in Experimental Clinical Physiology and Nuclear Medicine

#### Leadership

### Priority setting, including goals for external research funding

In the self-assessment, unit 9G states that the five groups forming the unit (Cardiac MR group, Medical Radiation Physics, Diagnostic Radiology Lund, Diagnostic Radiology Malmö and Nuclear Medicine) are working on having more positions partly paid by direct government funding. Since the research groups are strongly dependent on external funding (85% over many years), grant writing is an important task for the group leaders, but younger researchers are encouraged to apply for their own funding. Therefore, large efforts are made to develop skills for grant application writing. Although the unit has funding from several Swedish funding bodies, more efforts should be put into attracting international bodies, such as the European Commission and NIH. A larger part of the research based on international collaboration would strengthen the chances of such funding. This is also important, since the external funding today is dominated by few sources, and mainly located in Sweden.

#### Recruitment, promotion and succession

The recruitment basis for unit 9G is mainly junior colleagues from the various clinical counterparts of the research groups. Although all research groups have a strategy in planning for future academic career, most clinical personnel are involved in extensive graduate level teaching and the faculty is heavily dependent on external funding. Also, increasing financial demands from the faculty regarding registration of new PhD students hamper the recruitment. More permanent positions within the medical faculty are requested by the unit, and efforts from the unit of reaching this goal are ongoing.

It is the view of the members of the unit that the medical faculty lacks an overall strategy to recruit, develop and keep the best talents within the faculty. The recruitment strategies at Lund University is not regarded as clear and as straightforward as other comparable universities and research organizations. Active recruitment of eminent researchers is not performed and handling processes in recruitment are very long and rigid. It is stated as a possible threat to the research work that key persons may leave due to attractive positions elsewhere. This threat is real and have resulted in several senior researchers leaving for other institutions, nationally and abroad (e.g. NIH, USA and Karolinska Institute).

Nothing is mentioned in the report about the age distribution of the leading professors and senior researchers, how succession is planned, and how this leading group more specifically can be maintained or possibly expand in the future. The interview clarifies that in many cases early recruitment plans have been established, however some planned future leaders have been recruited by others prior to appointment.

#### Publication patterns

The unit aims to publish in peer review, open access journals. The scope of a given paper determines whether to publish in a narrower journal for technical development or in a paper for clinical studies. High impact factor is thus not always the goal, and indeed some of the research groups does not have access to journals with very high impact factors, due to their specific research field. Yearly statistics about publication of papers and abstracts is collected. Over the 5-year period 2014 - 2018 633 peer-reviewed

papers were published. From the Excel list of papers attached to the report by unit 9G, 582 of these papers are "Contribution to journal - Article (Peer-reviewed)". The rest is book chapters, PhD theses, etc.

However, not all are results of the research driven by the leading professors or senior researchers, or for that matter, the more junior researchers; 106 of the 582 papers neither have the first or the last of the authors from unit 9G. This way of making publishing statistics is certainly not uncommon and stresses the need for unifying the way such statistics are collected. The interview clarifies that this result is due to the large national and international collaboration the unit has, and that in some cases the research ideas indeed come from groups outside the unit.

# The balance between activities in research, education and external engagement

Unit 9G states that their main activity is research (approx. 80%), followed by education at graduate level (15%) and external activities (what type is not explained) (5%). A large part of the research is integrated in the clinical workflow. Efforts are made to integrate research into teaching and clinical practice. However, most of the PhD students, 41 out of 49, has a clinical appointment and therefore can perform only part-time research. On top of this, the high demand for clinical production makes it difficult to perform clinical studies. Also, the unit states as a weakness that access to large patient cohorts often depend on third party. To, despite these facts, be able to perform research to such a large extent of their total activity is impressive.

## The overarching research strategy

The overall research strategy, if present, is not very well described. Some groups within the unit have steering committees that prioritize among projects and applications for funding. In these cases, the strategy can have a "5-year plan, which is followed up twice a year". Although not all groups seem to have such extensive plans with follow-up, all groups still have regular open meetings where projects and their progress are discussed. Furthermore, funding may come from other parts of science, not always matching a research strategy. Research often has to obey the principle "follow the money". Also, the Department of radiology in Lund is closely related to the research strategy of the Department of Medical Radiation Physics in Lund (unit 9K)

Validations and verifications are important parts of the work. The unit focuses on finding fields of research where not so many other researchers are working, a strategy that can be fruitful if enough efforts and resources are allocated. If not, junior researchers run the risk of being left without sufficient guidance. Time investment in junior researchers, to help them get results, is a key point in the unit's strategy.

The problem of finding time for the researchers with clinical engagement is not discussed in the original report. As with all research units, where a substantial part of the researchers has clinical employments beside their research duties, it is always a challenge to find time for research. Clinical demands usually always have priority, and indeed this is often reasonable in a stressful day-to-day clinical setting. A pronounced and generally accepted strategy for allocating adequate time for research to group members with clinical work is a prerequisite for research continuity. Although a specific strategy for letting clinically active researchers allocate time for research does not seem to exist, in practice, at least for the usually busy departments of Diagnostic radiology, research time is usually allocated to a sufficient extent. "The clinic wants us to do research".

# To summarize Leadership:

- The external funding for unit 9G is today dominated by few sources. Efforts to broaden to this to further domestic as well as international bodies are encouraged.
- The unit's work towards more permanent positions within the medical faculty is essential for securing future research work.

- The scope of a publishing without searching for papers with the highest impact factor is reasonable and indeed, in many instances, of necessity. The number of publications in terms of papers and abstracts shows high research activity, also since most junior members of the respective groups are only part-time researchers.
- An overarching research strategy should be a part of every group's planning, and a pronounced strategy for allocating adequate research time to group members with clinical work is recommended.

## **Collegial culture**

### Opportunities for early-career researchers to develop their originality and independence

Developing originality and independence for junior scholars seem to be well taken care of in unit 9G. Internal weekly research meetings and networking throughout Lund University and abroad are parts of this strategy. Also, seminars and presenting work at internal meetings as well as at conferences support this. Administrative support for grant applications and grant management is provided within the unit. Career development plans are regularly discussed with group members. Young PhD:s are encouraged to apply for post-doc appointments abroad, and they are welcomed back to the group afterwards. This possibility, however, depends on funding, which is not sufficient at present. As stated above, more permanent positions within the medical faculty to be able to welcome post-docs back are requested by the unit whenever that possibility is available. There seems to be a general lack of relevant positions for researchers to which they can return. Arguments for relevant clinical positions whenever possible are also put forward. The issue is large for persons searching for a plain university career. It is less of an issue for persons having a clinical position or at least the possibility to be employed clinically.

#### Sustainability and renewal of research strengths

Since the research in unit 9G is mainly performed in the healthcare setting, a considerable advantage is its access to state-of-the-art imaging infrastructure. Also, specific agreements with many vendors give unique possibilities to perform research and development at the forefront. It is thus of high importance to maintain this access, which in many instances occurs in competition with the clinic's demands for "their" machines. This "problem" is not mentioned in the report by the unit, instead it is stated as a strength to have "high-quality imaging infrastructure accessible for research", an obvious asset for the unit and a situation to look after. The long-term assignment as a National Emergency Prepared Laboratory for the Swedish Radiation Safety Authority is a stable platform for environmental radiation research.

In unit 9G the regular ways of developing strengths are internal meetings and retreats as well as attending international conferences. Meetings with other research groups will promote renewal of research strengths, but it is not clear to what extent these meetings occur. Every member of the unit has meetings on a regular basis. The frequency of the meetings is adjusted to the size of the group members. Depending on the diversity of research areas in the groups, the focus may differ from mainly research to administrative issues. As a role model to the other groups in the unit, one of the groups has weekly open research meetings updating everyone on how all research lines are proceeding as well as weekly works-in-progress (WIP) meetings to deepen knowledge in specific projects. This group also regularly discusses leadership and collaboration.

The unit identifies small research groups with a small critical mass (eg. one supervisor and one PhD student) as a potential problem. Once the PhD is completed, the group is dissolved, and the research may not be continued. Continuous research over time also demands attraction from students from the natural sciences and clinicians to engage in the long-term commitment that constitutes a PhD project. International collaboration is strongly advised.

### Academic networks and collaborations outside the unit

Unit 9G states as a strength that they have extensive collaborations nationally, on European and global level. They mention the following collaborations with research institutions outside the unit itself (as calculated by the evaluator).

In Lund: 2 In Sweden (excl. Lund): 3 In USA and Canada: 10 In Europe: 6 In Australia: 1 International research consortiums etc.: 2 Environmental radiology (east Europe): 2 Major international companies and smaller enterprises: 9

The extent of the various collaborations – and the timing – is not stated except for the Lund University Bioimaging Centre (LBIC), where one group member is co-director. Although the number of international collaborations is impressive, it is therefore not possible to evaluate the outcome and the units' mechanism to enhance research quality.

The local networking in Lund/Malmö is however large and can strengthen translational research. Although the unit was organized by the RQ20 committee, and therefore no organized mutual research activities were set up previously, a fair number of fruitful collaborations, based on mutual research interests within the members of the unit, have been performed. Examples of these collaborations between all members of the unit have been given, including breast imaging, co-supervising PhD students, functional MRI of brain tumors during radiotherapy and projects on heart disease and brain.

### Diversity, integrity and ethics

Although a few PhD students and five post-docs from abroad have been affiliated to the unit, it is stated that improving cultural diversity is a challenge. Many medical doctors among the researchers need to have a good knowledge of the Swedish language, hampering international recruiting. Also, most of the PhD students have up to now been Swedish. Again, one group among the five is a role model for the others. They have a policy document in this subject that all must sign. In retreats the group members reflect over e.g. ethics and work environment. This policy document is now, following the interview session, shared among the members of the unit and work is in progress to adjust the content to the specific needs of each group.

Regarding gender equality, this unit seems to have a satisfactory distribution between men and women. Ethics related to clinical trials conducted within the unit is not mentioned in the report.

### Quality in applications and publications

All applications are reviewed, commented and edited before they are sent to a funding agency. Joint grant-writing workshops are mentioned as a way to increase quality of applications even more. All members of the unit are heavily engaged in applying for funding, since the economy of the unit rely on average to 80% on external funding. Junior researchers as a group (including PhD-students, post docs or equivalent) are encouraged to start applying for funding.

The research groups in unit 9G states that they prioritize quality over quantity. An iterative method is applied to manuscript writing; first a joint work by the first and last authors, then input to the first author from other co-authors and returned to the last author. These rounds are repeated until the last author approves.

Σ

## To summarize Collegial culture:

- Developing originality and independence for junior scholars seem to be well taken care of in unit 9G. However, more permanent positions within the medical faculty to be able to welcome post-docs back are needed.
- A considerable advantage for unit 9G is its access to state-of-the-art imaging infrastructure. It is thus of high importance to maintain this access, which in many instances occurs in competition with the clinic's demands for "their" machines.
- One of the groups has weekly open research meetings updating everyone on how all research lines are proceeding, as well as weekly works-in-progress (WIP) meetings to deepen knowledge in specific projects. This method should be adopted throughout unit 9G.
- Continuous research over time demands attraction from students from the natural sciences and clinicians to engage in the long-term commitment that constitutes a PhD project. International collaboration is strongly advised.
- Unit 9G has extensive collaborations nationally, on European and global level. The local networking in Lund/Malmö is also large and can strengthen translational research.
- One group among the five has a policy document for diversity, integrity and ethics that all must sign. This policy document is now shared among the members of the unit and work is
- in progress to adjust the content to the specific needs of each group. These subjects are also reflected over in retreats.
- Ethics related to clinical trials conducted within the unit should be commented.
- Quality in applications and publications seem to be high in group 9G, and junior researchers as a group (including PhD-students, post docs or equivalent) are encouraged to start applying for funding.

## Quality ecosystem

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research

Due to the engagement of teachers working in the clinics or are active clinical researchers in unit 9G, recent research is usually intertwined with the teaching activities. This goes for both the Medical School and the Medical Physics program. Some examples of this are given in the report; In pre-graduate education, in-house developed software is used to simulate the beating heart. The course on environmental radiology includes education and training for the police, customs and e.g. the Swedish Civil Contingencies Agency.

The unit's research profile has influenced national specialist training courses. Ten examples are given. Also, European courses in breast imaging are given as a result of the research program. Although much of the research finds its way to the education part, the report asks for even more collaboration within the unit in order to further enhance the links between education and training.

Unit 9G has extensive research collaboration with external bodies. This improves the quality of research and facilitates new ideas to come in. The access to instrumentation and patient cohorts is improved because of this. Many members of the unit are engaged in many national and international bodies. Many examples are given. Also, the collaboration with the industry is extensive, as stated above. Some research tasks are also commissioned by the government. Whether these facts have led to any important patents is not described.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

All parts regularly discuss these issues in staff meetings. Routines for ethical approval and research ethics by the Swedish Research Council are followed. Industrial collaborations are regulated in legal research contracts. As above, one group within the unit has adopted a more ambitious approach to the handling of ethical issues. Collaboration regarding research in radiation protection is mentioned where conflicts of interest can occur. The borderline between results from academic research and content in authority reports can sometimes cause debate, and the unit sometimes accept limiting task assignments from authorities.

## What is the unit's stance towards external engagement and outreach?

The unit is regularly seeking engagement with the media. Spectacular events usually gain interest. Also, social media are used and sometimes YouTube. Contacts with patient organizations are also frequent.

## To summarize Quality ecosystem:

- Recent research is usually intertwined with the teaching activities. Still, even more collaboration within the unit in order to further enhance the links between education and training is desirable.
- Unit 9G has extensive research collaboration with external bodies, including the industry, improving the quality of research and facilitates new ideas.
- Routines for ethical approval and research ethics by the Swedish Research Council are followed and industrial collaborations are regulated in legal research contracts.
- The unit is regularly seeking engagement with the media. Contacts with patient organizations are frequent.

## **Transversal themes**

## Management and leadership

The faculty level supports quality work on an administrative level. Requests for positions, however, usually happens more slowly than what is known from other universities. The unit is in general satisfied with the guidance, resources and other support from the university and the faculty. Leadership on the faculty level is visible and responds to emails and telephone. This is not always the case at the university level, which is regarded as discouraging. It is suggested that future vice chancellors be recruited among the best researchers. Support in this matter is gained from the literature; "…better universities appoint better researchers to lead them". A leader with a top researcher background will most probably strive to improve and develop strategies to increase the university's impact and ranking. Thus, this approach creates important strategic and operational synergies in the organization.

## Infrastructures

Infrastructure is provided by both the university and the hospital. A close relation to the clinics where imaging is performed secures access to machines and staff. The steering committee at the related department has an academic deputy from the unit and research leaders meet the head of the department monthly. A better alignment between the medical faculty and the hospital is desired. Translational research can to an even higher degree in the future be performed with e.g. the national 7T MRI facility and with MAX IV and ESS. Lund university and Quaternary Sciences jointly run a facility for assessment of radiation dose and geological and archeological dating. The Malmö part of the unit is not specifically mentioned in this respect in the report.

The unit expresses no general problems in getting access to state-of-the-art diagnostic and therapeutic equipment. A final wish, though, from the unit regarding infrastructure would be to have access to an MR-guided linear accelerator for cancer treatments.

Σ

# The relationship with strong and broad research areas

The unit is in many ways engaged in the broad research areas at Lund University. Many examples are listed, although with few comments on how opportunities from these projects are utilized. Also, EU funded research is mentioned, however not specifically noted in B1 as a major funding body. In many projects linked to the unit, artificial intelligence is used to analyze and manage large data sets. This also adds to the precision in research, diagnostics and treatment within the medical faculty.

# To summarize Transversal themes:

- The unit is in general satisfied with the guidance, resources and other support from the faculty. Better contacts are requested with the leadership on the university level.
- Infrastructure is provided adequately. A close relation to the clinics secures access to machines and staff. However, a better alignment between the medical faculty and the hospital is desired.
- The unit is engaged in the broad research areas at Lund University, although with few comments on how opportunities from these projects are utilized.
- The unit itself has at the end of the report summarized its specific desires for the future:
- The need for the Medical Faculty to establish an overarching strategy to recruit, develop and keep the best talents.
- A harmonization of the strategic plans for the Medical Faculty and Skåne University Hospital is desired.
- The university would benefit from higher visibility and increased communication with staff and society from the vice chancellor level.

# Recommendations

# Recommended focus points for the UoA

# Issues that call for immediate action (0 – 2 years)

- As stated in your goals for external research funding, the funding for unit 9G is today dominated by few sources. Efforts to broaden this to further domestic as well as international bodies are of great importance to ensure future research quality. Take advantage of "Forskningsservice" within the faculty and use your already extensive collaborations internationally to increase your efforts to gain access to eg. EU and NIH funds.
- More permanent positions within the Medical Faculty to be able to welcome post-docs back are needed. The unit's active work towards more permanent positions within the faculty is essential for securing future research work. However, since only two of the five groups within the unit have a strategy for succession to ensure continuation of research lines, it is advised that work in this direction is started in the other three groups. See also below, regarding the need for the Medical Faculty to establish an overarching strategy to keep the best talents.
- One of the groups has weekly open research meetings updating everyone on how all research lines are proceeding, as well as weekly works-in-progress (WIP) meetings to deepen knowledge in specific projects. Although all units indeed have regular meetings, this specific method should be adopted throughout unit 9G.

# Issues that need to be addressed in the long term (5 - 10 years)

- An overarching research strategy should be a part of every group's planning, and a pronounced strategy for allocating adequate research time to group members with clinical work is recommended.

- Recent research is usually intertwined with the teaching activities within unit 9G. Still, even more collaboration between the groups within the unit in order to further enhance the links between education and training is desirable.
- A better alignment between the Medical Faculty and Skåne University Hospital (SUS) is desired regarding infrastructure to secure access to machines and staff over time. See also below, under "Issues that should be addressed and resolved at other levels....".

# Highlights from the self-assessment

- The scope of a publishing without searching for journals with the highest impact factor is reasonable and indeed, in many instances, of necessity. The number of publications in terms of papers and abstracts is an indication of high research activity within unit 9G, also considering that most junior members of the respective groups are only part-time researchers.
- A considerable advantage for unit 9G is its access to state-of-the-art imaging infrastructure. It is thus of high importance to maintain this access, which in many instances occurs in competition with the clinic's demands for "their" machines. See above, regarding issues to be addressed in the long term.
- Unit 9G has extensive collaborations nationally, on European and global level. The local networking in Lund/Malmö is also large and can strengthen translational research.
- Quality in applications and publications seem to be high in group 9G, and junior researchers as a group (including PhD-students, post docs or equivalent) are encouraged to start applying for funding.
- Unit 9G has extensive research collaboration with external bodies, including the industry, improving the quality of research and facilitating new ideas.
- The unit is regularly seeking engagement with the media. Contacts with patient organizations are frequent.
- Infrastructure is provided adequately. A close relation to the clinics secures access to machines and staff.
- Developing originality and independence for junior scholars seem to be well taken care of in unit 9G.
- Routines for ethical approval and research ethics by the Swedish Research Council are followed and industrial collaborations are regulated in legal research contracts.
- One group among the five has a policy document for diversity, integrity and ethics that all must sign. This model is now distributed among the members of the unit and adopted to specific needs.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

- The unit is in general satisfied with the guidance, resources and other support from the faculty. However, better contacts are requested with the leadership of the university level.
- Unit 9G has considerable problems in keeping skilled researchers after their PhD exams. Thus, the need for the Medical Faculty to establish an overarching strategy to recruit, develop and keep the best talents, is crucial.
- A harmonization of the strategic plans for the Medical Faculty and SUS is essential in securing research and teaching in the long run. Using that as a starting point, the executive planning could continue downwards on corresponding hierarchical levels in the organizations.

- The university would benefit from higher visibility and increased communication with staff and society from the vice chancellor level. One way of getting there would be if future vice chancellors were recruited among the best researchers.

# 9H RQ20 Report - Pediatrics, Reproduction, and Obstetrics & Gynecology

Final assessment after comments from the UoA for the final report The Panel has received no further comments. This is the final assessment

## **Executive summary**

The UoA 9H consists of three separates unit - pediatrics, reproduction, and obstetrics and gynecology. They somehow create a unit, although they possibly have been forced together as they are not connected to each other by research, teaching, or administration. The units have submitted a coordinated self-evaluation but they could have well have been evaluated separately. The selfevaluation is well-written and organized. It is difficult to state anything about the competitiveness of the groups in grant applications and quality of publications as the information provided is not in detail. The research groups are performing well quality research with quite good funding, and they have established well-developed national and international collaboration. However, the research strategy may be unfocused and it seems that more or less driven by each principal investigator or professor.

The research groups are affiliated with one clinical department at Skåne University Hospital (SUS). The weakness at the Lund University is that the research groups are both geographically and administratively separated from each other. They belong to at least two different university departments of Medical Faculty with two totally different internal structure without a formal academic head. This seems to be one of the major weaknesses pointed-out in self-evaluation and during the interview of the research groups. The groups would benefit more and reduce the costs if they would have a centralized administration with a formal academic head, focused research strategy and support as well as equal curriculum for medical students. The academic career development for clinical scientists after PhD is not well supported by the university or hospital, and in coming years, there will be lack of succession of four professors. Several of the research groups have various forms of collaboration/interaction with the pharmaceutical industry or investigator-initiated clinical trials without involvement of the industry. To avoid potential conflicts of interests such as ownership of intellectual property and potential patents could be avoided if the university could offer high-quality experienced legal guidance.

## Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the

onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Rolf Ljung Professor at Paediatrics, Lund
- Stefan Hansson Professor at Obstetrics and Gynaecology (Lund).
- Aleksander Giwercman Professor at Reproductive medicine, Malmö.

### Leadership:

## Priority setting, including goals for external research funding

<u>Pediatrics</u>. The pediatric research covers a wide spectrum from basic experimental to clinical research. The overarching research strategy is to promote research in all sub-specialties in pediatrics. However, this may implicate that research strategy is unfocused. From academic networks and collaborations, it may be concluded that the priority areas of research are nephrology, diabetes, autoimmune disease, celiac disease, hemophilia, late effects of cancer treatments, and safe surgery in low- and middle- income countries. They state that the field corresponds well to the regional and national clinical goals. Many of the projects have a welldeveloped national and international collaboration.

The pediatric research groups are affiliated with one pediatric clinical department at Skåne University Hospital (SUS). The weakness at the Lund University is that the pediatric research groups are both geographically and administratively separated from each other. They belong to two different university departments (Department of Clinical Sciences, Lund, and Department of Clinical Sciences, Malmö) of Medical Faculty with two totally different internal structure without a formal academic head. Although, they have agreed to arrange joint administrative and scientific activities/meetings, they possibly would benefit more and reduce costs if they would have a centralized administration with a formal academic head, focused research strategy and support as well equal curriculum for medical students. The academic staff has a reasonable balance between research, educational, and clinical duties. Many doctors have "ALF-young researchers" or "ST-ALF". Of PhD students, 80% are physicians and sometimes they may have difficulties in obtaining protected research time.

The unit has national and international funding. The further goals for external funding are to have collaborations with the pharmaceutical industry or investigator-initiated clinical trials to get access to grants which would not otherwise be available.

<u>Reproduction</u>. Reproduction Medicine research group is a unique in Sweden, and they have an internationally recognized position within the area of male reproduction and they have initiated a good collaboration with gynecology. This seems not be a real research unit and it does not have focused research strategy but it is guided by the interest of principal investigators. Molecular reproductive medicine and molecular genetic reproductive medicine have a high priority although other areas such as clinical chemistry, and environmental epidemiology are also involved. They have access to unique clinical material, large biobanks, and national registries. So far, they have had a limited research collaboration with obstetrics and gynecology.

It is a weakness that the reproduction research groups belong to two different departments at the Medical Faculty, i.e., Translational Medicine in Malmö and Laboratory Medicine in Lund, and the research unit does not have a formal academic leader. Reproductive medicine is not recognized as one of the strong research areas in the Faculty of Medicine, and it is not part of mandatory curriculum for medical students. The major part of time of senior researchers is devoted to research, while the younger clinical fellows have only limited time for research. They are working on helping younger, talented co-workers with obtaining sufficient scientific and pedagogic merits and establishing academic positions within the area of reproductive medicine.

They have national and international funding. No local, regional or national funding bodies focusing on reproduction medicine. Their goals for external funding are to receive funding from the most competitive Swedish grant bodies and EU funding, and even from NIH (ReProUnion), and acquire financial support also from pharmaceutical industry.

<u>Obstetrics and Gynecology</u>. The research in obstetrics covers translational obstetrics, ultrasound research, clinical obstetrics, and epidemiology, whereas the research in gynecology covers clinical cancer research, infections, uro-gynecology, and ultrasound diagnostics. The research fields correspond well to regional and national clinical goals. They have a well-developed national and international collaboration. There seems to be no focused research strategy.

The clinical and academic organizations do not have a joint strategic research and developmental plans for the future. The research groups are affiliated with one clinical departments at SUS, which is functioning well. However, the weakness at the Lund University is that the obstetrics and gynecology research groups are both geographically and administratively separated from each other. They belong to two different university departments (Department of Clinical Sciences, Lund, and Department of Clinical Sciences, Malmö) of Medical Faculty with two totally different internal structure without a formal academic head. Furthermore, experimental translational research is conducted at the Department of Experimental Medical Science. Although, they have agreed to arrange joint administrative and scientific activities/meetings at LU, they possibly would benefit more and reduce costs if they would have a centralized administration with a formal academic head, focused research strategy and support as well the same curriculum for medical students.

They have national and international funding. In addition, several research groups have various forms of collaboration with the pharmaceutical industry or investigator-initiated clinical trials without involvement of the industry. However, most research groups lack 3- and 5-year grants.

### Recruitment, promotion and succession

<u>Pediatrics.</u> There are 5 active professors in pediatrics, of which 2 are over 60 years of age with large research groups. However, there is no clear plan for succession of these professorships. There are 4 adjunct professors, but there is also a lack of academic positions (lecturer/professor) in certain clinical sub-specialties despite research group leaders fulfill Lund University criteria for such position. Due to this there is a risk of losing some of these to other Swedish or foreign universities.

<u>Reproduction.</u> There are 4 professors in reproduction, and 4 associate professors. The unit recognizes that they lack a plan for succession after urgent retirement of two professors in a high priority research field. They have had difficulties in recruiting clinicians to engage in research projects, especially MD, PhD. Furthermore, the unit lacks academically highly merited researchers in the area of female reproduction.

<u>Obstetrics and Gynecology</u>. There are 2 professors in obstetrics, 1 professor in health science, and 2 adjunct professors in gynecology, which were appointed in 2018. They recognize that they have too few academic positions to cover all aspects of the broad speciality, and too few associate professors that can supervise PhD students. Only few postdocs have reached associate professor level. They point out that after retirement of the previous academic management, new replacements are in place and a critical mass of PIs will open up for a more research friendly environment that will aid in recruitment of new master and PhD students and postdocs.

#### Publication patterns

The bibliometric analysis was provided for the entire UoA. The total number of original papers is 794 for the UoA in 2014-2018. In the self-assessment, pediatrics reports 694 publications, reproduction 239 publications, and obstetrics and gynecology 205 publications for 2014-2019. Bibliometric analysis reveals that there has been a minor decline in scholarly output between 2014-2018. This is reflected in papers present in Top 10 and Top 1 percentile citations from 20/3.1 to 19.7/1.2. The number of doctoral thesis has varied from 5 to 9 per year.

## The balance between activities in research, education and external engagement

<u>Pediatrics.</u> In the self-assessment, the UoA states that the clinical and academic organizations do not have a joint strategic research and development plan to support clinical research and future combined academic-clinical positions. However, the academic staff has a <u>reasonable balance</u> between research, educational, and clinical duties. Many doctors have "ALF-young researchers" or "ST-ALF". PhD students who are working as physicians may have difficulties in obtaining protected research time, which is solved by these constructions enabling the physicians to carry out research 50% of the year.

<u>Reproduction</u>. All senior researchers are, to a greater or lesser extent, engaged in education, mainly of medical students, but also other student categories. However, the <u>major part</u> of their time (60-70%) is <u>devoted to research</u>. In addition, all senior researchers have other assignments of trust in national and international organizations and committees. Due to clinical duties the younger clinical fellows have only limited time for research.

<u>Obstetrics and Gynecology.</u> The academic staff <u>does not have</u> a reasonable balance between research, educational and clinical duties. Two have "ALF-young researchers" or "ST-ALF". The PhD students who are working as physicians may have difficulties in obtaining scheduled time for research, a problem usually solved in a constructive dialog with the clinical section/clinical heads.

#### The overarching research strategy

<u>In pediatrics</u>, the academic staff have a reasonable balance between research, education, and clinical duties. Many doctors have "ALF-young researchers" or "ST-ALF". PhD students who are working as physicians may have difficulties to obtain research time, which is solved by these constructions enabling the physicians to carry out research 50% of the year. The overarching research strategy is to promote research in all sub-specialties of pediatrics and to combine clinical trials, translational studies, and basic discoveries with clinical expertise. The current spectrum of research projects mirrors this strategy.

In reproduction, all senior researchers are, to a greater or lesser extent, engaged in education, mainly of medical students, but also other student categories. However, the major part of their time (60-70%) is devoted to research. In addition, all senior researchers have other assignments of trust in national and international organizations and committees. Due to clinical duties, the younger clinical fellows have only limited time for research. A significant part of the research focuses on male reproductive function. However, ever since the establishment of a clinical Reproductive Medicine Center at the connected hospital, female reproduction is also part of the curriculum and ongoing translational research.

<u>In gynecology and obstetrics.</u> The academic staff <u>do not have</u> a reasonable balance between research, educational and clinical duties. Two have "ALF-young researchers" or "ST-ALF". The PhD students who are working as physicians may have difficulties in obtaining time for research, a problem usually solved in a constructive dialog with the clinical section/clinical heads.

In summary, the UoA states that a close collaboration is crucial between the university and the hospital for both research and education. However, the research groups do not belong to any of the strategic research areas of the university. It is a weakness that the two different legal entities <u>do not have a joint</u> <u>strategic plan</u> for clinical research and education including for example budget priorities and plans for combined clinical/academic positions. Another field for improvement would be to obtain better integrated and "cross-talking" IT-systems. A previous vision, agreed between the hospital and the Medical Faculty, for a "<u>University Medical Center</u>" with more elaborate integration was never developed further.

## **Collegial culture:**

## Opportunities for early-career researchers to develop their originality and independence

<u>In pediatrics</u>, the students at the Faculty of Medicine are actively recruited to start 20p masters project during the 10th study semester which is a basis for recruitment of some students to PhD doctoral research projects. Other PhD students are recruited among junior physicians and preclinical students. These potential PhD students are offered a few months' research time covered by the supervisors' grants to try out their interest in the research field and, if they are accepted to PhD programs, clinically active PhD students may apply for protected research time. The existing research fields should be of great interest to develop further from the perspective of Skåne University Hospital and thus motivate Region Skåne to finance additional academic positions. There is also possibility to international student exchange.

In reproduction, they are regularly supervising medical students at semesters 5 and 10, which is a frequent entrance port for future PhD students. However, reproductive medicine is not part of the mandatory curriculum for medical students. Junior scholars are offered strong and formalized counseling and supervision in the process of manuscript writing and applying for funding.

Since reproductive medicine is not part of the curriculum for medical students they are organizing selective courses in reproductive medicine and supervising students writing bachelor and master theses. This is done with the aim of recruiting new young researchers.

In gynecology and obstetrics, the students at the Faculty of Medicine are actively recruited to start 20p masters project during the 10th study semester which is a basis for recruitment of some students to PhD doctoral research projects. A mentorship program motivates postdocs to advance to become "docent" (assoc. prof.). However, they mention that there is a threat to lose of competence/research groups to other Universities due to lack of academic positions.

<u>In all UoA</u>, there is a well-developed international collaboration between academic and clinical centers, which may enable student exchange. A mentorship program motivates postdocs to advance to become "docent" (assoc. prof.).

A clear funding for PhD students and post docs is lacking?

### Sustainability and renewal of research strengths

In pediatrics and gynecology and obstetrics, in the recruitment of young doctors to the respective clinics, the department advocates that research merits are highly rated for employment. In reproduction, there are difficulties in recruiting clinicians to engage in research projects, especially after MD, PhD. In gynecology and obstetrics, most research groups lack 3- and 5years grants. There is also a lack of academic positions for some areas of research.

In pediatrics and reproduction, there is a lack of plan for succession of totally 4 professors in becoming years.

### Academic networks and collaborations outside the unit

A close collaboration is crucial between the University and "Region Skåne" for both research and education. There is well-developed national, European, and international academic collaborations and networks outside the units. There is also good collaboration with pharmaceutical industry, with investigator-driven research initiatives. The department of Pediatrics has also been involved in educational collaborations with developing countries.

# Diversity, integrity and ethics

<u>In the pediatrics and gynecology and obstetrics</u>, the research groups include Swedish and nonSwedish students/researchers, and pediatrics also mentions to have a gender balance, while it is not mentioned in <u>the reproduction</u>. PIs are primarily responsible for the integrity and ethics.

# Quality in applications and publications

Publication policy is in peer-reviewed, good quality, established medical journals with a positive attitude towards open access journals and presentations at international congresses. Quality is promoted over quantity as a general guideline. The majority of the research is published in medium-ranked international journals. Only very few papers have been published in high impact general medical journals.

Many research groups are funded from prestigious national and international funds. Pediatrics and Gynecology and Obstetrics have also gained access to NIH grants. However, in pediatrics most research groups lack 3- and 5-years grants. In addition, collaboration with pharmaceutical industry has resulted in long-standing collaboration and access to grants, which would not otherwise be available.

# Quality ecosystem:

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research. Many of the research fields are translational from basic to clinical science, corresponding well to the regional and national clinical goals of Skåne University Hospital. Many of the groups have well-developed national and international collaborations. Several of the research groups have various forms of collaboration/interaction with the pharmaceutical industry or investigatorinitiated clinical trials without involvement of the industry. Senior members of the research group participate in national and international professional organization and have interaction with patient organization to develop health care, research and education and produce state of the art documents, guidelines and recommendations. This is most likely transferred back to the educational portfolio.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The research group leaders have the primary responsibility for the integrity, ethics and quality of the research and publications. Guidance on ethical considerations and ethical applications to the research groups has been offered. Several of the research groups have various forms of collaboration/interaction with the pharmaceutical industry or investigator-initiated clinical trials without involvement of the industry. Potential conflicts of interest in such collaboration, particularly the ownership of intellectual property and potential patents. The researchers suggest that the Medical Faculty could reach out in the organization and more actively offer high-quality experienced legal guidance in such collaborations.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere Core facilities are crucial and function well within the university. These include core facilities for imaging, proteomics, genomics for example. The resources allocated for technical support can be improved. An improvement would be to have overarching agreements on the Faculty level on the use of "core facilities".

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised. The research groups in 9H do not belong to any of the strategic research areas (SFO).

## Recommendations

### Recommended focus points for the UoA

There is no clear focused research strategy given in any of the units evaluated under 9H. It seems that the strategy is more or less driven by each principal investigator or professor, and there is no clear vision for the future overarching research.

The research groups in 9H do not belong to any of the strategic research areas (SFO) of LU.

To motivate region Skåne and the university to develop joint positions for the academic career development after receiving PhD to prevent loss of competence / research groups to other competitive universities. In addition, there is a clear need to develop a PhD program for clinical scientist to provide enough protected time for high quality research.

## Highlights from the self-assessment

The research groups are performing well quality research with quite good funding, and they have established well-developed national and international collaboration. The clinical units are affiliated with one clinical department at Skåne University Hospital (SUS), and are well organized. However, the research groups are both geographically and administratively separated from each other at the University of Lund. The less well-organized administration of research units at the University of Lund is pointed out to be one of the major weaknesses in self-evaluation and during the interview. The re-organization of the research groups should be commenced at the university site.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

Reorganization of the Faculty of Medicine to correspond to the clinics. It seems that research groups in all three units evaluated in 9H (pediatrics, reproduction, obstetrics and gynecology) are geographically and administratively separated from each other. This seems to be one of major weaknesses pointed out in self-evaluation and during the interview of the research groups. The groups would benefit more and reduce costs if they would have a centralized administration with a formal academic head, focused research strategy and support as well equal curriculum for medical students.

Creation of academic career development program to clinical scientist to prevent lack of succession of professorships in important clinical areas.

The university should offer high-quality experienced legal advice in the collaborations with pharmaceutical industry for external funding.

The university should give more support for clinical scientist in ethical approval, in writing grant application for funding.

It seems that the receive ethical permission and hospital permission for clinical research may be somewhat cumbersome for clinicians at least.

An improvement would be to have overarching agreements on the Faculty level on the use of "core facilities".

### Missing material

Publication list is difficult to interpret to get comprehensive understanding of quality of the research performed in each unit.

It is difficult to understand who has received external funding, and what is the annual development of external funding.

The written information given by self-analysis should have been supported by structured forms to make the evaluation easier. Otherwise, 9H self-assessment was well-written and organized which helped a lot.

The organization of the university was not clearly presented especially for a foreign reviewer, and the website of the Medical Faculty does not make it easier and does not give any help. In the self-evaluation some Swedish abbreviations (SFO, ST-ALF, ALF, etc.) for the university organization or others were used which are also difficult for a foreigner to understand.

# 9I RQ20 Report - Eye, ear, nose

### Final assessment after comments from the UoA for the final report

The Panel thanks for the received comments. We have corrected the names of people attending the virtual meeting (Changes in Italics below)

## **Executive summary**

This unit comprises three separate sections, subdivided into 2, 6 and 1 research groups, respectively. The two dominating sections are those for ophthalmology in Lund and Malmö. Most research groups have a defined group leader and separate budgets. Each research group has a specific aim for their research, but with no joint aims. Some of the research groups are small and do not represent real groups. With better cooperation between the research groups, both human and funding resources might be used more optimally. PhD recruitment should be increased by (nearly) all research groups. The unit or other bodies at the university may consider establishing criteria for authorized research groups regarding membership, publications and funding, and then give priority to such groups. The unit has published almost 200 scientific articles during 2014-2018, that is a stable output of around 40 articles per year. There is marked variation between the research groups and with correlation to external funding. The numbers of first authorships and last authorships are not given. The balance between medical research and clinical activities should be revisited, and with more focus on and time for research within the health institutions. The unit should be more aware of research strategies at the university and at external funding sources, and develop a strategy for further improving the quality and number of external grant applications. Ophtalmology as a research area at the university should be seen as one strong unit with a joint strategy, a clear leadership, with administrative support, and with a joint responsibility for research results such as publications, PhDs and funding.

### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two

made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Boel Bengtsson Senior lecturer at Ophthalmology, Malmö
- Fredrik Ghosh Professor at Ophthalmology, Malmö
- Maria Perez Senior lecturer at Ophthalmology, Lund
- Per Ekstrøm Senior lecturer at Ophthalmology, Lund
- Ulrica Englund Johansson, Associate professor at Ophthalmology, Lund
- Johan Aspberg, PhD student at Ophtalmology, Malmö

## Leadership:

This unit comprises three separate sections (named research groups in the self-assessment). These are again subdivided into 2, 6 and 1 research groups, respectively. The two dominating sections are the one for ophthalmology in Lund and the one for ophthalmology in Malmö. Most of the research groups have a defined group leader. They also have separate budgets. The membership in each group has been listed in the self-assessment.

## Priority setting, including goals for external research funding

Each research group has a clear and sufficiently specific aim for their research. The projects listed are generally in line with this overarching aim. The unit itself and the main sections do not seem to have a joint aim. This may be wise, as the research takes place within the research groups. Some of the research groups are too small and do not represent real groups. The unit is aware of this challenge and lists "too small research groups" as a weakness. Administrative support is more difficult with many small research groups. In the interview, some research groups informed that they were well-funded, but were unable to recruit a sufficient number of new PhD-students. Other research groups in the same unit informed that they had promising PhD-candidates but did not have funding for them. Recruitment of clinicians for PhD was reported to be more difficult than to recruit scientists. Still, with better cooperation between the research groups, both human and monetary resources should be used more optimally.

No priority between the groups has been listed in the self-assessment. According to this assessment, "there is very little, if any, interference from the faculty level and central university on the activities within the unit." With limited resources regarding administrative support and general funding, the unit or other bodies at the university may consider establishing criteria for authorized research groups regarding membership, publications, funding etc., and then give some priority to such groups.

The unit has not listed goals for external research funding. However, they have given some information regarding such funding, and they diligently show how such funding correlates with publication results within the unit. The unit is at the same time highly aware of the importance of academic freedom, and also that such freedom may attract researchers and stimulate them to activity.

Our recommendation is to give more support to the research groups being most successful, which would necessarily imply less support to those being less successful. The criteria for such priorities should be transparent and may include number of active researchers, publication results, external funding etc. They should consider measures stimulating to new and active research groups of sufficient size. This should promote even more interaction between the groups, with joint projects and applications.

#### Recruitment, promotion and succession

The unit lists 19 PhD-students, 8 of them in the ophthalmology imaging group. Most of the other research groups should aim to recruit more PhDs. They list factors and strategies that should make the groups attractive for PhD-students, but not active strategies regarding how to really recruit them. The unit reports 10 accomplished PhDs during the last 5 years. This is a low number for 9 research groups taken together.

The unit lists difficulties in recruiting postdocs. This is typical for clinical research and clinical research units. They list 7 postdocs, which seems a reasonable number. Several of their PhD- and postdoc-positions are part-time and combined with clinical work. This should be regarded an asset, but represents also some challenges. The institutions should find ways to secure the continued research contribution from clinicians who have taken their PhD.

Some of the research groups report difficulties in recruiting new leaders. This may reflect small size and more general vulnerability.

The unit missed administrative career support for PhD-students and young researchers, at the department or faculty level.

#### **Publication patterns**

The unit has published almost 200 scientific articles during 2014-2018, that is a stable output of around 40 articles per year. In 2018 they listed 50 scientific publications. This should be regarded as a good result. In the self-assessment, they show the marked variation between the research groups, and also the correlation to external funding.

The publication result regarding quality of journals has in the self-assessment been evaluated for all the research groups. This reflects awareness of publication quality for this unit. No clear aims for publications have been expressed. The unit does not seem to have obtained scientific publications in the leading general journals in medicine.

The actual contribution from the unit to the publications has not been assessed. It would be interesting to know the number of first authorships and last authorships. The number of accomplished PhDs is relatively low compared to the number of publications. The number of original scientific publications with either first or last authorship from the unit would represent an additional marker of interest for the research activity at the unit.

## The balance between activities in research, education and external engagement

The combination of research, education and clinical duties for most researchers represents an asset for this clinical research unit. It should be important with at least 50% research time for a core of the most active researchers. Seven out of 11 professors and senior lecturers used more time on research than on teaching. For employers of health institutions and at the same time been affiliated to the university, it is often difficult to have sufficient time for research. To find an optimal balance between clinical and research activities for clinical health workers represents a challenge for both the hospital and the university. The leadership at both institutions needs to cooperate and to give priority to this aspect. The clinical university units should try to push in a research-friendly direction. It is a clear recommendation from this evaluation that the balance between medical research and clinical activities should be revisited, and with more focus on and time for research within the health institutions.

## The overarching research strategy

The overarching research strategies differed among the research groups. None of the groups refers to strategies at the faculty, university or national level. Thus, each group defines their own activity. This is a good example of academic freedom. It is not clear if their aims and plans to some degree adapts to calls from funding agencies. That would be expected and wanted.

The institution should clarify at which levels research strategies should be worked out. Is it expected for a unit (ophthalmology) to have such strategies? How should the strategies be transferred from the university to the research groups and their individual researchers? The unit complained at the interview of lack of interest in ophthalmology from the university leadership. At the same time they did not themselves seem to try to adapt to the current research strategy of the institution.

The institution should clarify to what degree needs of the society and national and international priorities should influence the local strategy for the actual research undertaken in the research groups.

For this unit, we recommend more awareness of research strategies at their own university and at external funding sources. That should help in increasing the amount of external funding, and at the same time hopefully secure relevance of the research.

## **Collegial culture:**

## Opportunities for early-career researchers to develop their originality and independence

The unit describes effective and similar working routines in all research groups. Clinical research in medicine consists of active cooperation between juniors and seniors, and with ample space for junior independence. With so few PhD-candidates and other juniors in nearly all the research groups, a joint forum for juniors outside their own research group might be expected. This has not been clearly described by the unit. There may be research schools at the faculty, and / or national field-specific research schools? We recommend that early-career researchers have the opportunity to meet regularly with their peers to develop originality and independence, and to discuss how this should be promoted. This should at the same time support and stimulate recruitment of new PhD-candidates.

The challenges regarding developing research abilities and clinical specialization at the same time have not been discussed in the self-assessment. How to manage optimally such doublespecialization should be crucial for clinical research units, as well as for both faculty and university.

### Sustainability and renewal of research strengths

The unit shows a stable ability to maintain their research and recruit new researchers. They should in addition show some strategic flexibility, expanding some research groups, whereas other groups may disappear. Long-term research focused on one topic is a clear strength and is often necessary for international quality and visibility. This has, however, to be combined with flexibility and inclusion of new techniques and topics. This flexibility is taken care of within active and vibrant research groups, but is also needed at overarching administrative levels.

#### Academic networks and collaborations outside the unit

The unit and its research groups have wide local, national and international collaboration. This collaboration also includes education, clinical studies and benchmarking. The unit does not list strategic networks and collaborations to obtain external funding. This would be regarded as especially important for international funding (EU, NIH, NordForsk, others), but also for national and regional competitive grants. There is not listed a strategy for international activities for PhDcandidates and postdocs. Shorter or longer stays with research partners abroad are often regarded as mandatory for postdocs and is usually recommended for PhD-students.

### Diversity, integrity and ethics

The unit and its research groups are expected to adhere to all national and international rules, regulations and guidelines. The unit has not described how they secure that the correct procedures always are applied and followed. For the institution, the responsibility for the unit as well as for the research group needs to be absolutely clear. This is even more important for a unit where they report high academic freedom and relatively weak academic support.

461

# Quality in applications and publications For publications, see above.

Quality in applications is probably best assessed from success rate. The amount of external funding varies between very good and weak among the research groups. Applications and successful applications prove quality, relevance and ambitions. Applications for external funding should be a main aim for the unit. It is not clear how the unit uses its administrative and leadership resources to stimulate to draft applications and to further improve the applications from the researchers. All units at a leading university should have a responsibility for applications for external funding. The unit has not described its strategy and responsibilities. The differences between the research groups indicate that joint application activities within the unit might be a good idea; the successful ones explaining what they are doing. It is strongly recommended that the unit develops a strategy for improving the quality of and the number of applications. The unit should also express distinct expectations regarding applications for each of the individual research groups. The support given from the institution should reflect strategic importance, research quality, and the general priority setting as discussed above. The institution should aim at using the available support for applications at the department, faculty and university level optimally.

## Quality ecosystem:

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organizations) influence the quality of research

The combination with clinical activities and cooperation with health institutions is an asset for their research. The interdisciplinary approach represents another strength. The combination of research and education, not least specialist and specialized education, is a further strength. The educational tasks help in building research networks. The interaction with industry and nonhealth institutions is less clear from the self-assessment. For external research collaborations, see the evaluation above.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The unit manages these aspects together with the university and in accordance with accepted procedures, regulations and guidelines. The unit does not state any specific preventive or control measures.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere Nearly all research groups are highly dependent on research infrastructure at the university, the university hospital or at other institutions nearby. For most of the groups, this works very well. One of the research groups claims that the coordination of resources shared by many groups could be improved. The general impression is that the local infrastructure is sufficient and works very well for this unit.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilized.

The unit and its research groups describe a wide local, national and international research collaboration. See above for an evaluation. However, they do not describe any alignment to the University's strategic research areas or any other strong and broad research area. It is somewhat surprising that the unit and the research groups do not seem to try to adapt to or find associations to the SFOs. This might have been developed so as to become a strategic strength for them.

# Recommendations

## Recommended focus points for the UoA

- The responsibilities for the department, unit and sections versus the research groups should be better defined. The level and persons responsible for strategy, priorities, applications, allocation of resources, and research outcome should be better defined. These aspects should be more clearly communicated to the research groups.
- Number and quality of applications should be increased. Strategies and routines for writing of applications should be established. Expectations of the institution should be more clearly communicated to the research groups.
- The unit might develop an internal priority of the research groups, for example regarding funding and administrative support. This priority should be based on transparent research parameters.
- The unit should show a greater awareness of research strategies and priorities outside their own research group, in particular at their own university and at relevant funding sources.
- Ophtalmology as a research area at the university should be seen as one strong unit with a joint strategy, a clear leadership structure, with administrative support, and with a joint responsibility for research results such as publications, PhD-results and funding. The individual research groups within ophthalmology should cooperate more actively.

## Highlights from the self-assessment

- PhD recruitment should be increased by (nearly) all research groups. Strategies for such recruitment should be developed. Available funding and potential PhD-students should be better balanced.
- The best research groups should even more intensely take part in and develop international consortia, both for research projects and for grant applications.
- The joint ophthalmology unit as well as the authorized research groups should undertake a more detailed assessment of their publication achievements.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

- The combination of PhD and clinical specialization should be actively supported. Both the university (unit, faculty, central) and the university hospital should actively promote and support candidates that want to take this double specialization. Potential candidates in the clinic should be actively supported and stimulated to enter a research project with the aim of a PhD, preferentially with salary support specified for research. Such candidates are crucial for both ongoing and future activities at both institutions.
- Experimental research and research undertaken by scientists and other non-health professionals in cooperation with clinical departments should be acknowledged and supported by the health institutions.
- The general cooperation between the university and health institutions in the area needs continuous development.

Missing material None

# 9J RQ20 Report - Dermatology

Final assessment after comments from the UoA for the final report The Panel thanks for the received comments and have revised accordingly (Changes in Italics below).

### **Executive summary**

Dermatology is one UoA but is divided into three separate units, the unit in Lund with basic research both in inflammation and oncology, the department of occupational and environmental dermatology in Malmö, with its specific focus on dermatitis, and the unit of Dermatology in Malmö, which is more directed towards clinically based patient-oriented research. There seems to be very little intellectual connection between the three units and they do not do strategic work for research or recruitment. They belong to two different departments in the university. *The clinical side seems to be better connected, and this also includes education of medical students*. They also suffer from fragmentation clinically due to that they have three clinical sites and also private initiatives due to Vårdval.

#### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Professor Lars Gunnar Månsson, University of Gothenburg (Department of Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed the self-evaluation and publication output in February 2020. We have had access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with two persons being primary and secondary responsible for a Unit of Assessment (UoA) as indicated in the table on page 403. These two made the initial draft of the assessment, with modifications from all panel members before and after the zoom interview during May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Artur Schmidtchen, professor and head of office dermatology and venerology, Lund
- Cecilia Svedman Senior lecturer, associate professor, Occupational and Environmental Dermatology, Malmø
- Kari Nielsen, Senior Lecturer, Ass. Professor Dermatology and Venereology (Lund), Lund Melanoma Study Group Clinical Sciences, Helsingborg LUCC - Lund University Cancer Centre
- Andreas Sorensson, senior consultant, Lund
- Ola Bergendorff, associate professor, Occupational and Environmental Dermatology, head of laboratory, Malmø
- Josefin Ulriksdotter resident

## Leadership:

# Priority setting, including goals for external research funding

The unit seems well funded with a laboratory focused research with grants from VR, ALF, state and county funding, mostly located to the unit in Lund. External grants are of vital importance for their research. The unit's *(mainly the Lund part)* ability to attract certain strategic grants is, however, hampered by a lack of prioritization from the university, according to their own analysis. There seems to be an unclear number of research groups and ditto areas within the unit; an uncertainty that remains with the panel after the interview session.

# Recruitment, promotion and succession

The research groups in Lund and Malmö have had generation shifts, changing the research groups and research focus. In general, lack of resources hampers new recruitment to the unit. The process for re-appointing new positions is considered slow. A problem which comes up on several points is fragmentation, both to the two sites at the university but also dermatology clinics in other cities. They do not work actively with recruitment for positions and they talk about the old days with a common leader as something they do not seem to be realistic to function again. However, they cannot describe a good way to have a common leadership other than to have informal meetings regularly. Research decisions are always taken separately in the two sites, as they describe. They do not report any problems to recruit new students.

# Publication patterns

They did publish 340 papers and 272 peer reviewed papers, 4032 citations and 12.4 citations per article. 17.3 in Top 10 citation percentile (%) and 3.1 in Top 1 citation percentile (%). There is no trend. The publication rate and quality are fine and they do not complain of lack of possibilities to produce research. The different units work with inflammation and wound healing, atopical dermatitis dermatitis and skin cancer, and are involved in the *Lund melanoma group*.

They report 14 PhDs the last five years which seem low in comparison to the big number of PhD students.

# The balance between activities in research, education and external engagement

According to their report research is hampered because of big clinical burden although they report a big engagement in both national and international education, however this was not pronounced during the interview. They seemed quite proud with their educational skills. They would like to have more than two weeks allocated for their education in the curriculum. Furthermore, they seem heavily involved in international education and international professional research organizations. Whether PhD students in general are expected to take active part in educational activities is not described.

# The overarching research strategy

We asked this several times during the interview and they even denied that they have one, overall there seem to be very little collaboration between the groups in this area. Possible research strategies in Malmö is not known to the group in Lund. The group in Malmö and the group in Lund did not even seem to want an overarching research strategy. Our committee think this may be a problem for the future of Dermatology research at Lund university.

# **Collegial culture:**

Opportunities for early-career researchers to develop their originality and independence They actively work with early career researchers and *they report that they have 27 PhD students* and post docs which constitutes 40 % of the staff. We were not informed about the number of examinations

of the many PhD students. They are very active in promoting these with courses, seminars etc. Young researchers are free to use laboratories, cell culture facilities and equipment for their own projects. However, promotion of courses and seminars is very little coordinated between the two different department of Dermatology, which must lead to a decreased knowledge of dermatology for the research students. The total seminar structure seems good, but the lack of coordination is a problem. Also, here the wish to change this does not seem strong.

# Sustainability and renewal of research strengths

This was not responded well to during the interview, but they said it was not a problem, but they thought it may be a strength if they could have a common leadership, which is currently lacking. How the unit manages the trade-off between the long-term needs to produce a PhD and a renewal of research directions coming from e.g. clinical needs or grant is not well described.

# Academic networks and collaborations outside the unit

It is mainly the Lund unit which reports a big number of collaborations nationally and internationally. They also have a number of clinical trials and ongoing collaboration with start-up companies. During the interview this was further elucidated, and the different groups seems to use the new infrastructure well in many instances. However, to what extent all collaborations actually enhance research quality is not described.

# Diversity, integrity and ethics

The unit's report mainly describes that they have a big diversity and with a big international profile. Not well mentioned if they encounter problems or if they work specifically with these issues. This was, however, clarified during the interview and it seems that this is well-handled.

# Quality in applications and publications

Some publications are in high ranked journals such as Nature Communications, PNAS and the Lancet otherwise medium high ranked. Again, the groups are very different, and the laboratory side in Lund publishes in slightly higher ranked journals, although other parts of the clinical research are doing sufficiently well.

# Quality ecosystem:

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research. The educational portfolio seems fine with good collaboration between the three sites were education is executed, furthermore a big number of the staff is engaged in education on a PhD level. We think their research is good but hampered by fragmentation, which is not caused by the units themselves but by organizational factors, something, which have influenced dermatology research in all of Sweden. They would probably gain from some kind of centralization of their university units. This results in them having less strength and do not have the same possibilities to perform external research, even if they certainly do.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration.

They do not have a written down structure for this but are aware of how to work with it and have many continuing collaborations with other groups and handle it well.

How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere As stated above they work in these infrastructures and mention many of the new structures such as the Medicon Village, Max 4 and work in MRC.

If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised. They did not seem aligned with any of these structures, but they have a strong link to inflammation and oncology (melanoma) but did not mention any of the specific SFOs or other broad initiatives.

## Recommendations

## Recommended focus points for the UoA

From a university perspective, the unit is divided into at least two very separate parts, one in Lund and one in Malmö, an organization, which we feel must hamper the future development of Dermatology in the university. In our evaluation we find this striking, since, except for education, there are no formal collaboration going on, on the academic level. The clinical part seems well developed between these two university sites, which makes it even stranger. Thus we feel this should be initiated not only for the development of research but also for strategies in recruitment of new leaders and also funding

## Highlights from the self-assessment

We did not find research quality, quantity or funding to be a problem but rather the future development in the UoA. All three separate parts in Dermatology are basically doing good education and research wise and they feel pleased with their achievements, and our assessment agrees with this. Thus the structure does not raise a problem to carry on the ongoing research, they cover most of Dermatology but not psoriatic inflammation, an active decision in the group, and instead they focus on other areas. Dermatology covers a big field of research areas these days and it is good to focus on specific areas.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

During the RQ20 process a general theme was part of the self-evaluation and interviews. We have compiled this in the general recommendations for the faculty and university.

As is written above, we feel that the future of Dermatology research in Lund University may be hampered due to a lack of common central structure for the academy. A now ongoing good research process, may suffer from this. The UoA mention the lack of a common chair in Dermatology as a problem. The panel does not think the above issue will be solved by the UoA itself, and if an organizational change not is possible in order to unify the UoA, they need to be guided into a better common work with strategies. We feel they have much to gain through a better common planning.

## Missing material

It would be helpful to see the annual data for funding and sources, as well as if the UoA could check the list of publication we were provided.

# 9K RQ20 Report - Medical Radiation Physics

## Final assessment after comments from the UoA for the final report

The Panel thanks for the received comments. We have revised the report accordingly (Changes in Italics below).

## **Executive summary**

The Department of Medical Radiation Physics in Lund constitutes the whole unit 9K in the present assessment. The unit is associated with both the faculty of science and the faculty of medicine. The unit consists of four major research areas; MR imaging physics (MR group), nuclear medicine and molecular imaging physics (NM group), radiation therapy physics (RT group), and phase-contrast xray physics (XR group). Each of the four subgroups has a large number of national and international collaborations.
A majority of the research in the unit is oriented towards clinical applications. The research and doctoral education at the unit is one of its obvious strengths. However, short-term and long-term planning of research activities and possible extensions need to be performed, along with the formulation of an overarching research strategy. Also, the strategies for future funding, and information about funding for all groups, need to be clarified.

The recruitment of senior researchers may be hampered in the future. A possible threat to the research work is also that key persons may leave due to attractive positions elsewhere. Still, the unit has a relatively good economy to take care of post doctors "in-house". The medical physics program places special demands for the qualifications of its teachers, and coupled to the limited personnel, the possibilities to expand the research profile of the unit is hampered.

#### Introduction

The panel consists of the following persons: Professor Henning Grønbæk, (chair), Aarhus University (Department of Hepatology & Gastroenterology), Professor Iiris Hovatta, University of Helsinki (Department of Psychology and Logopedics), Professor Jes Lauritzen, University Copenhagen (Department of Orthopedic Surgery), Professor Nils Gilhus, University of Bergen (Department of Neurology), Professor Rolf Hultcrantz, Karolinska Institute (Department of Medicine), Professor Malin Sund, Umeå University (Department of Surgical and Perioperative Sciences), Associate Professor Lars Gunnar Månsson, University of Gothenburg (Department of Medical Radiation Physics), Professor Karl Lemström, University of Helsinki (Department of Surgery).

The panel was distributed all material February 2020 and have access to and read all relevant information. The panel worked by e-mail and video communications during the evaluation period February to May. Due to the COVID-19 situation and cancellation of the onsite meeting in Lund in May, it was decided to split up the work with one person being primary responsible for a Unit of Assessment (UoA) and another person being secondary as indicated in the table on page 403. These two made the initial draft of the assessment with final input from all panel members. During the process specific questions have been forwarded to the Lund RQ20 panel for further information when needed to finalize the final report, which also included new information from discussions with key persons from the individual UoA during the week of May.

During the process specific questions have been forwarded to the Lund RQ20 and UoA for further information when needed to finalize the report, which also included new information emerging from discussions with key persons from the individual UoA during the week of May.

At the interview the following UoA people attended:

- Linda Knutsson Professor at Medical Radiation Physics, Lund.
- Michael Ljungberg Professor and office director at Medical Radiation Physics, Lund.
- Hampus Olsson Doctoral student at Medical Radiation Physics, Lund.
- Christer Ceberg Professor at Medical Radiation Physics, Lund.
- Martin Bech Senior lecturer at Medical Radiation Physics, Lund.
- Tommy Knöös Adjunct professor at Medical Radiation Physics, Lund.

### Leadership

# Priority setting, including goals for external research funding

The Department of Medical Radiation Physics in Lund constitutes the whole unit 9K in the present assessment. Its relation in practice, to – at least parts of – unit 9G consists of cooperation both in research and

education in specific areas. The unit is "not formally a department, (but) is regarded as one in practice" and is associated with both the faculty of science and the faculty of medicine. According to their own view, the relation to the faculty of science is the strongest since they do not want to lose links to the natural sciences. Despite this fact, the department holds a strong collaboration with the clinics at the hospital.

The unit consists of four major research areas; MR imaging physics (MR group), nuclear medicine and molecular imaging physics (NM group), radiation therapy physics (RT group), and phase-contrast x-ray physics (XR group).

Unit 9K "sees itself as a department" and strategic decisions for the future are taken by the head of the department after consultations with the staff. The different group leaders are primarily responsible for the economy of the various projects. The routines and goals for funding are as follows:

MR group: A strategy meeting every January is dedicated to large and medium sized funding applications. The goal is to have several external grants "at the level of the Swedish Research Council and the Cancer Foundation, or similar organizations".

NM group: Has external funding from the Swedish Cancer Society and is part of an international network in Europe, USA and Africa.

RT group: Research goals are often coordinated with the faculty of medicine. "The allocation of financial resources is decentralized". Limited external funding from Swedish agencies hampers continuity and new ventures.

XR group: Not specifically mentioned.

In general, staff costs are primarily covered by faculty funding, which in general is considered adequate. Funds are also allocated for employing PhD students. The external funding, in part from the health care and medical industry, covers parts of student salaries. Senior teacher salaries are mostly covered by the faculty budget. The strategy for the future is to cover most of the cost for permanently employed teachers and staff by faculty funding, and short-term employments, such as PhD students and post-docs, by external funding. The strategy is also to have a good balance in teachers between the subtopics of Medical Radiation Physics. This is considered important to ensure a high quality in the teaching on the medical physics program. Of the total funding to the department, 18 % comes from undergraduate education, 49 % from the two faculties and 33% from external research funding agencies.

## Recruitment, promotion and succession

As threats for the MR and NM groups, a lack of junior research and teaching positions (post docs and assistant senior lecturer) are mentioned. It is specifically stated as a possible threat to the research work in the MR group that key persons may leave due to attractive positions elsewhere, but this problem is equally valid for the whole deprtment. For the NM group, the limited number of PhD and post-doc students may affect the recruitment of senior researchers in the future. For the XR group it can be difficult to recruit PhD students due to the topic of their work is not directly relevant to medical physics students. In general, the possibility to lose eminent researchers is a reality; a few post docs have been recruited to positions in the USA.

Regarding how succession is planned for the leading personnel, it is an advantage for the department that many of the leading staff are financed by faculty funds and thus have permanent positions, which secures the future for many professors and senior researchers.

Since 6 of 9 teachers at the unit presently are full professors, there is a need to recruit for the future to be able to supply new senior lectures and assistant senior lectures. The recruitment of an assistant senior lecture most likely leads to a permanent employment after some years. Thus, it is necessary to have a long-term strategy to ensure that the department can fund this person when that time comes. It is therefore considered necessary to increase the faculty funding to be able to assure sustainability for new recruitments. It is, however, in general hard to get money for new positions.

## **Publication patterns**

Usually one publication per PhD student and year is achieved, in addition to contributions from senior researchers. The aim is to publish in recognized open access and peer-reviewed journals. The department has a tradition of producing very extensive and long papers, which does not always meet modern demands from funding bodies. *A strategy towards more frequent publishing is therefore considered. Apart from journals, much effort from senior researchers are expended on writing books and book chapters, and also on reviews and guidelines. Occasionally, members of the unit have been part of publication in high impact journals (e.g. Nature Communications and Brain)*, but usually the research groups do not have access to journals with very high impact factors, due to their specific research field. From the Excel list of papers from 2014 to 2018 attached to the report by unit 9K, 257 papers are "Contribution to journal - Article (Peer-reviewed)", of which 74 (29%) neither have the first or the last of the authors from unit 9K. This is reported to be a byproduct of the large collaboration with other groups in the field. Helping other research groups is a common way of working for the department, e.g. by the MR group. However, this way of making publishing statistics is certainly not uncommon and stresses the need for unifying the way such statistics are collected. Also, 17 PhD theses were finished during the five-year period.

## The balance between activities in research, education and external engagement

The relationship in terms of economic resources between research and education is not specifically stated by Unit 9K. The unit (department) has full responsibility for the education of medical physicists at LU, and the self-assessment report argues that "the level of competence in health care is strengthened by the research and doctoral education at (the department)". This fact is considered one of the strengths of the unit. It is also mentioned as a weakness that the need for teachers in the medical physics program, and the limited personnel, limits the possibilities to expand the research profile of the unit, and thereby the possibility to have larger grants. The total educational burden is divided by only seven persons, supported by PhD students in laboratory parts. All teachers have course responsibilities, often coupled to the group's research field. External assignments are common, both nationally and internationally, e.g. training for foreign countries.

### The overarching research strategy

The overall research strategy is not treated specifically in the report. The introduction states that "the research is characterized by interdisciplinary and increased international cooperation". It is stated as a strength that a majority of the research in the unit is oriented towards clinical applications. Research on clinical applications is performed in collaboration with clinically employed medical physicists and physicians. Plans exist on a 4-5-year basis on a research group level (e.g., within grant applications and in the individual study plans for PhD students). It is e.g. stated that the MR group has some short-term plans. However, a written document describing a general strategy for a longer period of time has not been produced.

Research in radiobiology and reconstruction of medical images is mentioned as possible future directions for research. Formal benchmarking against other similar departments in Sweden is mentioned as a possibility but is not realized, even if informal benchmarking by separate groups has been done, without documentation.

## To summarize:

- The unit's formal relation, as well as relation in practice, to unit 9G consists of cooperation both in research and education in specific areas.
- Strategic decisions for the future are taken by the head of the department after consultations with the staff. The different group leaders are primarily responsible for the economy of the various projects. The strategy for the future is to cover most of the cost for permanently employed teachers and staff

470

by faculty funding, and short-term employments by external funding. The strategy is also to have a good balance in teachers between the subtopics of Medical Radiation Physics.

- Some groups see problems with recruitment of PhD students. The MR and NM groups see a lack of junior research and teaching positions (post docs and assistant senior lecturer). The recruitment of senior researchers may be hampered in the future. A possible threat to the research work for the department as a whole is that key persons may leave due to attractive positions elsewhere.
- There is a need to recruit for the future to be able to supply new senior lectures and assistant senior lectures. Thus, it is necessary to have a long-term strategy to ensure that the department can fund these persons when that time comes. It is therefore considered necessary to increase the faculty funding to be able to assure sustainability for new recruitments.
- The aim is to publish in recognized open access and peer-reviewed journals. A strategy towards more frequent publishing is considered to meet demands from funding bodies.
- The research and doctoral education at (the department) is considered one of the strengths of the unit. However, the need for teachers in the medical physics program, and the limited personnel, limits the possibilities to expand the research profile of the unit.
- A majority the research in the unit is oriented towards clinical applications. Research on clinical applications is performed in collaboration with clinically employed medical physicists and physicians. Long-term planning of research activities and possible extensions are not addressed.

# **Collegial culture**

# Opportunities for early-career researchers to develop their originality and independence

An open environment in unit 9K facilitates for young scholars to develop their own career. PhD students are given the opportunity to take responsibility for their own projects. (How this is done is, however, not described.) The post doctor period gives further chances to form a personal research profile. The unit is not in favor of the faculty's focus on moving abroad for new post doctors. Modern video technique and common access to documents also allows for international collaboration. The underlying economy to take care of post doctors "in-house" is reported to be relatively good. The aims of the unit are to formulate work descriptions that enhances originality and independence, with the goal of promoting associate professorship. Post-docs have been trained during their PhD studies to be independent and self-going. As in B1, the fact that everyone must accept teaching may limit the flexibility to explore new research areas.

# Sustainability and renewal of research strengths

One strength of the unit is to meet the needs often coming from the clinical departments, trying to balance the introduction of new research fields with the time it takes to gain enough understanding of new issues. The unit sees no inherent contradiction between renewal of research directions and engagement of PhD students. The unit engages PhD students to participate in research topics that were proposed in approved applications to external funding agencies. Many of the PhD projects related to such grant applications can be translated to clinical routine, and the PhD program and the clinical needs are therefore inherently linked. Major changes in research directions, affecting the entire strategic plan of a research group, seldom occur within the fouryear-period of a PhD education. Minor changes in project directions can normally be accommodated.

A possible future threat to the unit's research sustainability would be limitations in performing clinical research. Since only two staff members for reasons of affiliation can apply for the ALF clinical research funds, the economy for such research risks of being endangered. The access to patient data can also be limited for organizational reasons. The RT group is also heavily dependent on good connections to the

clinic. A specific situation thus pertains to all clinical research demanding clinical access and clinical support, performed by the unit. The eligible researchers for ALF grants are appointed responsible for all such projects, also for those where they are not actually involved. To improve the possibility to perform clinical research in the future, the unit strives towards a communication with the ALF committee, to open up for those senior teachers and professors that are formally employed by the Science Faculty, but who are actively involved in clinical research, to also become eligible for application of grants from ALF.

## Academic networks and collaborations outside the unit

Each of the four subgroups forming Unit 9K has a large number of national and international collaborations. This includes for all groups common research projects, collaboration with medical companies, and actively serving many international scientific committees. In addition, the MR group has a shared post-doc position at Harvard medical School, an adjunct associate professor affiliation with John Hopkins Medical School and a visiting professor in Guangzhou. All major collaborations are listed in the unit's report.

Although the number of international collaborations is impressive, the extent is, with some exceptions, not stated and it is therefore not possible to evaluate the units' specific mechanism to enhance research quality. The local networking in the Lund/Malmö/Copenhagen area is however large and can strengthen translational research.

### Diversity, integrity and ethics

These issues seem not to be a problem for unit 9K. Guidelines and policies are followed. An introductory dealing with e.g. integrity and ethics is given to all new PhD students. The unit has a working group that "actively promotes discussion and policy reviews related to gender aspects, equality and equal opportunities". The gender distribution among the different research groups is regarded as "healthy". Two female professors were recently appointed at the department.

### Quality in applications and publications

Members that actively write research papers are encouraged to also act as reviewers. People with different expertise often take part in writing applications to broaden the competence. The unit acknowledges the potential conflicts between the needs for publication within a time limit and the desire to publish in a paper with high ranking. Usually the choice is to publish in a paper that best fits the specific topic. Regarding high-level grants, none have been received by the unit during the evaluation period. Medical radiation physics is a small subject for possible grants, and therefore subject (sic!) to high competition.

Most projects within the unit consist of multidisciplinary teams with the necessary expertise (medical physicists, biomedical engineers, radiologists, and clinical specialists). In addition, the research has a strong international component through collaborations, helping to focus on topics of current importance, thereby improving the quality of papers and grant applications. Several researchers at the unit are part of international committees that have led to more formal publications. *Training in scientific writing and in grant application is included as mandatory parts in the department's and/or the faculty's PhD education*.

#### To summarize:

- PhD students are given the opportunity to take responsibility for their own projects. (How this is done is, however, not described.) The fact that everyone must accept teaching may limit the flexibility to explore new research areas.
- The unit is not in favor of the faculty's focus on moving abroad for new post doctors. The underlying economy to take care of post doctors "in-house" is relatively good.

- The unit sees no inherent contradiction between renewal of research directions and engagement of PhD students. Major changes in research directions, affecting the entire strategic plan of a research group, seldom occur within the four-year-period of a PhD education.
- A possible future threat to the unit's research sustainability would be limitations in performing clinical research.
- The unit will initiate a communication with the ALF committee, to open up for those senior teachers and professors that are formally employed by the Science Faculty, and actively involved in clinical research, to also become eligible for application of grants from ALF.
- Each of the four subgroups forming Unit 9K has extensive national and international collaborations. The specific mechanisms to enhance research quality by this fact alone are not described in any detail.
  Diversity, integrity, and ethics seem not to be a problem for unit 9K.
- Members that actively write research papers are encouraged to also act as reviewers. People with different expertise often take part in writing papers and applications to broaden the competence. Strong international collaborations help to focus on topics of current importance, and thereby improves the quality of papers. Training in scientific writing is included as mandatory parts in the PhD education.

# **Quality ecosystem**

Research strengths and how these are reflected in the educational portfolio. How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research All MSc projects are directly involved with the current research in the unit. Most PhD students are trained

and educated medical physicists, which is an advantage in relation to the research focus and quality of the unit. The research collaboration with health care is essential for the quality and relevance of the research.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

This is described in the self-assessment. Compliance with GDPR, the Swedish Ethical Review Authority as well as decisions by local ethical committees is always strived for. Compliance with integrity requirements is ensured by a review of individual project by a local research board, research group policy documents, research and industrial agreements, relevant disclosures and disclaimers in connection with publications and dissertations, etc.

# What is the unit's stance towards external engagement and outreach?

The awareness is high within the unit of the high public demand for accessible and scientifically correct information about radiation and its risks and effects. The unit has in this respect had several contacts with media through the communications officers within Lund University in the form of published press releases. Radio, newspapers as well as magazines have been interested and published articles about the research performed by the unit.

# To summarize:

- The educational portfolio is directly reflected and is influenced by and supports the research in the unit. The research collaboration with health care is essential for the quality and relevance of the research.
- The unit has had several contacts with media regarding radiation and its effects. Radio, newspapers as well as magazines have been interested.
- Questions of integrity and ethics in relation to collaboration are well taken care of in the unit.

## **Transversal themes**

#### Management and leadership

The unit is satisfied with the support and help from the faculty and university, including basic support such as library, IT etc. Also, legal issues have been well supported. The unit has, however, demands for its senior lecturers, demands that are different from other units at the faculty of science. This is due to the educational needs for professional education of medical physicists, regulated by the Swedish Ministry of Health and leading to a certification to work as a clinical medical physicist ("legitimationsyrke"). It is e.g. regulated that this education shall be in Swedish, which is in conflict with the policy of the university for broad international recruitment. The unit would prefer to be able to include a comprehensive medical physics degree as a requirement in the recruitment of a new teacher, which is a long-term investment for the department. However, this has not always been accepted by the Science Faculty and this has become a potential problem.

### Infrastructures

The unit has good access to imaging infrastructure, both by its own initiatives and by access to medical imaging equipment at the hospital (SUS). Developing LU infrastructure has long been a task for members of the unit. As a result, Lund has the only 7T MR installation in Sweden, and many pre-clinical imaging installations. Development of biomedical applications at MAX-IV has mainly been driven by the unit, as well as more experimental imaging facilities. The hospital provides the major part of infrastructure for clinical research in imaging, including the two cyclotrons for production of radionuclides. The 7T MR facility and MAX-IV as well as the imaging equipment at the hospital is also mentioned as an asset in the report by unit 9G.

The access to infrastructure is a general issue between the needs of Lund University to perform medical research and the obligations of Skåne University Hospital in prioritizing health care. The unit would benefit from working together with parts of unit 9G to formulate a strategy for how to improve the possibilities for clinical research and the use of clinical equipment.

## The relationship with strong and broad research areas

The unit has not defined any specific research field related to this issue.

### To summarize:

- The unit is satisfied with the good support from the faculty and university but has not met full understanding about its special needs regarding recruitment of senior lecturers for the medical physics courses.
- Good access to infrastructure for research, both by own initiatives and by access to the hospital. A collaboration with unit 9G regarding clinical research and infrastructure is encouraged.
- No relationship to issues of "strong and broad research areas" is described.

#### Recommendations

### Recommended focus points for the UoA

# Issues that call for immediate action (0 – 2 years)

- Some groups see problems with recruitment of PhD students. The MR and NM groups see a lack of junior research and teaching positions (post docs and assistant senior lecturer). The recruitment of senior researchers may therefore be hampered in the future. A possible threat to the research work for the whole department is that key persons may leave due to attractive positions elsewhere. Unit 9K thereby shares the problems of keeping skilled researchers with unit 9G after their PhD exams.

Thus, the need for the Medical Faculty and the Science Faculty to establish an overarching strategy to recruit, develop and keep the best talents, is crucial.

- The special needs for the qualifications of the teachers in the medical physics program, and the limited personnel, limits the possibilities to expand the research profile of the unit. Therefore, the efforts of the unit to gain acceptance from the faculty on this question must continue. See also below.

# Issues that need to be addressed in the long term (5 – 10 years)

- A majority the research in the unit is oriented towards clinical applications. Research on clinical applications is performed in collaboration with clinically employed medical physicists and physicians. Long-term planning of research activities and possible extensions are not addressed and should be performed, along with the formulation of an overarching research strategy.
- Strategic decisions for the future are taken by the head of the department after consultations with the staff. The different group leaders are primarily responsible for the economy of the various projects. The strategies for future funding, and information about funding for all groups, however, need to be clarified.
- A possible future threat to the unit's research sustainability would be limitations in performing clinical research. Good access to infrastructure for research, both by own initiatives and by access to the hospital, is crucial for Unit 9K. One way of improving this possibility is to clarify and deepen the relation to unit 9G.

# Highlights from the self-assessment

- The research and doctoral education at Unit 9K is one of the obvious strengths of the unit.
- The unit is not in favor of the faculty's focus on moving abroad for new post doctors. The underlying economy to take care of post doctors "in-house" is relatively good.
- Each of the four subgroups forming Unit 9K has extensive national and international collaborations.
- Diversity, integrity, and ethics seem not to be a problem for unit 9K.
- The educational portfolio is directly reflected and is influenced by and supports the research in the unit. The research collaboration with health care is essential for the quality and relevance of the research.
- The unit has so far good access to infrastructure for research, both by own initiatives and by access to the hospital.
- Members that actively write research papers are encouraged to also act as reviewers. People with different expertise often take part in writing applications to broaden the competence.
- Strong international collaborations help to focus on topics of current importance, and thereby improves the quality of papers. Several researchers at the unit are part of international committees that have led to more formal publications.

# Issues that should be addressed and resolved at other levels of the University including the faculty level the central university management.

- The unit is satisfied with the good support from the faculty and university but has not met full understanding about its special needs regarding recruitment of senior lecturers for the medical physics courses. These needs are due to demands from eg. The Swedish Ministry of Health. This fact actually limits the possibilities to expand the research profile of the unit. The Faculty of Science should be more aware of this fact and give relevant support to the unit.

# Missing material

- No relationship to issues of "strong and broad research areas" is described in the selfassessment.
- Each of the four subgroups forming Unit 9K has extensive national and international collaborations. The specific mechanisms to enhance research quality by this fact alone are not described in any detail.



# 7. Faculty of Science (N)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 3	TOTAL NO UoAs: 16
SUBJECT PANEL NAME	UoA NAME
Geology, Physical Geography and Ecosystem Science	Biogeological Evolution
	Ecosystem Modelling and Climate Impacts
	Earth Observation-Geographical Information Science
	Lithospheric Science
	Quaternary Science
	Terrestrial, Aquatic, and Atmospheric Processes in the Climate System
Biology I	Molecular Biology
	Evolutionary Ecology 1
	Evolutionary Ecology 2
	Molecular Ecology and Evolution
	Functional Zoology 1
	Functional Zoology 2
Environmental Science and Biology II	Biodiversity and Ecosystem Services
	Soil Microbial Ecology
	Aquatic Ecology
	Systematics and Plant Ecology

# Foreword by the faculty leadership

The constitution of the panels for Science was decided in upon in collaboration with the faculties of Engineering and Medicine. Since there is substantial overlap between research at the three faculties, sharing of infrastructure and even common departments, it was deemed essential to coordinate the work. The organisational overlap between faculty of Medicine and the faculty of Science is minor, the division of Radiation Physics is a *de facto* department under the faculty of Science, but it is also part of a department at the faculty of Medicine. It was decided early in the process that this division should be handled by the faculty of Medicine.

The relationship between the faculties of Science and Engineering is more complex. There are no less than three departments that are shared between the faculties, and to construct the panels in a way that best reflects the structure of research, the borders between faculties were largely ignored in the process of constituting panels. From an organisational point of view this may have been confusing for the panellists, but our assessment was that it is better to make the science coherent at the expense of organisational clarity than *vice versa*. Thus, the department of chemistry (shared between Science and Engineering) was put into a single panel together with Chemical Engineering and Food Chemistry at the faculty of Engineering. Similarly, the department of Physics (shared between Science and Engineering) was in a single panel together with the department of Astronomy and Theoretical Physics at the faculty of Science and the shared department of Physical Geography and Ecosystem Science formed a single panel while the largest department at the faculty, Biology together with the Centre for Environmental and Climate research together formed two panels. The reasoning behind the division into Units of Assessment was largely dictated by the wishes of the departments. For the panel Geology and Physical Geography and Ecosystem Science the Units of Assessment were constructed based on scientific cohesion without recourse to the organisational divisions between and within the respective departments, while in the large panels of Physics and Chemistry, existing organisational divisions are recognizable in the structure of the Units of Assessment.

# External panel reports

# Geology, Physical Geography and Ecosystem Science

# Panel overview

The panel was allocated six Units of Assessment (UoA) that are split between the three departments and further divided on the basis of unifying research foci. The UoAs do not coincide with existing research management structures, vary in size in terms of personnel, funding, and research productivity, and can contain considerable overlap.

The Lithospheric Research (LiR) UoA consists of 11 members from the bedrock unit in the Geology department and though the focus is three-fold, its main goal is to understand the evolution of continents and the effects of bolide impact events through Earth history. The unit hosts analytical infrastructure that is used by researchers from other UoAs. The Bio-Geology (BiG) UoA consists of 18 members from both the bedrock- and quaternary sub-units of the Geology department, where the focus is on the study of the evolution of life, rocks, fossils or extant living organisms as tracers of climate- and environmental evolution over timescales from billions of years ago to the present. The Quaternary Science (Quat) UoA consists of 29 members from the quaternary subunit of the Geology department. The research focus of this group is diverse and covers glacial geology, palaeomagnetism, solar activity and its linkages to climate change, palaeoclimate and palaeoecology and hydrogeology.

The UoAs TAAP (Terrestrial, Atmospheric and Aquatic Processes – 67 members), EMCI (Ecosystem Modelling and Climate Impacts – 44 members) and EO-GIS (Earth Observation- GIScience – 36 members) are grouped under the Department of Physical Geography and Ecosystem Science and Centre for Environmental and Climate Research. EO aims to understand ecosystem patterns and processes at various spatio-temporal scales with optical instruments, while GIS focuses on spatial data modeling, analyses and infrastructure as well as interdisciplinary applications. EMCI focuses on ecosystem model development and applications at regional to global scales, including climate adaptation in agriculture and forestry, empirical research in terrestrial areas and soil biochemistry modelling. TAAP researchers study greenhouse gas exchange, reactive trace element gases, aquatic biogeochemistry in boreal environments and the effects of environmental change on terrestrial, aquatic and atmospheric processes. TAAP also improves process representations in ecosystem and climate models using data and insights from observations.

There is extensive research collaboration between members of different UoAs, both within and between the three departments. Research infrastructure is a strong motif and is used by scientists from all EECEE UoAs as well as researchers outside the panel.

# External panel report

# **Executive summary**

The units of Assessment (UoA) grouped under the area of Earth Evolution, Climate, Environment & Ecosystems (EECEE) represent a very broad collection of a wide range of research areas within Earth Science. Although the UoAs were defined specifically for the RQ20 exercise to be as comparable as possible, they still differ considerably in size and in their general research approach; whilst some have comparatively more industrial and societal relevance, others are more directed towards basic research. The fact that the UoAs not have functioned as distinctive administrative or strategic units (something which is stated in the self-evaluations) has been a major obstruction for developing constructive suggestions in this report and possibly it would have been more useful to have conducted this assessment exercise using the existing departmental structure.

In general, the main strengths of all the UoAs within the EECEE are that they: (1) conduct high quality research with a high degree of national and international collaboration that results in high-quality publications, (2) are successful in receiving external funding, and (3) have access to state-of-the-art research infrastructure.

Within the UoAs making up the EECEE there is generally a strong emphasis on 'bottom-up' processes and organisation (as is the case in most Swedish universities). This approach is both a strength and a challenge, as pointed out in the self-evaluations. It generally promotes a stimulating research environment with highly motivated individuals. The disadvantage is that this approach makes leadership and management more difficult, and doesn't promote longer-term strategizing.

Major weaknesses within this RQ20 exercise and the area of EECEE are: (1) The UoAs represent an artificial gathering of researchers which naturally lack overarching research goals, (2) the lack of a clear strategy to ensure that "education and research are to be intertwined" (as expressed in the LU strategic plan), and (3) an uneven distribution of teaching relative to research within the EECEE.

Recommendations are made for each UoA, but common themes include:

- Consider whether the UoAs within the EECEE can develop a synergistic research strategy to identify/ form an interdisciplinary group(s).
- Develop strategic and implementation plans aligned with the LU Strategic Plan within each UoA.
- Reduce administrative burdens on teaching and research faculty, perhaps through consolidation of some administrative tasks.
- Take steps to better integrate education and research at all levels.
- Devise support plans, with University partnership, for maintaining and upgrading UoA infrastructure.
- Assess hiring plans to enhance areas of excellence (depth vs. breadth), increase diversity, and flatten demographic curves.
- Improve incentives for collaborative efforts, both with LU and with national, international, and private sector partners, to leverage funds.
- The Science Faculty could work towards better implementation of fiscal policy changes to stabilize budgets, and could make promotion and tenure processes more transparent and uniform.

# 1. Introduction

The panel was allocated and has reviewed the following six Units of Assessment (UoA) within the area of Earth Evolution, Climate, Environment & Ecosystems (EECEE): (1) Lithospheric Research (LiR), (2) Bio-Geology (BiG), (3) Quaternary Science (QUAT), (4) Terrestrial, Atmospheric and Aquatic Processes (TAAP), (5) Ecosystem Modelling and Climate Impacts (EMCI), and (6) Earth Observation GIScience (EO-GIS). These are distributed across the Department of Geology, the Department of Physical Geography and Ecosystem Science and the Centre for Environmental and Climate Research. The UoAs do not coincide with existing research management structures; they vary in size in terms of personnel, funding, and research productivity, and contain considerable overlap. Consequently, with diverse UoA needs, it is difficult to entirely integrate our overall recommendations for the EECEE as a whole and we have not attempted to do so. Specific feedback for each UoA is provided under **section 6**.

The evaluation was carried out by Zoom meetings during May 4–7, 2020. It included a planning meeting with just the panel members on May 4<sup>th</sup>, followed by 3 days of meetings and interviews. During these days, the Panel was given the opportunity to interview a wide range of personnel including the heads of the three departments as well as representatives of the UoAs and faculty level representatives. Considering the difficult circumstances with arranging a complete change of the intended format of the RQ20 evaluation in a short interval of time, the evaluation panel feels that we were given as good conditions for our work as was possible. However, we regret missing the opportunity for an on-site meeting of the wider group of representatives for the UoAs, and most importantly we are sorry that we did not get to interview a wider group of representatives from the UoA environments including PhD-students and other researchers. This opportunity would have given the panel a more comprehensive picture of how the units function and also improved our work in completing the tasks for this report.

The zoom meetings, presentations and interviews with the head of departments, deans, and other representatives from the UoAs were as well-organized as could be expected, and the panel would like to express our appreciation for the informative, open and friendly way that the meetings took place.

# 2. Observations

#### Leadership

*Priority setting, including goals for external research funding* – The self-evaluations provided uneven/ non-uniform information on research leadership goals and strategies, which is clearly related to the very different ways that the UoAs are organized and their differences in size. Some of the UoAs (TAAP, EMCI and EO-GIS) refer to existing common strategy groups and documents, while others do not due to the fact that they do not represent administrative research units. As pointed out in the self-evaluations, the UoAs are in some cases artificial gatherings of researchers formed exclusively for the RQ20 evaluation, and therefore lack an overarching research strategy.

Some units (LiR, BiG, QUAT) note the need to have a more clearly formulated overarching research strategy - this would help to establish common research priorities, joint proposals and focus recruitment, thereby ensuring contemporary development of the department. The University/Science Faculty could assist in this respect by encouraging/financially supporting 'strategy days' once per annum at the department level. It is often the case that dedicated time for such considerations off-site provides a very constructive means to constructively deliberate on such matters.

In some groups (LiR, BiG, QUAT) the focus on obtaining research funds is directed towards submitting individual applications to the Swedish Research Council (VR). With a limited (or reduced) VR budget this is not a viable long-term strategy, but it is positive to note that these groups are seeking to broaden their resources by looking at funding alternatives (communes, industry, etc.).

*Recruitment, promotion and succession* – Some UoAs (TAAP, EMCI, EO-GIS) at the Department level have longer-term plans for recruitment of new researchers and permanent teaching staff, and there are existing plans for targeted recruitments in others (QUAT). The recruitment of early career researchers mostly depends on external funding as staff replacement associated with retirement is not guaranteed. The UoAs need to consider not only position replacement due to retirement, but also gender and age in order to promote a more balanced demographic. For example, it is not a good strategy to have mostly senior academic staff, because retirement over a short span of years results in a significant loss of knowledge. Better continuity is achieved when the age demographic is distributed. On the other hand, some UoAs also see the retirement of senior personnel as a risk factor, indicating the need for a long-term strategy in this respect.

Promotions (e.g. lecturers to professors) generally occur in discussion with heads of department following LU guidelines, but as in most Swedish universities the road to promotion is rather complicated. There is also the perception that interpretation of the regulations may vary between different faculty administrations. At the department level, staff receive annual reviews to discuss promotion possibilities, salaries and other personal development. We appreciate the University's and the Faculty's financial and administrative responsibilities, yet it is clear that a changing promotional landscape is both demoralizing and discouraging to staff members. All efforts should be made to simplify and standardize this process.

Positions such as researchers in most units are initially funded externally and then, depending on the economic conditions, may be transferred to the UoAs within a Department, e.g.- if there is enough money. This has both positive and negative consequences for the individual Departments (economic, total number of staff, teaching distribution, etc.).

In order to encourage applicants from under-represented groups, search committees may choose to actively seek and encourage applications from under-represented groups for permanent posts. In general, the percentage of female staff remains low throughout the EECEE. In some of the UoAs (LiR, QUAT) the plans for recruiting additional staff are on hold due to the current strained financial situation. Could the Faculty be more proactive in promoting the hire of under-represented groups with an explicit policy of financial support (e.g.- first year of salary to be supplemented by the Faculty) to those units that successfully recruit permanent hires from those groups? Some universities establish mechanisms including a non-voting "search advocate" from outside the hiring department, empowered to assist the search committee in following policies to make sure an appropriately diverse candidate pool is evaluated fairly.

*Publication patterns* – Most UoAs do not present a clear general strategy, but have a demonstrated record of publishing scientific papers in high-quality peer-reviewed journals. While striving for open-access publications, the costs are not always easy to cover.

While this exercise is about self-reflection, given the UoAs took the time to compile bibliometric data it could have been better utilised. In this case such data would need to be field-normalized for comparison across the UoAs, since publication cultures and citation patterns differ widely from the fields of research.

The balance between research, education and external engagement – This balance varies between the UoAs but in general academic staff teach approximately 20% or more of their full-time employment. Some groups (for example, LiR) have an unsustainably high level (40%) of teaching (including mentor-ship/BSc and MSc thesis supervision) which necessarily impacts research productivity. Such disparities between UoAs surely need to be assessed and equalized or compensated. The Faculty should consider investigating this as it is highly variable across UoAs and promotes teaching- versus research-bias, yet both are the proper mandate of the University.

The overarching research strategy – All the evaluated units refer to the need to have more internal processes and discussions concerning exploring existing and new potential sources of external funding, something which increases the need for intra-unit collaborations. As pointed out above, some of the UoAs concentrate on basic research, traditionally funded by individual grants and national funds (mainly VR). Although the units have had a considerable high rate of success in obtaining such funding, there is clearly a danger that this type of funding may decrease in the near future. Some UoAs have been quite successful funding equipment through for example The Crafoord Foundation.

The initiative to create internal and informal peer review for research funding applications and annual strategy meetings (QUAT, BiG) within the UoAs is positive and to be applauded.

# 3. Collegial culture

- *Opportunities for early-career researchers to develop their originality and independence* It is unfortunate that the panel did not get an opportunity to interview early-career researchers and PhD students. Thus, we can only base our observations on the information given in the self-evaluations.
- Sustainability and renewal of research strengths Due to constrained economic resources, sustainability and renewal of research strengths are mostly only possible via external funding (BiG). The lack of shorter- and longer-term staffing strategies for some units is a hindrance.
- *Academic networks and collaborations outside the unit* All the UoAs indicate that they have extensive national and international collaborations on all levels and this a positive attribute.
- *Diversity, integrity and ethics* The gender imbalance is a problem within the Faculty of Science at LU and elsewhere. In general, the female staff accounts for only c. 30% of total staff within the units, although there are slow upward trends. Again, the Faculty should have a role in promoting this.
- *Quality in applications and publications* A bottom-up process whereby research proposals are written at the initiative of individual researchers is prevalent across all the evaluated units. This is a positive but self-limiting mechanism to overall productivity. For specific calls, collaboration groups have been formed and a more general internal review system implemented.

# 4. Quality ecosystem

- *Research strengths and its reflection in the educational portfolio* The UoAs universally indicate that all teaching staff are involved in research to varying extents and consequently the link between research and teaching exists. This link works best in higher level Master courses. However, the available material from the self-evaluations clearly indicates that *undergraduate education and research are largely kept separate*. There seems to be the perception that research is more prioritized by the Faculty, creating a situation where units/academic staff who spend more time teaching may be adversely affected.
- *External research collaborations and the influence on research quality* All the units report research collaborations, but some have more direct industrial and societal relevance, while others are more directed towards basic research. To promote industry and/or societal relevance, the University/Faculty might establish incentive mechanisms to achieve this, such as fractional matching funds.
- Integrity and ethics, including potential conflicts of interest, in relation to collaboration These issues are
  handled in the introduction course for new staff and the PhD-program includes an obligatory course
  in research ethics. The units also refer to open and collegial contacts between staff and students, and
  like at other Swedish universities there are additional support functions provided at the faculty level.

- *The use and capitalization of available research infrastructure* LiR and BiG utilize National infrastructure (e.g. MAX IV), while INES is directly involved with ICOS, INTERACT and Sites. There are also strong modelling teams developing in-house models (LPJ-GUESS and ForSAFE) with international usage. These links are strong and constructive.
- Alignment with strategic research areas (SFOs) and other strong and broad research areas, and utilization of opportunities from such connections There are several active and positive alignments that include, for example: EMCI and TAAP are tightly aligned with the strategic research areas (SRAs) BECC and MERGE, that are coordinated from CEC. QUAT participates in MERGE and BECC.

# 5. General Recommendations

# Strengths:

- High quality research with a high degree of national and international collaboration.
- Good number of high-quality publications.
- Successful in attracting external funds.
- Access to state-of-the-art research infrastructure at university, national, and international levels.
- Wide field of research subjects.

# Weaknesses:

- Lack of clear strategy in ensuring that "education and research are to be intertwined".
- The UoAs represent artificial gathering of researchers (formed exclusively for the RQ20 evaluation), lacking an overarching research strategy.
- Lack of systematic follow-up on former students and their careers as alumni.
- Limited interaction with industry in many UoAs (LiR, BiG).

# The panel recommends the following actions:

- Decide if the UoAs are useful units and if so make them more visible and formulate overarching research strategy.
- Better definition of strategies, goals, and department-wide plans are needed.
- Better definition of strategy (also at the Science Faculty level) in ensuring that "education and research are to be intertwined" (as stated in the University Strategic Plan) make teaching count.
- More concrete plans for how the excellent UoA infrastructure will be maintained and/or expanded.
- Budget stability is essential for any organization to create and implement shorter- or longer-term strategic plans and this is especially true for the more critical budgets of the smaller UoAs. The Science Faculty could work towards better implementation of fiscal policy changes with this consideration in mind.

# 6. Specific recommendations and feedback to UoAs

# (1) Lithospheric Research (LiR)

The research performed by the LiR group is of a high international standard and leading in their fields. Productivity is high, external funding significant (c. 40%), and strategic infrastructure appropriate for the group. There is little more to be done to improve things *on the basis of individual researchers*.

# Specific recommendations:

<u>Critical mass.</u> It seems that LiR is too small, with just enough personnel to deliver the degree program and maintain individual research interests, but the high workload (teaching and administrative) for too few

students is untenable and unsustainable. Something has to give and longer-term viability and strategies need to be prioritized. Some thoughts to explore/discuss in relation to this:

- 1. Change the degree program. Consider creating/integrating new cross-disciplinary degree programs or more applied programs which incorporate teachers from other units in order to reduce LiR's teaching load.
- 2. Teach for other programs. Teaching in other programs and being compensated for it doesn't reduce the overall teaching load, but it may liberate funds for hiring in more strategic directions, e.g.-permanent researcher, technician, etc.
- 3. Request more salary in grant applications. This can be used to 'buy out' teaching and liberate funds to employ junior teaching/research staff.

With respect to no. 1 above, LiR might consider sharing a broad Geoscience degree with BiG and/or QUAT in which first year courses are common and specialization occurs in years 2 & 3. The motivation for this is two-fold: 1) To develop a curriculum that will attract wider numbers of students, and 2) to diversify and distribute the first year teaching load. In addition, the geological/historical perspective on climate change is an important means to evaluate modern process(es) and should be playing a part of any Climate research program. These types of linkages can attract a wider student pool and lead to increased numbers of students following the LiR subjects (students love microscopy and field work, so exposure to these in year one really attracts them to the programs).

<u>Additional Funding</u>. EU/EC funding requires knowledge of the current initiatives. EU funding is usually promoted in Sweden through VR, so knowledge of the VR committees, how they work, who sits on them is advantageous. For example, the EU EPOS initiative funds a 'geohazards' component. These 'big money' initiatives take a lot of time, but they also provide funds for additional personnel.

<u>Shorter-term strategy</u>. Geology is fundamental to Swedish resources and the group should be considering ways to capitalize further on this natural link to interdisciplinary initiatives and societal challenges. Specifically economic geology (mineral and infrastructure resources) or ore geology, both widely utilized in Sweden, would bring additional breadth and potential industry collaborations to the group, as well as allowing linkage to environmental remediation (sustainability). Furthermore, Engineering geology (landslides, coastal erosion, disaster mitigation, etc.) or Carbon storage might warrant a strategic joint appointment between LiR and another department.

# It would be appropriate for the faculty to make a strategic investment in any of the disciplines within LiR.

*Longer-term strategy.* There is strength in numbers the LiR unit might want to discuss the pros and cons of merging (with BiG and/or QUAT). Such a move might help to balance academic staff numbers, teaching loads, budgets, etc. As a voluntary exercise, it requires only time and an open mind. As gaps become apparent, for example by merging groups, opportunities to build strengths via new hires or new collaborations might be appropriate. In addition, it is important to evaluate group age demographics with a view to diversifying. It is important for continuity, keeping up-to-date with methods, etc., that you try to maintain a broad range of junior to senior academic staff.

# (2) Bio-Geology (BiG)

The specific recommendations concerning the BiG group are closely similar to those listed for the LiR group above, and in the first version of this report, they were treated together. However, in accordance with the comments and suggested corrections from the UoAs to the first version of this document, the recommendations concerning BiG are now listed separately below. As noted for the LiR group, research performed by the BiG group is maintained at a high international standard and the members are leaders in their fields. The scientific productivity continues to be high, and the group has been successful in receiving both external funding as well as an impressive number of distinguished awards, honours and recognitions. Moreover, the production of publications in high-profile journals (e.g. *Nature* and *Science*) is impressive. The available infrastructure within the group is appropriate for the work carried out. Thus, as noted for the LiR group, there is little more to be done to improve things *on the basis of individual researchers*. The BiG group is congratulated for their hard work and deserved successes.

# Specific recommendations:

<u>Critical mass.</u> Although BiG is larger than LiR, it is also a smaller group, with just enough personnel to deliver the degree program and maintain individual research interests, but the high workload (teaching and administrative) for too few students is, as noted in the document, both untenable and unsustainable. Like LiR, something has to give and longer-term viability and strategies need to be prioritized. Some thoughts (as suggested for LiR) to explore/discuss in relation to this:

- Change the degree program. Consider creating/integrating new cross-disciplinary degree programs or more applied programs which incorporate teachers from other units in order to reduce BiG's teaching load. The possibility of further collaboration with Biology as mentioned in the document would be a positive development
- Teach for other programs (like Biology). Teaching in other programs and being compensated for it doesn't reduce the overall teaching load, but it may liberate funds for hiring in more strategic directions, e.g.- permanent researcher, technician, etc.
- Request more salary in grant applications. This can be used to 'buy out' teaching and liberate funds to employ junior teaching/research staff.

With respect to no. 1 above, BiG might consider sharing a broad Geoscience degree with LiR and/or QUAT in which first year courses are common and specialization occurs in years 2 & 3. The motivation for this is two-fold: 1) To develop a curriculum that will attract wider numbers of students, and 2) to diversify and distribute the first year teaching load. In addition, the geological/historical perspective on climate change is an important means to evaluate modern process(es) and should be playing a part of any Climate research program. These types of linkages can attract a wider student pool and lead to increased numbers of students following the BiG subjects. It would also be possible to include aspects of BiG subjects in the Biology curriculum.

<u>Additional Funding</u>. As noted by the BiG group, there are problems of securing long-term funding. Thus as suggested above for LiR, EU/EC funding should be explored. This requires knowledge of the current initiatives and as EU funding is usually promoted in Sweden through VR, and thus knowledge of the VR committees, how they work, who sits on them is advantageous. These 'big money' initiatives take a lot of time, but they also provide funds for additional personnel.

<u>Shorter-term strategy</u>. Geology is fundamental to Swedish resources and to the society at large. As was suggested above for LiR, the BiG group should be considering ways to capitalize further on this natural link to interdisciplinary initiatives and societal challenges.

As with LiR it would be appropriate for the faculty to make a strategic investment in any of the disciplines within BiG.

*Longer-term strategy.* There is strength in numbers and, as suggested above, the BiG group might want to discuss merging with LiR and/or QUAT. As noted by BiG there are also possibilities of further collaborations with Biology. Such moves might help to balance academic staff numbers, teaching loads, budgets, etc. As a voluntary exercise, it requires only time and an open mind. As gaps become apparent, for example by merging groups, opportunities to build strengths via new hires or new collaborations might be appropriate. In addition, it is important to evaluate group age demographics with a view to diversifying. It is important for continuity, keeping up-to-date with methods, etc., that you try to maintain a broad range of junior to senior academic staff.

### (3) Quaternary Science (QUAT)

The Quaternary Sciences sub-department within the Department of Geology is well known and respected internationally for its high quality research, and as a "brand" it has put Lund University in the top ranks of paleoclimate research centers for many years. Given this history, our assessment starts with the intent to "first, do no harm". Although a relatively small group, its research output is both broad and strong, often in top international journals, and well cited internationally. QUAT supports key infrastructure, particularly related to geochronology, most notably the accelerator facility, but also optically-stimulated luminescence, paleomagnetism, and other related equipment. These assets are a key strength of the program, worthy of ongoing support for operations, maintenance, and as appropriate, upgrade or replacement.

The assessment identified some emerging threats to the program. First, as a relatively small group trying to cover a broad research spectrum on a fixed budget creates risk if retiring faculty cannot be replaced due to budgetary constraints. The small size also means administrative burdens for the faculty and are a distraction from important research and teaching missions.

The research infrastructure in the QUAT group, while primarily a strength, also presents a challenge in lean budget times. In particular, the accelerator facility is aging, and this technology is advancing such that competition is emerging for this research niche. As the University focusses funds on even larger infrastructure investments such as MAX-IV and ESS, it would be unfortunate if the essential mid-scale infrastructure and the research programs around it were to fall behind for lack of investment. The need for continued support for operation, maintenance and timely replacement of mid-scale infrastructure such as the accelerator deserves priority attention from the group and the University.

Although this exercise is about research excellence, low student numbers are an issue as this can create budget weaknesses. Low student numbers have become a distraction for the QUAT group, and for Geology in general. Linkages between student learning and the research experience are important even at the undergraduate level. Experiential learning is growing globally and the group might consider the inclusion of students in the excitement of research-based discovery about the Earth as a marketing opportunity.

The QUAT group is involved in the various interdisciplinary programs at Lund, but this wasn't detailed and we were left unsure of the role of paleoenvironmental studies in these cross-departmental initiatives. It is worth considering whether the QUAT group might play a larger and more visible role in the environmental side of interdisciplinary "Earth System Science" efforts, and through that visibility and inclusion of students in research, if this would create synergy and excitement of benefit to both research and education.

# Specific recommendations:

<u>Administrative burden</u>. It is not clear to us how much administration is done at the sub-department level, but it is worth exploring opportunities for consolidating some administrative functions to reduce the burden on the UoA.

<u>Staffing</u>. From a research perspective, creating clusters of strength in emerging topics, while covering breadth through external collaboration, may be more effective than a "one of each" hiring strategy.

<u>Infrastructure</u>. The University should work with the QUAT group to maintain and modernize its key infrastructure, most urgently the accelerator facility – mid-scale infrastructure is a great attractor of new faculty and an opportunity to expand key elements of strength in the program.

<u>Research funding</u>. The group is very successful at obtaining external research funding, in part because of its infrastructure assets. Building on these assets and further developing national, European, and global collaborations, there may be opportunities to expand sources of funding.

<u>Interdisciplinary programs</u>. QUAT might consider a more visible role in some of the interdisciplinary programs related to Earth System Science and Environmental Sciences. This group holds the key to long-term temporal dynamics of the Earth on scales relevant to long-term prediction, and can play an essential and central role in such programs.

<u>Students and Education</u>. Research is key to the student experience at all levels. The inclusion of students in research could be explored as a marketing tool. Quaternary Science programs can uniquely teach systems-thinking, quantitative rigor of both observation and modeling, dynamics of complex natural systems, and fundamental underpinnings of managing a changing earth system. What could be more exciting for a student? What could be more important in a changing world? Marketing these assets, both to students at the University who might want to change their focus, and to potential future students, may be productive approaches. One would hope the incentive funds or technical support (such as videography) could be provided by University or Faculty level administrations for marketing support.

#### (4) Terrestrial, Atmospheric and Aquatic Processes (TAAP)

Although TAAP is an artificial unit of people coming from two existing departments/centers, it is carrying out internationally renowned science of high societal value and is already defining itself. The obvious integration challenges have been recognized by TAAP and there are signs that it will start to address these vital issues in near future. Thus, it would be useful to have a strategic plan for this.

There are characteristics which make this medium-sized unit quite unique. Especially satisfying is the integration of observational research with modelling, which carries great potential for scientific break-throughs. This is especially true because TAAP is tightly connected with several world class research and modelling infrastructures and has excellent access to key research infrastructures in its own field, e.g.-ICOS. This asset should be more vigorously used in research collaboration with for example Physics and Biology departments, thus *widening* biogeochemical approaches of TAAP. To achieve this, the aquatic sciences in TAAP should be strengthened as they are underdeveloped and rely on a limited number of staff. The idea of adding (eco)hydrology to the research palette is welcomed since it can also be used as a way to connect the different parts of TAAP – terrestrial, atmospheric and aquatic system – more tightly together. Better integration inside TAAP and wider external collaboration are also tools to increase the annual number of publications, as well as secure steady flow of external research funding.

The flip side of the coin is that by putting so much emphasis and human as well financial resources on development of infrastructures – and models – the role of TAAP is at risk of changing from a research unit to a resource and support provider. TAAP recognizes this, but action is needed to ensure that TAAP scientists are fully credited for their efforts with these infrastructures, i.e.- this work should finally result

in measurable research outputs. World class infrastructures are expensive to build and run, which also carries considerable financial risk as securing funding can take quite a lot of time and human resources, which could have been used in alternative ways, e.g.- writing research applications. Thus, it is strongly advised to have a plan for situations where you face challenges in infrastructure funding.

TAAP has an operational system to address diversity, integrity and ethics, which is welcome. As a result, TAAP has a collegial working atmosphere and non-hierarchical environment, which is an asset when the unit aims to higher achievements in research. This should be nurtured since it creates synergy and helps for example when applying for research grants. It also ensures free flow of ideas and prevents formation of 'silos' and internal competition within TAAP. In a collegial atmosphere it is also easier to integrate the younger staff members into the group. The whole group can then benefit from the views of the second generation of scientists and for example make use of their skills in social media to gain more visibility. To enhance the sense of unity, always be truly open and frank when distributing the departmental 'base funding'.

A well-functioning academic research unit has good connections not only to doctoral training but also to undergraduate education, i.e.- the connection with research and teaching must be tightly linked. One of the teaching challenges for TAAP comes from large infrastructures which are not necessarily built keeping in mind this vital connection. This can be addressed by further integration of such infrastructures in teaching. This may require investments in experts in numerical sciences (such as Big Data and AI), which will also be beneficial for research. In research, as well as in teaching, focus on core TAAP know-how and integrate with the students' perspective: The environmentally-wise prospective students surely appreciate TAAP's research achievements, but besides following up the destruction of the ecosystems, they often have a real urge to save the world, i.e.- their own future. Perhaps links to sustainability issues can be used to attract the students? Without losing the core of TAAP, the same may be said when planning new collaborations and research.

## Specific recommendations:

<u>Collegial atmosphere</u>. Ensure the trust based collegial working atmosphere, since that is an important stepping stone to future success.

<u>Infrastructure exploitation</u>. Plan how to fully exploit the resource intensive research infrastructures in your research, research collaboration and teaching.

<u>Aquatic sciences strategic planning</u>. Strengthen the role of aquatic sciences in your unit and seriously consider adding eco-hydrology in research topics.

*<u>Financial strategic planning</u>*. Plan for possible financial challenges due to the nature of large infrastructures.

*<u>Finances.</u>* Aim for larger integrative research grants, while simultaneously ensuring departmental 'base funding'.

<u>Attracting students.</u> Find a suitable twist e.g. towards sustainability issues to attract more students in all levels.

#### (5) Ecosystem Modelling and Climate Impacts (EMCI)

EMCI was recently formed as an RQ20-unit of assessment and the self-evaluation is very similar to TAAP (partly the same text). The formation of these UoAs thus seems artificial and implementation of the recommendations of the panel would likely have been easier with stronger links between actual management units.

EMCI is a very strong interdisciplinary unit with a research profile meeting high international standards. The publication pattern is stable and of high quality (including top-journals such as *Science* and *Nature*), and with a good number of publications per researcher annually. The research carried out is also of high societal relevance and members of the group have participated in key international assessment reports (IPCC and Arctic bodies) in which model results have been used. The members of EMCI have been very successful at attracting external funding (including an ERC grant), with strong links also to national and regional agencies. EMCI has also close collaboration with IVL and SMHI on model developments.

Research within EMCI is critically dependent on modelling infrastructures, based on the in-house models LPJ-GUESS and ForSAFE. Model development is also carried out as part of large international networks, including work under the strategic research areas (SRAs) MERGE and BECC. EMCI has strong connections to research infrastructures, including the INTERACT, ICOS and Sites infrastructure projects. Data from these infrastructures are used in model developments and applications. EMCI is also tightly aligned with BECC and MERGE. There seems to be good systems for maintaining research integrity and freedom to do basic research.

## Specific recommendations:

*Financial strategy.* Secure institutional funding for in-house model (LPJ-GUESS and ForSAFE) developments and infrastructure maintenance. These critical components depend to a large extent on external (mainly short-term) funding. Collaboration with TAAP and the SRAs is critical and should be maintained (see also below).

<u>Staffing</u>. Recruit senior staff to compensate for retirements and to enhance possibilities for international (EU) research funding. More international funding and involvement in larger projects would decrease risks regarding financial management and stability of the Unit. With respect to smaller applications/ projects, mentor younger researchers regarding project applications and project management.

<u>Integration.</u> Increase connections between empirical research, infrastructure developments, and model developments/applications. This seems to be an underutilized resource (likely dependent on staff resources?). In this context, discuss enhanced strategic cooperation and coordination with SRAs BECC and MERGE, since cooperation seems to be of a very integrated nature. There has been a great expansion of research activities within EMCI recently, so better integration/coordination might open new opportunities, enhance efficiency and decrease financial risks.

<u>Attracting students.</u> The Faculty can help to increase "marketing" activities and attract sufficient numbers of new national and foreign students to the programs. This is a common issue for all the UoAs.

#### 6. Earth Observation - GISciences (EO-GIS)

EO-GIS is not a formal unit, but of the units assessed by our panel it may be the most coherent one. The use of Geographic Information Systems (GIS) and remote sensing (EO) at INES of LU has been in the forefront in the methodological development and applications in Northern Europe since the 1990s. GIS and EO of LU is well known in Europe, and EO especially is unique in Sweden for its focus on ecosystem science. It has collaboration with environmental physics and ecosystem science in Sweden and abroad.

The unit is carrying out world-class research and is also advancing to new fields of science, e.g. use of GIS in epidemiology, hydrology and social sciences. Unit has received external grants, has large base funding, and access to infrastructure and research programmes. Their success has no limits, especially if the unit can use the various SRAs (BECC and MERGE) and centres of LU more efficiently, as well as cooperate with companies and agencies and increase visibility via media and social media. In addition, as a part of ICOS and FLUXNET it has remote sensing cooperation with other units and disciplines, including internationally.

The unit is part of AGILE (organized AGILE conference in 2018), but could also take part in EAR-SeL, which is an equivalent organisation for remote sensing in Europe. The unit is also coordinator for SITES infrastructure in Sweden and part of Geoforum. There is no equivalent benchmark department among Swedish universities, with the closest ones in Scandinavia at the University of Helsinki within the Department of Geosciences and Geography and INAR.

The unit EO-GIS consists mainly of two different but overlapping groups, which are EO and GIS. The EO-GIS unit has expanded during the last 5 years due to successful applications for external funding, and due to more cooperation within LU and externally. In addition to two groups, the unit also involves LU Centre for Geographical Information Systems, which facilitates use and teaching of GIS within the whole of LU. Many EO-GIS staff members collaborate a lot with other units, e.g. with TAAP and EMCI, especially within remote sensing.

The unit has published 22-31 (2015-2018) papers annually and although some journals are world class (Nature, PNAS and RSE), most publications have not received much attention because there is a tendency to publish in lower ranking journals (especially in GIS). Papers are likely to receive more citations if published in higher IF-journals and the group should aim to do this. Unfortunately even the best GIS journals may have low IF and to reach the right audience it is necessary to focus on these; on the other hand new readers may be reached focusing on non-GIS journals. This coin has two sides.

There are several reasons for low output even though the group has expanded. First, because INES/ EO-GIS supports teaching across all departments at LU, the teaching load for some staff is very high and prioritised over research (despite the low numbers of BSc and MSc students) and this an integral part of departmental finances. Secondly, the teaching load for remote sensing and GIS is typically high as the discipline is responsible for providing this education to geographers and other departments across LU, and also through the LU Centre for GIS. Thirdly, a lack of support staff means that the time spent on administration and maintenance of the equipment reduces research time. These are more or less universal for remote sensing and GIS everywhere.

# Specific recommendations:

# Shorter-term

<u>Research.</u> The unit needs to find a better balance between teaching and research, with equal time for research to maintain longer-term funding, productivity and IF.

<u>Teaching</u>. The unit should consider reducing the amount of teaching, especially if most students are outside physical geography, due to the low numbers of BSc and MSc students.

<u>Publications</u>. The unit should publish more and in general aim for higher ranking journals, especially in GIS. Perhaps applied GIS papers should be submitted to other journals in other disciplines than GIS, with higher IF and more citations, and also to attract the use of GIS by other disciplines

*Education.* Continue delivering PhD courses, participating in the Erasmus cooperation, and provide more EO-GIS courses to BECC and MERGE.

# Longer-term

<u>Staffing</u>. A strategic plan is needed for recruitment to replace retirees, for example joint professorships among various departments or governmental institutes, like SMHI.

*<u>Funding proposals.</u>* The unit or INES should have a research coordinator to help with technical parts of funding proposals.

Attracting students. A feasible plan should be made to attract more BSc and MSc students.

# Biology I

# Panel overview

Panel Biology (B1) with the following Units of Assessment (UoA): Molecular Biology (B1.1)
Evolutionary Ecology 1 (B1.2)
Evolutionary Ecology 2 (B1.3)
Molecular Ecology and Evolution (B1.4)
Functional Zoology 1 (B1.5)
Functional Zoology 2 (B1.6)

The Department of Biology is a large department with (2019) 38 professors, 23 senior lecturers and 3 associate senior lecturers, 65 PhD students, as well as 17 post-docs and 62 researchers (of which about 1/3 have own grants covering their salaries, while the others are "senior post-docs"), and 39 technical staff. Thus it was divided into two panels for RQ20, where the second also includes biologically oriented research at the CEC. Panel B1 includes about 60 % of the research active personnel at the Department of Biology.

The department was formed 2010 by merging the former Department of Ecology and Department of Cell and Organism Biology, the Department for Biology Education, the small Marine Biology satellite in Helsingborg, and the Biological Museum. In this way the undergraduate teaching became an integrated part of the department. The department board meets 7-8 times per year to make strategic decisions including recruitment of faculty, to decide about and follow up on the budget. After internal discussion and following suggestions from external advisors, the department was, 2011, structured into six units, each with a unit head, while the museum formed an organization within the department but with a separate budget. The head of department has informal meetings with the deputy head of department, the unit heads and the director of the museum every second week to discuss issues of general interest, including allocation of technical personnel and the use of premises.

The six department units are:

- Molecular Biology (this panel, UoA Molecular Biology B1.1)
- Evolutionary Ecology (this panel, two UoA Evolutionary Ecology B1.2 and B1.3)

Molecular Ecology, Microbial Ecology och Evolutionary Genetics – MEMEG (divided between this panel, UoA B1.4 and panel Environmental Sciences and Biology, UoA B2.2 Soil Microbial Ecology) Functional Zoology (this panel, two UoA B1.5 and B1.6)

- Biodiversity (panel Environmental Sciences and Biology, two UoA B2:1 Biodiversity and ecosystem services and B2:4 Systematics and Plant Ecology)
- Aquatic Ecology (panel Environmental Sciences and Biology, B2, UoA B2.3)

The six department units were formed primarily for administrative reasons when the Biology department was organized and structured after the merger. The organizing principle was *"bottom up"*; more or less well-defined research groups/environments (as well as individuals not really belonging to any research group) were lumped into "units" to make administration manageable and to strengthen subcritical environments. The aim was also to open up for stronger interactions between research environments within the entire department, to optimize distribution of teaching obligations, to promote joint programs for undergraduate and postgraduate education and facilitate a more flexible use of resources. From this primarily administrative role follows that the units do not necessarily match research environments. This

is obvious from their mismatch with Units of Assessment. To further avoid creating barriers and to encourage collaboration and flexibility between the units, the administration is centralized and important economic decisions, including all teacher (lecturer and professor) salaries, are taken at the department level and funded by the department. The head of department discusses such strategic decisions with a central steering group, thus avoiding unwanted competition between the units for resources. All teaching and courses are centrally organized, with one Director of Undergraduate Studies (including bachelor and master level) and one Director of Postgraduate Studies. Courses and teaching obligations thus do not belong to a specific unit or research group but to the department.

The budget of the Department of Biology has, over the years 2015 to 2018, been between 250 and 300 million SEK, and consisted to 10-15% of the budget for bachelor and masters education, 40-45% direct faculty funding for research, and 40-50% external funding from national and international research grants. Since the Department of Biology started in 2010, external funding has risen from about 86 million SEK to over 120 million. While the budget for teaching has shrunk, the government funding for research has slightly increased. External funding has fluctuated but generally increased.

External funding is handled by research group leaders in each unit. However, although externally financed staff is listed at unit level, decisions regarding employment are taken at the department level. This only excludes PhD students. The total sum of faculty funding allocated for PhD student salaries is decided by the department, but decisions about allocation of this money are taken at the unit level. As a rule, newly employed professors, lecturers and junior lecturers get some start-up faculty funding of PhD positions.

The department has established central routines for recruitment of teachers and for departmental infrastructure. Departmental decisions regarding teacher recruitments have in most cases been based on a thorough internal or external review of the research environment in a particular field. This review process analyzing strategically important aspects such as international standing, publication records, funding, relationships to teaching and future developments, forms a solid basis for discussions and final decisions on the department level.

The Department of Biology is housed in two neighbouring buildings, the Ecology Building and the Biology Building. The Department accommodates two externally funded infrastructures:

LP3, a university- and faculty-supported infrastructure for protein production and crystallization, and a node of NBIS/WABI, the national bioinformatics infrastructure. The Ecology building also houses CEC (the Centre for Climate and Environmental Research). The Biology Library serves nboth research and teaching at the department and CEC.

Major infrastructures at the department include the Biological Museum, animal facilities, greenhouses, the Stensoffa field station, microscopy and 3D imaging facilities, a sequencing facility, an electronics lab, a lab for instrumental chemistry, and a wind tunnel for animals flight studies.

While the Biological Museum has its own fixed budget directly from the faculty, the other departmental infrastructures are handled at departmental level by a specific internal infrastructure committee, which also advices, discusses and prioritizes individual research groups' and researchers' applications to the infrastructure funding from the faculty. Financial support for infrastructures from the department varies in proportion to internal and external users as well as strategic and general relevance for the department. Infrastructures are partly financed by user fees.

Because CEC was formed as a faculty research center, which initially did not employ scientific staff, several staff members including the head of CEC are formally employed by the Department of Biology. CEC does now employ scientific staff, but is still located in the Ecology Building. While CEC and the Department of Biology are independent and separate units, the co-localization provides strong synergies for both, with a high degree of collaborations and shared facilities, not least for different educational programs.

# External panel report

# Executive summary

All members of the panel were struck by the exceptionally positive attitude towards the Department of Biology expressed by virtually all members of the UoAs that we interviewed. This appears to be a department with few conflicts and with a collegial and social culture that is working exceptionally well.

A main worry expressed by most UoAs is that there are a significant number of retirements coming up in just a few years and it was unclear to many, including the panel, how the department planned to proceed with the hiring of new faculty, and how priorities would be made. Clearly several groups or UoAs are exceptionally successful scientifically, being world leaders in their fields, and their success and attractiveness could rapidly decline if there is a loss of momentum within the groups before the hiring process ensues. "Hire before retire" is strongly recommended. Providing clarity about the hiring process, including its timing, is also important for the senior postdocs and researchers who do not have permanent positions. We recommend that hiring new faculty should primarily be done on the basis of scientific merit and not to fill gaps in the teaching portfolio – after all, most of the faculty teaches less than required, and the capacity to fill teaching requirements already resides within the department. The strategy to fill positions to cover teaching is likely to produce singletons - i.e. small and isolated research groups lacking a critical mass – and may compromise scientific quality. Recruitment based on scientific merits should be able to fill most gaps if the teachers are prepared to step a bit outside their own field of research. It is also important that effort is placed into improving the diversity of members holding faculty positions, both in terms of hiring, as well retaining e.g. current female members.

In general the teaching load appears to be moderate and well distributed, although one UoA (B1.1 Molecular Biology) indicated that their teaching load was too high. Since the panel was not given any quantitative data on teaching, it is not possible for us to give any firm recommendations here.

The gender balance is poor in most of the UoAs, especially at the professor level. The university and department need to ensure that strong female professors already at the department are retained, and ensure that the department and university are attractive for additional female professor recruits in the future. This includes ensuring that current female faculty are not over-burdened with committee and panel work due to a lack of potential female representatives on such committees.

Please note that some of the recommendations we give for the UoAs also have general implications for the department and the university.

# Introduction

Our panel consisted of six members:

Göran Nilsson (University of Oslo) Chair Bart Kempenaers (Max Planck Institute for Ornithology) Juha Merilä (University of Helsinki) Craig Primmer (University of Helsinki) Heather Wallace (University of Aberdeen) Robbie Waugh (University of Dundee)

Each member familiarised themselves with all the material, but we divided up the responsibility for writing the first drafts for the UoA assessments as follows: B1.1 Wallace, B1.2 Kempenaers, B1.3 Primmer, B1.4 Waugh, B1.5 Nilsson, and B1.6 Merilä. We have all had a chance to give input on all the assessments, starting from the discussions we had after each Zoom interview. We also had meetings before the interviews to discuss our approach to ensure consistency and agreed on some questions that would be asked of every UoA.

For the next RQ assessment round, it would be advisable to have an independent, field-normalized and bench-marked citation analysis for each of the PIs in the UoAs, as well as information on obtained grants. This would better allow the panel to evaluate the strengths and weaknesses in the research environment of the UoAs. UoA level statistics are informative but conceal much of the detail necessary to develop informed opinions. We also felt that information regarding the teaching load and course structure would have been useful, particularly since it relates to the hiring of new faculty - the main immediate challenge for the Department of Biology. We found that the UoAs were generally a bit small, and some of the UoAs were only a part of an actual unit, which made it difficult to assess the entire environment.

# Observations and recommendations

#### Unit of Assessment 1: Molecular Biology (B1.1)

The Molecular Cell Biology UoA (MCBU) as reflected in the self-assessment document consists of approximately 60 persons with 12 PIs. There are four Professors and eight Associate Professors of which 2 are female. The Panel spoke to Mats Hansson, Fredric Carlsson and Olivier van Aken. The UoA has grown by approximately 60% since 2014 with a marked increase in 2016-17. The increase has included affiliated units such as Lund Protein Production Platform (LP3) and NBIS. The research focus of the UoA is to understand, in mechanistic terms, the functions of cells, genes and proteins at the molecular level. The main research groupings are: Microbiology (Carlsson, Flardh and Wachenfeldt), Plant Biology (Hansson, Rasmussen and van Aken), Bioinformatics (Ahren and Elhaik), Genetics and Molecular Biology (Cohn, Knecht, Sall).

These research areas are quite diverse and it may be difficult to develop meaningful collaborations. However, the UoA shares equipment, technical staff, methodologies and infrastructure. They aim to generate new knowledge and educate students in molecular biology. All PIs are involved in teaching (15 – 40 %) at UG and PG level.

#### Observations

#### Leadership

The UoA is active in securing grant funding and the majority of the PIs are publishing regularly. It appears that the UoA now has more direction with new teams establishing themselves within the UoA. There was a difficult time in 2014-2016 when two staff members died and one retired. The UoA is recovering from this low period and there is a new energy apparent with staff exhibiting a positive attitude and greater engagement. The staff are happy as members of this unit.

The research groups have traditionally been headed by individual PIs working in their own research areas and so there was little cross fertilisation. It now seems to be in the process of evolving with new groupings emerging. These groupings are small at present but engaged and active. The UoA publication record has two or three very good papers from collaborative projects but otherwise the publication record is patchy with some staff (4/12) publishing regularly (> 9 publications in the 5 years) but a significant number (5/12) have 1 or less publication over this time. The list of publications provided also includes some active emeritus staff which may not continue.

The grant/external funding position is not clear. The report indicates that 75% of PIs have major grants but the time lines of the funding and the amounts are not clear. The number of PhD students is relatively low for in a research-intensive UoA and there are no assistant professors (2014-18). There is no clear indication of the number and extent of interactions of the MCBU with industry. Clarification of this would be very useful for future planning.

There does not seem to be a support system in place for internal review of grant applications, fellowship applications and potential publications.

The staff demographic is biased to the upper age band with approximately 50% of staff likely to retire in the next 5-8 years. This has major implications for the future of the UoA in terms of funding and critical mass within the current research areas. A better gender balance should also be encouraged as at present only 16% of the PIs are women. The recruitment process seems to be at the departmental level and the input from individual groups specifying their needs is unclear. A strategy for recruitment is needed that considers both the research and teaching requirements of the UoA. Horizon scanning for the emerging research areas would be helpful in highlighting areas for strengthening or for new areas to develop. Recruitment of like for like is unlikely to lead growth of the UoA.

The UoA contributes to the teaching of biology at all levels. While teaching and research are both taking place, the integration of the two is not at all clear. While the percentage teaching loads do not seem high compared with other UoAs, there was a strong feeling from the UoA staff that the teaching was too much. While staff contributed to a number of courses distribution of teaching loads was unclear. In addition, the number of students taught at UG or PG level, the actual hours of teaching and time devoted to assessment were not clear or available. Due to the lack of details on this contribution and on the UoA structure, it was difficult to understand the exact position. MCBU must, however, develop new courses that better reflect the scientific strengths of the current PIs.

The UoA indicated a strong concern over the available data storage capacity and system back up facilities. This was a common thread across the discussions with several UoAs.

### **Collegial culture**

The MCBU is emerging from a difficult time and is evolving into 4 cognate groups. Considering the numbers in the UoA the development of these subgroups is likely to strengthen the research base. The academic staff meet regularly but it is not clear what arrangements are made for seminars and engagement with the post-doctoral researchers and PhD students.

There are a number of other units associated with MCBU. These include LP3 and NBIS but the nature of these links is not clear. They are also part of BECC and MERGE. The relationship between all these groups is unclear as is the distribution of the core staff and the reliance of MCBU on the other UoAs and *vice versa*. While there is collaboration with LP3 and NBIS, the interdependency is not clear. The opportunities and the threats to MCBU of these overarching structures is unclear.

#### Quality Ecosystem

The funding for PhD students is a relatively complex process and a limiting factor within the UoA. Career progression of junior researchers was raised as an issue with the need for Assistant Professors high-lighted. There was a suggestion that the bar for evaluation of assistant professors was set too low and that raising the bar would be beneficial to the whole department.

Collaborative research is highlighted as essential to increase scope and quality of the research. Care should be taken to grow this organically. Individuals should continue to be encouraged to submit their own grants too. There was emphasis placed on the interdependency of teaching and research.

It would appear that MCBU is ideally placed for collaborations with industry, however, these links were not highlighted or apparently encouraged.

#### Recommendations

*Immediate attention.* Support system: There does not seem to be a support system in place for review of grant applications, fellowship applications and potential publications. Introducing a review system is strongly recommended. Organisation: Clear organograms are recommended to understand fully how this UoA functions. This should include the grant funding, PhD students, papers/publications and teaching linked to each PI. This would highlight the areas where there is excellence but also deficiencies. With a clear picture, the UoA can plan strategically for the future. Teaching: An audit of the teaching commitments across the UoA and the department would be useful to ensure fair distribution of the teaching load. A simple system to allow refreshing or realigning of existing courses is recommended.

*Long-term attention*. <u>Recruitment</u>: A strategic review of each research area is recommended together with horizon scanning for potential new themes. A phased and planned recruitment drive over the next 5 years is recommended. Ideally, there should be some overlap between new PIs and the retiring staff to ensure continuity. <u>Collaborations</u>: The interdependency of facilities such as LP3 and NBIS on the MCBU need to be clarified. An organogram would be very helpful showing all the links and dependencies is recommended to ensure that all can operate independently.

# Unit of Assessment 2: Evolutionary Ecology 1 (B1.2)

The UoA consists of nine PIs, of which six have permanent positions (four full and two associate professors), 4-7 postdocs and up to 11 PhD students. Of the two female PIs, one has a permanent position. We spoke with two staff members: Susanne Åkesson and Jan-Åke Nilsson (head of the section). Overall the group has an excellent scientific output. The majority of the UoA appears satisfied with their working situation and they are positive about the organization and functioning of the department. They highlighted continued funding, level of funding, declining numbers of PhD students, opportunities for younger scientists and teaching portfolio as their main concerns. The average teaching load of the PIs is low (20%, range: 10-35%).

### Observations

#### Leadership

This is a superbly functioning, internationally highly visible group that consists of several PIs that are clearly world-leaders in their field. The UoA has a somewhat diverse research portfolio, but still forms a well-defined UoA in that all the research groups use birds as their model system. The UoA's research topics are closely linked and nicely complementary to those of Evolutionary Ecology 2, but also to Molecular Ecology and Evolution. It is noticeable that during the period of evaluation, there were joint publications with five out of six PIs from MEEL, versus none with Evolutionary Ecology 2. Overall, the UoA has an excellent publication record, in terms of quality, originality, quantity and impact in the field.

The UoA is concerned about the decline in the number of PhD students (currently less than one per PI). They see PhD education as an important part of their task, but argue that the decline is inevitable given reduced budgets and increased costs. The UoA is concerned about the lack of a functioning merit-based tenure-track system and is acutely aware of the importance of developing a strategy for recruitment to maintain strength in key research directions.

The UoA has been highly successful in obtaining external funding. Currently, all but one PI have external grants. Members of the UoA were the leading force behind a large-scale, long-term grant (CAn-Move, 10 years, now finished), involving many PIs from other UoAs within the department. During the interview, the UoA expressed concerns about the future funding situation. In particular, they feel that individual-based grants – which are essential to keep a leading edge in basic research – may become harder

to obtain and provide lower levels of funding. The UoA is actively seeking other funding opportunities. The UoA emphasized the good infrastructure grants from the University, which have allowed them to obtain cutting edge tools.

In common with other UoAs, this UoA works with a bottom-up philosophy, i.e. a system that promotes individual academic freedom and does best without strong, centralized leadership. Research ideas are developed by the individual PIs, but frequent interactions with other scientists within the section and beyond help motivate the development of original projects. During the interview, the UoA stated that their success was closely linked to a caring, warm, and open atmosphere and they emphasized that the majority of the staff loves to come to work. The UoA is attractive internationally for short- and long-term visitors. The success of the UoA is also visible in terms of the number of scientists they have produced that have obtained academic positions (many within the department).

The UoA contributes to teaching and to outreach activities, although few details are provided. A major concern is that the strong research areas of the UoA are not sufficiently represented in the teaching curriculum. During the interview, the panel learned that the teaching budget has decreased and that there is no good arena for discussing renewal of the curriculum. The panel felt that there was a strong motivation to design a new program, closely linked to research strengths.

#### Collegial culture

The UoA supports early-career researchers, but has little resources to offer, except the positive research environment and (limited) PhD funding prioritizing junior scientists. The UoA emphasizes that decisions about tenure-track and recruitment are taken at a higher level. In the interview, it became clear that the Evolutionary Ecology section – to which this UoA belongs – fosters a culture of intense discussion about the future of the UoA, including recruitments. The UoA feels heard in the department, with well-functioning communication between the section head and the head of department. In the written report, the UoA mentioned negative effects of strong competition and the uncertainties about the future for young scientists.

Sustainability of research strengths is potentially threatened by (a) the strong dependence on external grants, and (b) uncertainty about future recruitment. Nevertheless, the UoA is optimistic that these issues will be dealt with and they see no critical problems for the near future. They consider the size of the UoA as optimal and they are looking forward to discuss recruitment. They feel that there is some urgency here, given the large number of retirements in the coming years, and they also wish for a faster process at the Faculty level. Overall, the UoA is happy with the structure and functioning of the department. The UoA is involved in the CEC (through BECC) and sees their activities as complementary and very important for the scientific environment. In particular, the UoA feels that the CEC helps with the development of citizen-science projects and with securing grants for biodiversity and conservation-related research, thereby allowing the UoA to tap into additional resources. The UoA highlights the importance of the CEC being in the same building.

The UoA emphasizes the high diversity of their research – which they consider a strength –and the importance of their excellent and diverse research infrastructure. The implementation of user fees to cover part of the infrastructural costs is considered a good way to judge the importance of specific infrastructure for the department as a whole. In general, the willingness to stay flexible and to invest in new infrastructure is seen as an important prerequisite for scientific achievements. Nevertheless, one key resource is the technical lab, including people that develop new technology and software, and maintaining and perhaps extending support for this lab seems essential. The problem of a limited number of supporting technical personnel seems common to all UoAs.

The UoA highlights the increased workload regarding applications for ethical permits, but is aware of their responsibility to society to explain their research and to deal with ethical issues.

#### Quality ecosystem

The UoA produces fundamental science of the highest quality and the research environment is strong and highly recognized internationally, also through collaborations and through the organization of seminars and workshops. The members of the UoA have an extensive national and international academic network and the UoA considers itself highly attractive for guest researchers at different levels. The evolutionary ecology part of the UoA's research is well represented in the teaching portfolio, but not their more mechanistic research foci. Overall, the UoA has the potential to make further ground-breaking discoveries.

## Recommendations

*Immediate attention.* Given retirement(s) in the near future, there is an urgency to develop a strategy for recruitment to ensure keeping the UoA functional and attractive. The panel considers it essential that hiring is aimed at strengthening of the research portfolio of the UoA, while also providing opportunities for merit-based tenure track of junior scientists and promoting gender balance. Hiring should not be related to teaching needs (see below). The UoA would benefit from a "hire-before-retire" approach. Discussions about what discipline to hire in should be focused on complementary strengths and on supporting cooperation. Bringing together a group of top scientists that work in a highly collegial manner is key to the UoA's success. During our meeting, the UoA suggested that too close research interests could lead to unhealthy competition.

In their mission and vision statement, the University highlights that research and teaching should be intertwined. In this context, the panel sees an urgent need for involving the UoA in department-wide strategic discussions to modernize the teaching. The department can tap into the existing enthusiasm of the faculty to renew the teaching curriculum (e.g. new Master's programme in movement ecology) through a bottom-up process. This will also help the UoA to recruit the best students and train them early on in skills relevant to the UoA's research.

Given the high quality and originality of the research made possible by the technical lab, which was financed through a large-scale, long-term grant, the university should consider possibilities to ensure the continuation of this key infrastructure.

*Long-term attention.* The research environment would benefit from a department or university-wide strategy regarding hiring PhD students and developing a functional and attractive tenure-track system for junior scientists. If the university considers PhD education as important, it should set appropriate incentives to hire PhD students. The current system favours hiring post-docs instead.

The University could help by lobbying to secure and enhance opportunities for their staff to apply for and obtain individual-based grants. The trend to reduce funding of the Research Councils is a potential threat to the UoA and to the department as a whole.

The University would do well to help in all possible ways to reduce administrative hurdles and time needed to invest in administration. The problem of increased administrative burden is by no means unique to Lund, nor to Sweden, nor to science, but seems to permeate all of society. Helping scientists to focus on research and teaching should be the top priority for any university. It will lead to the least waste of tax-payers' money because scientists can produce higher-quality research and teaching and because it reduces the risk of burn-out or demotivation.

# Unit of Assessment 3: Evolutionary Ecology 2 (B1.3)

The UoA describes itself as conducting theory-driven science at the forefront of ecology and evolutionary biology, with a strong track record in publishing in leading journals of these fields and having high funding success. The UoA consists of six PIs, of which four have permanent positions (three full professors, one associate professor plus two 'soft money' PIs), 16 postdocs and six PhD students. This includes one female PI (associate prof level). In our discussion, the UoA was represented by two PIs: Prof Tobias Uller and Associate prof. Jessica Abbott. Overall the group has very good scientific output, averaging 30 papers per year (5 per PI). Their papers are cited around 400 citations per year (67 per PI), with 15-20% of these papers being in the top 10 citation percentile of their field. The UoA is generally satisfied with their working environment, and note that their UoA, and the department as a whole, is a very inspirational place to work. Their main concerns relate to the lack of a clear identity for their evolution-focused research profile as well as a mismatch between their research expertise and teaching programmes in the department.

## Observations

### Leadership

The UoA's self-evaluation noted that most strategic decisions take place at a different level than this UoA, and thus they focused their comments on issues they feel they can influence. The UoA emphasized that their main interactions in the department do not necessarily relate to this UoA, nor even the whole evolutionary ecology section. Indeed, collaborative publications between PIs in the evolutionary ecology UoA seem to be rare, but several PIs have collaborations with other researchers more broadly in the department and associated UoAs. The UoA emphasized that each PI has the freedom to determine their own research strategies, priorities and goals but that this has not excluded joint efforts and visions. From this UoA's perspective, a more coherent platform for evolution-focused research would enhance departmental (and further afield in the university) collaboration opportunities.

In terms of publication patterns, the group has very good scientific output, averaging 30 papers per year. Their papers are cited around 400 times per year, with 15-20% of these papers being in the top 10% of papers in their field. There is somewhat uneven contribution to this output from the PIs however.

As was mentioned by many of the UoAs, also UoA3 noted that there is no clear strategy for recruitment, nor a clear plan for succession. This particular UoA recognized their well-balanced age demography as a strength and thus did not note any urgent issues due to retirements (unlike other UoAs in the department). In common with the majority of UoAs, they recognized the low number of female PIs as a weakness. Discussions regarding how earlier recruitment has functioned revealed that one of the most effective informal processes has been to encourage young researchers to apply for high-level individual funding (ERC starting grant, Wallenberg Fellowships etc.) to move (back) to Lund and from there, they have sometimes been successful in obtaining ongoing positions. They noted their intentions of continuing this in the future.

The UoA excels in outreach, including involvement in the Fråga Lund television series. As noted above, they felt the value of their contribution to teaching could be increased if the teaching programs were more aligned with their over-arching research strengths (in particular, evolutionary biology) and have taken the initiative to try and address this.

### **Collegial culture**

The UoA notes that collaborator networks are generally established and maintained at the level of the individual researcher, but that this functions well in maintaining the high international reputation of the department, and *vice versa* as the department is a very inspiring place to work. This notion is reinforced by the observation that in many UoAs of the department, a number of faculty members are 'return migrants' whereby they have either studied, or been a PhD student or post doc in Lund and have then returned to Lund to take up an ongoing position after a varying length of time elsewhere. This strongly suggests very positive collegial culture, as it is a place people want to return to.

As noted above, the UoA has attempted to attract new, promising early-career researchers via informal means of encouraging promising people to apply for high-level individual based funding. They noted that these efforts could be improved if it was possible to promise an ongoing position at the conclusion of such funding.

Efforts for improving quality in applications and publications appear to be mostly informal e.g. a recent initiative for using internal peer review and coaching of applicants that are struggling to attract external funding.

#### Quality ecosystem

The UoA conducts primarily fundamental research of high quality and the research environment is strong and well recognized internationally. They did not note any ethical issues related to conflicts of interest due to collaboration, however some concerns were expressed due to the lack of a clear path for bullying and harassment complaints to be heard and dealt with in an anonymous manner.

The members of the UoA have an extensive national and international academic network and the UoA considers itself highly attractive for guest researchers at different levels. The UoA highlights an important mismatch between their core expertise (evolutionary biology) and the teaching programmes and propose the establishment of a new master's programme in evolutionary ecology to address this. They note that their research is strongly aligned with BECC.

#### Recommendations

*Immediate attention.* In their mission and vision statement, the University highlights that research and teaching should be intertwined. This currently does not hold for this UoA where evolutionary biology is a research strength, but does not have a clear path in teaching. In this context, the panel sees an urgent need for involving the UoA in department-wide strategic discussions to better align teaching and research.

The enthusiasm with which former Lund researchers look to return to their 'home' university (as has occurred in this UoA as well as others in the department) is somewhat of a double-edged sword. On the one hand, it sheds a very positive light on the Department's collegial culture, and generally these faculty members have been selected in strongly competitive calls and/or via obtaining highly competitive external funding, thus clearly demonstrating their scientific credentials. On the other hand, if such hires become too common, it may inhibit renewal and initiatives to establish strengths in new emerging fields and rather just 'maintain traditional strengths'. It is recommended that there is an open discussion about the pros and cons of these alternatives in the near future.

*Long-term attention.* One issue noted by this, as well as other UoAs, that appears to hinder more co-operation within the department is having different UoAs of the department separated in two different buildings: it was noted by several UoAs, including this one, that collaborations more easily arise with colleagues from the same building. This seems to be a particular barrier for collaboration between ecology and molecular biology researchers, which is a weakness potentially limiting further multidisciplinary research. There is no easy fix for this issue, but it is important to recognize, and keep in mind if reorganization of locations is ever being considered.

# Unit of Assessment 4: Molecular Ecology and Evolution - MEEL (B1.4)

The MEEL UoA comprises six Pl's, three Professors, three Associate Professors, and currently over twenty-five post-docs and PhD students. They have a mixed age profile – but only one female PI. We spoke with three staff: Staffan Bensch, Dennis Hasselquist & Helena Westerdahl. Overall the MEEL UoA has an excellent scientific output. They appear generally happy with the way things are currently going and were complementary of departmental organisation and administration. They enjoy coming to work and were enthusiastic about Lund University Department of Biology. Continued funding, level of funding, technical support, infrastructure maintenance, teaching portfolio and strategic recruitment (both replacement and expansion) were their primary concerns.

# Observations

## Leadership

MEEL consider themselves 'a flat organisation with generous leadership'. Within this structure the PI's operate as lone academic researchers responsible for their own priority setting and career development. There is no overall articulated "research strategy" for the UoA. However, it was clear from both the number and frequency of joint publications (and our discussions) that they are 'more of a team' than many of the other UoAs. While this was somewhat atypical, the assessors consider this a strength, with all appearing to benefit from the approach. These natural links could be exploited more in future funding and research activity.

The UoA overall were well funded over the reporting period (e.g. with ERC and Wallenberg funding), but there was concern that this level will be difficult to maintain. This will be compounded by the level of funding awarded in Research Council grants which they consider is now too low, impacting their ability to recruit PhD students while delivering on the objectives of the grant (could this be addressed with the funding councils at a collective University level?). Despite funding successes for at least one individual being 75%, there was a general concern that funding will be more difficult to obtain in future. This will likely require expanding their focus from blue skies to more applied research and extending their funding base.

The UoA has a mixed age profile with gender balance an issue with only one female PI. In principle, this age profile should buffer any immediate issues with succession, but for future planning, actively searching for top female talent should be encouraged. The recruitment strategy at faculty and departmental levels was questioned because of its historical links to the teaching curriculum as opposed to considering emerging research priorities and opportunities. For promotion, the lack of recognition for second supervisors in the track records of candidates to the panel seems unfair and out-dated.

The UoA identified scientific gaps that, if filled, would strengthen MEEL but were frustrated by the lack of a mechanism to actively recruit future PI's. A specific concern revolved around the short time-frame post PhD allowed to recruit competitive PI's at BUL level. Rapid turnover of staff with key skills and the automatic transfer of staff employed for more than two years to permanent contracts leading to protracted severance issues had negative implications for UoA finance. Transparent, quicker and more streamlined procedures for both recruitment and severance could be sought at higher levels. For succession, a 'hire before retire' recruitment strategy was widely favoured to maintain some level of continuity and early stage mentoring. A more innovative targeting of 'potential PIs', actively helping them win their own 5-year funding (e.g. an ERC starting grant) could, with appropriate support from the department, be an appropriate succession planning strategy. Expertise in more contemporary scientific disciplines was suggested/highlighted as an opportunity.

The UoA articulate a three-pronged publication strategy but the panel would anticipate that there is no decision made at any point about which path to follow – categorisation will simply emerge from the original scientific questions and where the funding came from. Regardless of the strategy, they have been very successful and should be congratulated, with a consistent flow of high-quality research outcomes over the reporting period.

Average teaching load is a modest 10-30% which, given the 1:5 ratio of contact-hours to preparation, allows research to be their major focus. The UoA recognise the value of research-based teaching and state that they regularly update content. PhD students get involved in teaching as part of their education program. Curiously, postdocs, despite their wider scientific experience and maturity, appear not to be

provided the same opportunities which could impact their immediate career prospects. For all research groups, teaching allows contact with an important, local pool of talent for future PhD/researcher posts. A modest increase in teaching load for some could easily be accommodated. External engagement activities appear to be on a 'when required' basis and organised by the departmental Communications officer. Continued involvement of PhD students in the 'Biology Show' should be encouraged.

## Collegial culture

By all measures the UoA appear to be highly collaborative and collegiate among the PI's within the UoA and wider department. They appear to operate effectively both as independent PI's and as members of a team, actively supporting junior and less experienced members. They assist junior PI's by helping them enrol a PhD student at the start of their appointment to improve their chances generating the high quality publications that will ultimately be their route to promotion and permanence. Junior PI's receive a higher proportion of faculty funding for their first PhDs relieving some of the burden faced by others who are expected to fund >50% of the PhD costs from 'other funding'. This is an important collegiate initiative that should be both recognised and encouraged, openly demonstrating a level of departmental commitment to new PI's. Weekly group meetings and open-lab policy are strengths that encourage broad intellectual development, training in communication skills and equal access to facilities with appropriate technical guidance.

In recognition of the fact that that papers and grants can always be made better regardless of the experience of the author has led the UoA to implement of a system of 'internal review' and iterative improvement. Having the opportunity to read, and possibly improve colleagues' papers or grant submission should rightly be considered an 'honour' and given full attention. The panel recommend such an initiative is maintained, and if not already operating widely, extended beyond MEEL.

The self-appraisal highlights the reliance of the UoA on a range of infrastructures developed within (and beyond) Lund University. It is clear that these are required for much of the current work but how long this continues into the future should be discussed at a departmental level – especially considering e.g a 10-year horizon where some staff will retire and new appointments will have been made that have different needs. A short term need for improved Computational Infrastructure across the University, especially for maintenance and analysis of large datasets, was highlighted.

Initiatives like BECC and MERGE were generally regarded favourably although their interactions with them were limited. There are possible opportunities here, especially as some areas of endeavour appear to overlap. Integrity and ethics, external engagement and outreach were not discussed during the face to face but appear to follow University guidelines and protocols.

#### Ecosystem

The UoA place a strong emphasis on research-linked teaching which has a number of advantages. First – the teachers should have an informed and in depth knowledge of the subject areas. Second, it is easier to keep subject matter 'contemporary' through regular updates. Third it introduces the students to the research being conducted in Lund, which will in some cases influence career choices. Fourth, it minimises teaching preparation time once the course has been developed as only 'improvement and updates' should be necessary. The UoA are involved in a wide range of BSc, MSc and PhD courses though it wasn't obvious what their contact hour commitment was to each course. They recognise that teaching provides access to a pool of possible future talent and welcome the opportunities it brings. However, they also note that the educational portfolio could be strengthened, and commented upon the difficulties associated with modifying the curriculum.

MEEL are currently focused almost exclusively on Blue skies research which has led to limited contributions to applied research projects. They raised concerns about the move towards more applied research by Research Councils and the potential impact of this on their ability to compete for funding. This potential weakness will require they amend their focus to extend beyond curiosity driven research. Some preliminary evidence for this was conveyed during the face to face and in the self-assessment. MEEL need to appreciate that a lot of applied research can also be considered excellent and lead to high impact outcomes!

#### Recommendations

MEEL, in discussion with the department and faculty, needs soon to address strategies for recruitment linked to succession planning and staff retirements. Innovative, transparent and more streamlined approaches to 'hiring before retiring' should be explored. For example, timing the appointment of targeted junior PI's bringing prestigious 5-year funding with projected retirements may be an attractive cost neutral proposition for the department. High performing female candidates should be actively sought.

Mechanisms for adequate and equitable technical staff provision across the UoAs should be explored. MEEL has 0.5 FTE technical support and this places their whole operation – and particularly the commonly used 'molecular lab' – in a vulnerable position. We note that there are 39 technicians and 38 Profs in the Department of Biology. A discussion should be had at the appropriate levels about how these existing resources, along with income from external grants, income from 'shared use' of facilities, and savings made from upcoming retirements and recruitments can address technical staffing.

The education portfolio could be modified and strengthened. The link between the curriculum and 'retiring' expertise should be decoupled (or relaxed) to allow flexibility for modification to course content and maintenance of a contemporary education offering. Staff should be made aware of the procedures and timescales involved when considering 'changes' and interact with those responsible for teaching. A modest increase in teaching load for some MEEL staff could be easily accommodated with minimum impact on research quality or output.

With concerns over limited research funding for blue skies research the UoA should act now upon the clear need to embrace more applied funding channels.

A review of the cost, benefit and use of various common research infrastructures should be conducted to understand how these may change with impending retirements and new research opportunities. This may refocus investment on emerging areas that need support. For example MEEL articulate the ambition to establish single cell genomics capability – an endeavour the panel would strongly support while recognising this would require more than investment in key pieces of equipment. University wide investment in Data Infrastructure appears to be urgently needed.

# Unit of Assessment 5: Functional Zoology 1 - The Lund Vision Group (B1.5)

## Observations

#### Leadership

Reading the self-evaluation was inspirational. This is clearly an extraordinary well-functioning group with a worldwide reputation as leaders in comparative sensory biology. The group has a distributed collegial leadership that forms and sustains a very inspirational and productive research environment. When the self-evaluation was written there were five professors and two Research Fellows (temporary positions) who collectively run the UoA, each with their own research group but with many common projects. The number of professors has since then fallen to three, after one has moved abroad and another has moved to another UoA at the department. The move of Prof. Almut Kelber, a very productive researcher, to Germany is troublesome for the UoA as she still had a long time to retirement. On the other hand there
are now three externally funded Research Fellows. During the interview the UoA stated that they had successfully assimilated the members of the Kelber group. The younger researchers (postdocs and PhD students) at the UoA are mixed between groups in their offices to encourage interactions. The UoA appear to function so well socially and scientifically that a strong centralized leadership is not needed, and probably would be counterproductive.

The UoA participate in the teaching at all levels and their teaching load appears to be similar to that of other UoAs at the department. They allow postdocs and researchers to participate in the teaching, thereby gaining educational merits that will often be needed for their future careers.

They are very pleased with the localities they now reside in and with the high level of advanced and specialized scientific equipment that they have at their disposal and which allows them to be leaders in the field.

### Collegial culture

The publication output is relatively high but reveals an emphasis of quality over quantity, where several of the papers yearly occur in top journals, such as Nature, Science, PNAS and Current Biology. Indeed, over the evaluation period they have the highest output in the top 10 citation percentile (22.6 %) of any of the UoAs our panel evaluated. Not surprisingly they are also well-funded. Presently, they have three ERC grants in addition Swedish Research Council funding, and they have also had a large common grant from the Wallenberg foundation. They point out that for the future obtaining grants may be threatened if more and more funding is directed towards applied research, and like other UoAs they are concerned about the steady fall in funding for basic research given out by the research councils. This UoA is very much focused on basic research.

They state some worries about future recruitment. Their international high standing has so far allowed them to recruit top people from around the world, maybe more so than most other UoAs at the department, since Swedes are in a minority in this UoA. However, since also this UoA faces upcoming retirements, and have recently lost two professors, they stress the importance that these are replaced by new excellent researchers before the retirements (so hire before retire) since the UoA otherwise would lose much of its attractiveness as a leading environment within vision research. They state in their self-evaluation that their scientific questions, methods and equipment are largely different from the rest of the biology department, which may cause isolation and give them a peripheral standing. However, when pressed on this issue they played it down and it may have been raised as a consequence of the SWOT analysis that had to be filled out.

### Quality ecosystem

This UoA appears to have a well-balanced mix of research and teaching, and they are very active when it comes to public outreach and popularizing science, not the least in Swedish media. Top tier researchers are often also very good teachers and willing to popularize their research. Together with the Pheromone group at the department (UoA 6) they organize a regular (every second year) graduate course in sensory ecology, which contributes to making Lund an international hub within this field and clearly helps in recruiting young scientists.

Their overarching research strategy is clearly to uphold a very dynamic and inspirational environment that nurtures new ideas and projects, and attract students and researchers from around the world.

Currently they are hosting a core facility for imaging (TEM, SEM and confocal microscopes) that are also very much used by the UoA itself. They expressed a positive attitude towards CEC and BECC but in contrast to most other UoA at the department they do not participate in these activities.

The few contacts they have had with industrial partners appear to have had a negative impact and left them disillusioned about such collaborations.

Like all other UoAs we have assessed, this UoA is generally very pleased with the Department of Biology and sees it as an extraordinary well-functioning department, although they do worry about how future hiring of permanent faculty will play out. They also state that they are happy for the support they get from the Faculty but worries about the increasing administrative burden coming from the government and central administration. *Indeed, they propose an interesting idea: to have a yearly user audit performed by academic staff of the service, regulations and management provided by higher levels of the university.* 

### Recommendations

In general it is difficult to make suggestions for improvement of an environment that at present appears to function exceptionally well. For this UoA threats are much more likely to come from outside than inside.

*Immediate attention.* The major problem facing the UoA is the loss of key researcher that are either retiring or, in the case of non-tenured PIs, offered permanent positions elsewhere. One threat is that the UoA will not be given the attention needed by the department to ensure that they can hold on to their top talents and keep up a reasonable number of permanent faculty. If there is drain here they will lose much of their ability to recruit top-tier researchers. One possibility would be to advertise a position aimed at their top Research Fellows holding ERC grants. Other European universities even attract ERC grant holders by promising them permanent positions. Another possibility would be to advertise not advertise positions more broadly, for example in Functional Zoology, since the best younger scientists in this UoA would be very strong contenders for such positions.

The UoA expresses the need for a new micro-CT, and given the groups success in this field this would clearly be a good investment.

*Long-term attention.* As mentioned the UoA expressed a positive attitude towards CEC and BECC but in contrast to most other UoAs at the department they do not participate in these activities. Maybe they could contemplate to do so in the future as rising temperature and carbon dioxide levels have been found to affect sensory and neural functions in aquatic animals. Thus, with the current trends for research funding in Sweden, they UoA could look for opportunities to also obtain funding aimed at more environmentally oriented research.

The few contacts the UoA has had with industrial partners have been disappointing. However, particularly their functional studies of visual systems and visual processing could of course have industrial applications and this avenue of funding should still be on the horizon.

### Unit of Assessment 6: Functional Zoology 2 (B1.6)

### Observations

#### Leadership

This is an UoA with fairly diversified research interests, and because of the academic freedom and bottom-up definition each of the PIs' research orientation, it was hard to identify any common overarching goals in the UoA's research strategy. These strategies likely exist with the individual research groups, or at least, become manifested in the success of the research groups' ability to attract funding, make impact and make themselves recognized nationally and internationally. In this respect, this UoA is somewhat heterogeneous, but still a very strong research environment in a very good international standing. The UoA has a solid track-record of publishing original and impactful science, often in highly respected journals. While the UoA's publication and citation record might not be characterized a stellar one, it is solid and internationally competitive as also reflected in the field-normalised citation data. Given that the UoA has five professors, three active emeriti, four lecturers, 12 post docs and 10 PhD students, the research output by this UoA is not very high. The panel notes that the retirement of two key professors from this UoA during assessment period has been a notable loss, but the impact of this has not yet become fully manifested as they have remained active and productive emeriti. Similarly, the panel recognizes that Professor Löfstedt was the acting head of the Department of Biology for period of nine years, covering also the assessment period. In spite of this, the Pheromone Group has remained active, productive and successful in bringing in a steady flow of significant external funding according to information gained in the panel interview. More detailed information about the amount of external funding in the documentation would have been helpful (applies to most UoAs assessed by the panel).

The UoA appears to make a significant contribution to undergraduate teaching in biology, accounting for 18% of teaching load at the department according to their report. Some of the groups within the UoA appear to be very successful in attracting MSc students. Hence, the UoA appears to strike a good balance between research and education. However, given the lack of information regarding the actual contents of their teaching curriculum, it was not possible to gain insight into how their research strengths contributed to teaching. The panel notes that the number of PhD students (n=12) produced during the assessment period for this UoA was fairly low relative to number of Pl's in the UoA ( $\leq 1$  per PI). Nevertheless, this seems to be a common pattern across the different UoAs reviewed by the panel.

Three professors from the UoA have retired recently, and within the next 2-5 years, three more retirements are to be expected. The panel identified this as a chief point of concern regarding the future of this research environment: there is an urgent need for a contingency plan.

### Collegial culture

Most of the research groups within the UoA have extensive academic networks and collaborations both internationally and nationally. Being part of new virtual Max Planck Centre, the Pheromone group is particularly well placed in this respect. The UoA's involvement with CEC, MERGE and BECC has been limited, but a positive attitude towards these constellations was perceivable. Sustainability and renewal of research strengths is the UoA are clearly in jeopardy because of the approaching retirements of the senior faculty on top of the already incurred retirements. Lack new hires for permanent faculty over recent years makes situation particularly volatile. The male-biased gender balance among the faculty is troublesome.

The way the governmental funding is divided within the UoA was perceived to be sensible and collegial. In the SWOT analysis, the UoA identifies the shortage of governmental funding for salaries of technicians and infrastructure as a threat: this is common concern across the UoAs and clearly, the department and faculty should look into solving this issue in one way or another. The panel sees the weekly common meetings for the two main groups within the UoA as a positive thing, especially as these meetings were told to be mandatory. The position of the Ecological Immunology group within this UoA remains somewhat unclear.

### Quality Ecosystem

The UoA produces both high quality fundamental and applied science. The Pheromone Group in particular is a well-established and strong research environment recognized internationally. The other three groups within this UoA are smaller, one consisting only single PI. Nevertheless, also they are in good international standing, but perhaps subcritical in size and internationally not as visible as the Pheromone Group. Yet, good individual scientists reside also within these groups. It was not possible to make statements regarding how research strengths were reflected in the UoA educational portfolio (beyond listing course the UoA contribute) as this information was not shared with panel.

The UoA has a very positive and active stance towards external engagement and outreach. It reports a lot of external research collaborations with industry, county councils, municipalities and non-governmental organisations, and these collaborations appear to be important source of funding and stimulus for future research. These collaborations have also opened up career opportunities for students and staff, and lead to several patent application.

The UoA is not directly aligned with any of the SFOs, but the sensory ecology (this UoA + UoA 5, The Vision Group) is a strong research area in Lund University, and could be recognized as area of strategic importance for the university. The UoA utilizes several departmental infrastructures, and these appear to critical for their research. The panel commends UoA's involvement to the Max Planck Centre for next Generation Insect Chemical Ecology – this flagship organization likely brings future benefits and recognition to The Pheromone group.

### Recommendations

*Immediate attention.* Given that large proportion of the full professors have recently retired and many of the remaining will do so in the near future, there is urgency for formulation of a strategic plan for the UoA's future. Given the UoA's (and The Pheromone Group's in particular) high international standing, new hires to this UoA are recommended, preferably before the current leaders retire. These decisions should seek to address the male-biased gender balance among the department's professors and lecturers. The issue common to all UoA's identified by the panel, namely, finding a solution to solve the problem regarding the low number of supporting technical personnel requires urgent attention. In this particular UoA, the challenge is acute because of the retirement of a key technician. Together with the UoA 5, the The Pheromone Group contained with this UoA form a synergistic "sensory ecology" conglomerate. The UoA 6 report makes a fair point stating that the sensory ecology is a strong research area in Lund University, and could be recognized as an area strategic importance for the university.

*Long-term attention.* The panel thinks that presence of the Ecological Immunology group's size with one PI is subcritical, and while collaborations within the UoA and parts Department of Biology are good ways to support this group, its long-term viability cannot rest on shoulders of one PI. The same concern (sub-critical size) applies also to the Development in the Cellular Milieu group.

The panel commends the UoA's commitment to the department's common good, and in particular the UoA' leader was serving as the head of the department over a considerable period of time.

The question whether any of the issues with this UoA should be resolved at a higher than department level is a difficult one. It's the panel's impression that collegial culture at the department is very healthy, and therefore, it could counterproductive to let any of the issues to be decided by faculty or higher level of administration. This said, it is in the Faculty's interest to oversee that strong research environments do not dwindle just because the processes at the lower administrative levels do not progress in timely fashion or run into stalemate.

This UoA's report expressed deep dissatisfaction for the RQ process and instructions provided. The panel agrees that many of these points were valid. For instance, the panel noticed inconsistencies in reporting (or not reporting) of the publications by emeriti faculty amongst UoAs, something that undermines the fair assessment of different UoAs' academic achievements. In the same vein, the fact that the self-evaluation report of this UoA had to be divided into separate sections for groups within the UoA to be meaningful, indicates that this UoA is not really a natural UoA. This might also explain why the report hardly mentioned the Ecological Immunology group, and as the single PI in this group did not join the panel meeting, it was practically impossible for the panel to form informed opinion of that part of the UoA. Similarly, in order to reflect upon how the UoAs research contributes to teaching, more information on teaching duties would have been needed (this applies to all UoAs).

# Environmental Science and Biology II

# Panel overview

Panel Environmental Science and Biology (B2) Assessment units (UoAs):

B2:1 Biodiversity and Ecosystem Services

- B2:2 Soil Microbial Ecology
- B2.3 Aquatic Ecology

B2:4 Systematics and Plant Ecology

The panel consists of scientists from the *Department of Biology* (all UoAs) and the *Centre of Environmental and Climate Research* (CEC) (B2:1 & B2:2). *Dept. Biology* also have scientists in Panel Biology (B1), and CEC in the Physics, Geology-Ines, and Social Sciences 3 panels.

Dept. Biology resides in the neighbouring Ecology and Biology Buildings, while CEC mostly resides in the Ecology Building.

The Department of Biology is large, with (2019) 38 professors, 23 senior lecturers and 3 associate senior lecturers, 65 PhD-students, 17 post-docs and 62 researchers (~1/3 with own grants covering their salaries, while others are "senior post-docs"), and 39 technical staff. This panel includes ~40 % of the departments' research-active personnel. The department was formed 2010 by merging Depts. Ecology, Cell and Organism Biology, Biology Education, the Marine Biology satellite in Helsingborg, and the Biological Museum. This made undergraduate education an integrated part of the department. A department board makes strategic decisions and decides budget. The department head is responsible for daily management, supported by an informal leadership group consisting of the deputy department head, the unit heads and the museum director. Since 2011, the department is structured into six units, each with its own head, while the museum forms an organization with a separate budget. The six units are: *Molec*ular Biology (panel B1), Evolutionary Ecology (B1), Molecular Ecology, Microbial Ecology and Evolutionary Genetics – MEMEG (B1 and B2, UoA B2.2), Functional Zoology (B1), Biodiversity (B2, UoA B2:1 and B2:4), and Aquatic Ecology (B2, UoA B2.3). They were formed by more or less well-defined research groups/environments being lumped into "units" to make administration manageable and strengthen subcritical environments, why they often do not match actual research environments. The reshuffle also served to facilitate department-wide interactions, to optimize distribution of teaching obligations, to promote joint educational programs, and to facilitate a flexible use of resources. To encourage collaboration and maintain flexibility, the administration is centralized and important economic decisions, including recruitment of and salaries to faculty, taken at departmental level. Education is centrally led, with separate directors of under- and postgraduate studies.

The departmental budget has 2015-2018 been ~275 MSEK, whereof 10-15% for undergraduate education, 40-45% faculty funding for research, and 40-50% external funding. While the budget for education has shrunk, the faculty funding has slightly increased. External funding has fluctuated but generally increased; since the inauguration of the department in 2010 external funding has increased from ~86 to >120 MSEK. External funding is handled by research group leaders, but employment decisions are taken at the departmental level. Allocation of resources to PhD students' salaries are, within budget constraints, decided at the unit level. As a rule, new faculty get start-up funding of PhD positions. The department has routines for recruitment of teachers and investment in departmental infrastructure. Faculty recruitments have usually been based on a thorough internal or external review of a research field, focusing on e.g. international standing, publication records, funding, relationships to teaching and potential. The department accommodates two national infrastructures: LP3, a university-and faculty supported infrastructure for protein production and crystallization, and a node of NBIS/WABI, the national bioinformatics infrastructure. Other major infrastructures includes the Biological Museum, animal facilities, greenhouses, Stensoffa field station, microscopy and 3D imaging facilities, a sequencing facility, an electronics lab, a lab for instrumental chemistry, and a wind tunnel for animals flight studies. An infrastructure committee handles departmental infrastructures (except the museum), and advices on and prioritizes applications for faculty funding of infrastructure. Departmental support for infrastructures varies depending on user demands and strategic relevance.

The combined physical and virtual Centre for Environmental and Climate Research (CEC) is commissioned by the Faculty of Science to coordinate and conduct research, education and stakeholder interactions on environmental and climate issues, building on university-wide networks. In 2019 2 professors, 3 senior lecturers and 1 associate senior lecturer, 9 PhDstudents, 18 post-docs and 11 researchers (some with their own grants, others being "senior post-docs"), and 20 administrative staff where employed at CEC. This panel includes ~75 % of CEC's research-active personnel. In addition, 27 faculty/researchers at other departments have parts of their salaries from CEC to contribute to leadership, research, education and external collaboration.

CEC was formed 2010 by merging the Department of Studies in Environmental Science and the Strategic Research Areas (SRAs) Biodiversity and Ecosystem Services (BECC) and ModElling the Regional and Global Earth system (MERGE). CEC is responsible for undergraduate and graduate educations in Environmental Science. Several university overarching activities are associated with CEC, including three research schools, the LU Sustainability Forum (a university-wide umbrella organization), and Climate KIC@LU. A board with members from associated departments makes strategic decisions including budget. A director is responsible for daily management supported by an informal leadership group. Internal boards and sub-directors are responsible for SRAs, undergraduate and graduate education. External funding is handled by research group leaders. CEC, as well as many of its components, are guided by elaborate plans of action/strategies that are anchored in discussions involving colleagues and networks. The budget of CEC has 2015-2018 been 65-70 MSEK, whereof 11-12% undergraduate education, 44-46% faculty funding for research, and 42-45% external funding. Since CEC started in 2010, external funding has increased from 14.5 to 32.5 MSEK CEC hosts the national infrastructure Integrated Carbon Observation System (ICOS), and provides organized support to interdisciplinary research, external collaboration and outreach related to sustainable development. The links between Dept. Biology and CEC are strong, including shared personnel, generating synergies. The Biology Library serves both organisations.

# External panel report

Report from Panel: Environmental Science and Biologyll Panellists: Kerstin Johannesson (chair, Univ of Gothenburg) Katherine Richardson (Univ of Copenhagen) Thomas Elmqvist (Stockholm University) Jim Prosser (Univ of Aberdeen) Susanne Renner (Univ of München) Anna-Liisa Laine (Univ of Zurich)

509

### Executive summary

The Panel was concerned with how the Units of Assessments (UoA) were formed and that two separate, and non-communicating, Panels assessed different parts of the same Department. This made the task of assessing the organisation of the Department's research and its research environment more difficult. It was like being asked to complete a jigsaw puzzle without having access to all its pieces. Also the Centre for Environmental and Climate Research were divided between two separate Panels.

Of the four units that the Panel assessed, only one gave the clear impression of a well- functioning and harmonised unit with a strong and supportive collegial culture. This unit also showed a positive trend in external funding and expansion of research staff. The other UoAs gave more or less strong impressions of being less coherent.

Although research quality of individual projects and PIs was generally high, the Panel strongly believes that the full potential of these research environments is not being reached.

The Centre for Environmental and Climate Research (CEC) is an excellent research environment under strong leadership. Nevertheless, the Panel concluded that increased opportunities for collaborations in teaching and research across faculty borders should be facilitated and stimulated by the University to increase the centre's future potential.

The biological museum needs immediate attention. In light of increased appreciation of the importance of historical biological material for studies of ecological and genetic aspects of biodiversity under climate change, the Department needs to see the museum as a strong and important infrastructure rather than a problematic budget post.

All in all, the Department of Biology has a well-organised structure for leadership and administration but it might be time to revise the sub-structuring of at least part of the research environment. The Panel also advocates more long-term visions and plans for all of the necessary recruitments that will be possible over the coming period of retirements. Although this is the responsibility of the Department leadership, all the PIs (not least those recruited more recently) should be invited and organised to take part in the discussions of where to go from here.

### Introduction

The expertise of the five members of the Panel matched well the topics of the Units of Assessment (UoAs), namely B2:1 Biodiversity and Ecosystem Services, B2:2 Soil Microbial Ecology, B2.3 Aquatic Ecology, B2:4 Systematics and Plant Ecology. The video-interviews with the UoA members (three per unit) enabled open and honest discussions on topics chosen by the Panel. In addition, the short Power-Point presentations by the UoAs were generally informative and complemented the written self-evaluations which, in turn, provided useful and necessary information for the Panel.

The rationale behind composition of the UoAs was, however, unclear to the Panel, i.e., their relationship to the formal organisation of the Department of Biology with its six sections. Only one UoA (Aquatic Ecology) overlapped completely with a formal entity of the Department (Aquatic Ecology). Other UoAs were parts of one or several sections, and collaborations among faculty of the Department ran across the two Panels. If the Panel had been required to evaluate the science, this would not have been a concern, but it was an important issue given that the Panel was asked to evaluate organisation of the research environment. The Panel also felt that the lack of overlap of three of the UoAs with departmental organisation was an issue for the UoAs themselves, who in the discussions with the Panel sometimes did not clearly know which body of the organisation to whom they referred. Division of the Biology Department assessment between two Panels added to the challenge of getting a full picture of the organisation of the Department and this situation was not improved by lack of communication between the two Panels. In addition, the assessment of the organisation of the CEC centre would probably have been more complete if dealt with by a separate Panel with multidisciplinary competence, and maybe the same Panel could have been involved in evaluation of the LUCSUS centre in order to look at synergy effects of the two centres and between faculties.

### Observations

### **Biodiversity**

The research in the Biodiversity and Ecosystem services UoA focuses on the conservation and sustainable use of biodiversity and analysis of ecosystem services. The UoA is not a formal structure but formed from several research groups from CEC and the Biodiversity Unit. The UoA consists of several well recognized PIs and is organized in subfields: Biodiversity and Conservation Science, Soil Ecology group Green Space Governance group, the Landscape Ecotoxicology lab, the Uncertainty and Evidence Lab, and the Biodiversity Monitoring group.

The Panel noted that while the UoA does not match the existing administrative organisation, it nonetheless constitutes a research unit with critical mass and scientific expertise.

### Leadership:

The largest part of the UoA is the Centre for Environmental and Climate Research (CEC) which has shown leadership particularly in developing the Strategic Research Area (SRA) Biodiversity and Ecosystem Services in a Changing Climate (BECC) as well as in undergraduate and graduate education. The Panel noted that this UoA has an impressive list of societal interactions at local to international levels, ranging from traditional outreach to synthesis and research on interaction with stakeholders.

A challenging factor for the leadership of this UoA is the complex governance structure in which multiple organisations need to be bridged. The process of setting overarching strategic goals and securing technical support and infrastructure was mentioned to the Panel as particularly challenging. A closer collaboration between CEC and the Department of Biology on these issues seems necessary.

Undergraduate education exemplifies the challenges met by the UoA in this regard as it is based on collaboration between CEC and a large number of departments in a rather complex administrative process. In addition to administrative complexity, this means that CEC is often dependent on priority setting for education of the other departments, as CEC does not have the resources to recruit long-term teaching positions. The Panel concludes that a discussion involving several departments and both the Social Science and Science Faculties should be initiated in order to ensure that the considerable teaching potential housed within CEC is maximised at the University.

PhD education in Environmental Science at CEC consists of about 15 PhD students of which half are physically located at CEC and the remainder located at different departments. The CEC is involved in running three PhD research schools (ClimBEco, Bioeconomy, and Agenda 2030) and a partner in one (COMPUTE), and the Panel concludes that the Centre is a very important player in graduate training.

The support from Lund University is increasing and the University has taken a number of recent initiatives in sustainable development and interdisciplinarity, relevant to this UoA. One example is that the current Faculty plan of action explicitly addresses interdisciplinarity and sustainable development. However, the Panel had the impression that navigating the University to take full advantage of efforts to support interdisciplinary research and education was sometimes difficult, and this should be a concern for the leadership of the University.

511

### Collegial culture:

The opportunities for early-career researchers to develop their originality and independence appears to be adequately addressed and the UoA seems to actively encourage junior scholars, including post-docs, to further pursue research careers in multi-disciplinary science. Many of the young researchers have recently successfully applied for external grants of their own.

The UoA has eight lecturer or professor positions but the Panel noted that renewals and recruitments were mainly based on external grants for post-docs and young researchers.

The UoA appeared to take gender and ethics seriously and viewed the apparent gender imbalance in top positions as a challenging problem whose solutions lie in long-term efforts to remove subtle forms of discrimination through e.g. internal education. The Panel noted that less thought was given to aspects of diversity other than gender. The ethical standards seem adequate with mandatory courses for PhD students in research ethics.

The Panel noted that the quality of applications and publications is high in comparison to international standards, with prestigious grants through e.g. ERA-net and most publications in medium to high-impact journals.

### Quality ecosystem:

The UoA is involved in and lists a large network of national and international research institutions, policy organisations, industry and NGOs. CEC has also played a prominent role in advancing several environment and climate-related initiatives at the University. Examples include Hållbarhetsforum, which CEC is hosting, and Climate- KIC, LU-Land and the Research School Agenda 2030. CEC has also engaged in developing a sustainability strategy for Lund University.

Together, these activities have fostered a healthy, outward-looking atmosphere at the UoA, stimulating new research and helping to develop new skills in communication of research. The Panel noted that there is also an awareness of the challenges associated with stakeholder involvement, including the risk of compromising scientific integrity due to dependence on funding from stakeholders.

The main challenges facing the UoA are a) long-term consolidation of research and education in environmental science and finding an appropriate organisation to achieve this, b) securing funding of infrastructure in the long-term, and c) building a sustainable critical mass in social sciences.

The self-evaluation stresses that the lack of critical mass in social sciences constrains the potential to develop cross-disciplinary, global-change research of high international standard. The Panel agrees with this insight and recommends that the UoA works actively to increase the number of affiliated or associated social scientists with complementary competences, e.g. through shared research positions between natural and social science departments. This sharing should not compromise the need for adequate intradisciplinary training and a thorough connection to the development of the research methods and tools within each discipline.

The UoA has identified collaboration with Lund University Centre for Sustainability Science (LUCSUS) as a path to strengthen social science research. The Panel recommends that the University actively support such initiatives and commit to facilitate more interdisciplinary activities, including exploring the potential for shared positions across faculties and departments, showing commitment to the development of joint research projects and innovative research areas.

### Microbial ecology

This is a well-funded group of research-active PIs performing internationally recognised research in soil microbial ecology. They have recruited good PIs who have developed reasonably strong research groups with good publication records, established national and international collaborations and exploited infra-

structure within and outside the Department. There is concern, however, that a lack of strategic analysis and organisation of support for staff reduces efficiency, has potentially significant consequences for future success of this unit and increases vulnerability to staff loss. Management of different aspects of research is informal and inconsistencies between research groups were apparent. It was difficult to assess the quality or impact of management and advice and achievement of future potential requires serious discussion of research strategy to provide a strong case for replacement of retiring staff and identification of other resources required for sustainability.

### Leadership:

The microbial ecology research unit comprises several well-funded and productive research groups. External funding is good, but largely from national funding bodies, and reflects the strengths of individual PIs and their research groups. Each PI collaborates widely and no barriers to collaborative research were identified.

However, there appears to be no system for priority- or goal-setting by the unit or mechanisms for coordination, communication or interaction at the unit level. Any discussions are informal and undocumented and the report and interview suggested that serious discussions on research strategy had not been initiated and plans for expansion of funding sources for future research (i.e. ERC and unspecified applied research) are vague.

Recent PI appointments have significantly strengthened and broadened the research base, which the unit considers to be a strength, but also a weakness, given impending retirement and increased administrative load of two senior members. Retirements are seen only as a threat, with considerable anxiety regarding recruitment and succession, but recruitment also offers an important opportunity for reinvigorating and developing future research that should be exploited. Recruitment is the responsibility of the Department and mechanisms for influencing Department decisions are seen as opaque. Nevertheless, development of strong arguments for replacement of staff and clear ideas of requirements that fit with overall strategy are essential if opportunities are to be exploited. This strategy should be communicated to the HoD and should go beyond replacement of existing expertise, which cannot be justified without thorough analysis.

The publication record and patterns are good but could be improved by developing, e.g., strategies for improving quality and impact of papers and more ambitious targeting of better journals. Unit staff are involved in a range of external activities and no major issues were raised regarding the balance of these activities. This may reflect lack of discussion within the unit and there was no evidence, beyond possible informal advice, of individual or unit level assessment of appropriate balance, optimisation of links between activities and how these relate to career development.

Research strategies within individual research groups are good and PIs have avoided the temptation to follow fashionable trends and employ modern techniques where appropriate, and exploit them through collaboration if necessary. The focus is generally on research quality but with an occasional tendency to discuss future developments in terms of new techniques and funding, rather than scientific goals.

There is, however, no evidence of an overall research strategy for the unit or of a mechanism or process for achieving this. There is an unsupported and tacit assumption that ectomycorrhizal research will remain a major focus but this is not based on assessment of developments in microbial ecology research or teaching, locally, nationally or internationally, or of other Departmental priorities. There was no indication of the criteria the unit would use to assess current unique strengths, weaknesses or future requirements and no communal attempts to identify potential future directions, major scientific or applied research questions or research areas, and potential links to funding.

In addition, research strategy for this unit should include the soil ecology research group, with which there are overlapping interests, and future research and whose requirements are likely to be similar. Importantly this will offer opportunities for more holistic approaches to soil ecology.

### Collegial culture:

Early career-researchers are free to develop their own ideas, with informal advice on funding sources, career-development and grant applications, but no apparent system seems to be in place for supporting a successful publication strategy (e.g. combining papers to generate higher impact publications, choice of journal, writing

style). Increased competition for funding, and proposed plans to target EU and other funding bodies, increase the importance of, and need for, a better organised system for assessment, improvement and quality control of grant applications by staff at all levels, pooling advice from those on grant committees and more experienced staff.

The informality of the systems prevents monitoring and assessment of the nature, breadth and quality of advice, its impact or ways in which it could be improved. While some advice will be discipline-/re-search area-specific, it is difficult to argue against involvement of broader expertise and experience across the Department. The success of the Aquatic Group strategy for funding would seem to provide a good model. Current delegation of responsibility for mentoring to research groups and PIs is likely to lead to duplication of effort in seeking training approaches and resources. Members of the group have editorial roles with journals, but it is not clear how their expertise is transmitted to younger staff. This applies also to membership of senior staff on committees of funding agencies.

It is difficult to assess the sustainability of the unit in the absence of future strategy and plans, particularly given forthcoming retirements.

#### Quality ecosystem:

Teaching duties are aligned with research interests and potential new postgraduate and Masters courses are being considered. However, plans are quite vague and based on existing expertise rather than intelligence and analysis of demand, with little consideration of the impact of increased teaching load on research activities.

The unit focuses on fundamental, rather than applied research, although their work is relevant to agriculture, forestry, climate change and sustainability. PIs have extensive cross-departmental, national and international research links, but links with stakeholders are through LU Land, and do not appear to be strong. Applied research is proposed as a major funding strategy but there are no detailed plans for engagement with stakeholders to identify their requirements, necessary resources, funding mechanisms and goals.

Unit researchers actively use institutional infrastructure that has significantly enhanced research activity and success and the unit runs the DNA sequencing service. The unit claims to have a 'long-term strategy for future developments', but with no detail. They share a general concern regarding strategic assessment and policy for distribution of technical support, with cost recovery, and general cost recovery for central infrastructure from external grants and other funding sources.

### Aquatic ecology

As noted above, this unit was best aligned with the Department of Biology's organisation of the four units evaluated by the Panel. This made it much easier to evaluate the unit against the evaluation criteria and, with respect to all criteria, the Panel was most impressed with the performance of the unit.

### Leadership:

Given that all major decisions, e.g. recruitment, with economic implications are taken at the department level, the local leadership has only limited ability to actively shape the profile of the unit. Nevertheless, the Panel was very impressed with the strategic focus from the unit's leadership to diversify the portfolio of external funders supporting research in the unit. This unit is highly dependent on external funding for maintaining its impressive research activities and the diversification in source funding has clearly increased the unit's resilience in the face of fluctuating funder behaviour. The strategic move of increasing the number of different funders has concurrently resulted in a large increase (nearly a doubling) of external funding in the period 2014-2018. While this is impressive and commendable, it has also led to an imbalance in the profile of employees in that a very large proportion are now early career researchers on short-term contracts. There is naturally the desire to retain some of these researchers in more permanent positions. This desire can potentially be in conflict with the overall strategic aim of promoting excellence and diversity as external recruitment is often a tool for achieving diversity and catalysing new research directions. In this sense, it is considered positive by the Panel that recruitment decisions are made at the department and not the unit level.

There is no formal overall research strategy for the unit as a whole. Research ideas are generated "bottom-up". This *de facto* leaves the "decision" regarding the research profile of the unit largely in the hands of the external funders. This is a typical situation for university research in 2020. The heavy dependence on external funding ensures that the research carried out is competitive and of societal interest/relevance (at least for the funders) but given that university teaching is research-based, this also gives the external funders control over much of the teaching offered. The unit's research is well integrated with the teaching activities. The unit does, however, seem to have a very high teaching load.

Given this heavy dependence on external funding (which, again, is typical for university units today), the Panel found that the leadership had demonstrated impressive success with initiatives designed to encourage the unit's researchers to work together on projects and teaching. Thus, the unit appears to function well as a unit with a common feeling of "belonging" to the unit, despite the unit's very broad research profile. The publication track record (~30 publications/year, where most are in medium to high ranking journals) is impressive.

The unit has a clear strategy in place for the distribution of faculty resources allocated at the unit level and, once common services (e.g., lunch room, etc) and activities (e.g., seminars) have been covered, the funds are used to encourage and reward employees for funding success (co-funding of PhD students, etc.).

### Collegial culture:

Aquatic Ecology was the unit evaluated by the Panel with the strongest collegial culture. Several impressive structures/initiatives have been developed to mentor and encourage the younger scientists in the unit. These include grant-writing workshops, symposia, and leadership training programs. There is also an important (and unfortunately necessary) focus on ethics and the scientific process in the unit's seminar series. For PhD students, a tradition of participation in a "scientific expedition" has existed since the 1980s. Here, the students, themselves, plan and execute the expedition, which results in scientific publications. While credit for the establishment of such a long tradition cannot be given to the current leadership, the very existence of such a tradition corroborates the Panel's impression that scientists at all levels associated with Aquatic Ecology do feel themselves as being a part of something bigger than just an accumulation of employees placed in the same building.

Although *ad hoc* mentoring of early career researchers takes place, there is currently no formal program in place to do so. From the unit's self-evaluation, it appears that there is some consideration of perhaps developing a more formalised mentoring program for this segment of employees and the Panel would like to encourage the unit to do so. As part of this mentoring program, focus might be given to "grooming" for the preparation of applications for prestigious (i.e., ERC) grants. Success in these large programs is a lottery, so it should be emphasised that failure to obtain such an award is not necessarily a reflection on the quality of the applicant's research. The experience of being a part of the process is, in itself, an important learning experience for young researchers today. Success, on the other hand, would consolidate the career of the lucky individual and reflect positively on the unit as well as the university as a whole. The unit appears to have a good focus on developing an external network both through guest researchers and seminars given by external speakers. Furthermore, the majority of PhD students are recruited from outside Lund University. Gender equality in the permanent staff is improving but there is absolutely still room for improvement.

### Quality ecosystem:

The research competences found within the unit align exceedingly well with their teaching activities. The breadth of competences found within the unit is a prerequisite for the comprehensive master's program on Aquatic Ecology, which was initiated in the unit and for which the unit is (in practice) responsible. This program appears to be both popular and successful but does place a large teaching burden on the staff.

The Panel was also concerned that the rapid growth in external funding in recent years has led to an unhealthy balance in scientific, relative to technical personnel. The unit's one technical assistant is approaching retirement. Continuation of research and teaching at the load level currently experienced by the unit will require – at minimum(!) – replacement of this technical assistance.

The Panel was pleased to note that the unit was very aware of the challenges of maintaining scientific independence and integrity when working together with stakeholders on issues of societal and potential economic interest. There is no "formal" process for assessing where and when these might occur. However, the Panel feels that it is not possible to create a formal structure for this purpose. Every case is unique and it is not possible to make rules that eliminate the possibility of encountering compromised situations. It is, however, important that all units are observant with respect to the potential conflicts that can arise as appears to be the case for Aquatic Ecology.

### Systematics and plant ecology

As described in the self-evaluation and confirmed in the Panel's conversation with its three representatives, this UoA is a heterogeneous group that has undergone large changes in the last five years. It now mainly comprises expertise in plant ecology and insect phylogenetics, with a joint focus on plant/insect interactions and coevolution and speciation genomics. Recent recruits have common interests in processes leading to diversification of species at both the micro- and macroevolutionary scales. The number of staff over the past five (six) years has grown by two more associate senior lectures and three more postdocs. The Biological Museum is an important research infrastructure, not a research environment, and the self-evaluation therefore stressed that "the museum *per se* should not fall under the self-evaluation." Nevertheless, considerable time was spent on a description of the plight of the Museum in terms of staff and funding, and on the Panel's view of how the University (not any single UoA) will have to deal with finding more support for the Museum.

The museum collections represent an important resource for researchers at the Department of Biology and belong to Sweden's cultural heritage, where they rank among the most important collections of any kind nation-wide.

### Leadership:

The Panel failed to understand whether this UoA has a clear priority in terms of hiring and focus, but this may be due to its heterogeneous nature and to recruitment strategy being set at the Department level. The Systematics and Plant Ecology research environment is going through a period of transition, with several new external recruits (5 between 2015 and 2019), three of these tenure-track positions, of which the first is coming up for tenure in 2020. In addition, the self-evaluation stressed the need for a replacement in plant biosystematics within the next few years and restoration of basic competence in plant ecology.

### Collegial culture:

During the discussion with the Panel, it became clear that some of the relatively recently recruited staff felt insufficiently 'accommodated' in terms of space, or, at least, communication about laboratory and office space appeared to be poor.

### Quality ecosystem:

The self-evaluation understood this concept (quality ecosystem) as referring to the teaching, which the Panel accepted. Systematics and plant ecology apparently are well integrated into the teaching portfolio. Currently, the PIs have the main responsibility as course leaders or make major contributions in 15 basic or advanced courses in floristics, systematics and conservation biology, molecular ecology and population and community ecology, which is an impressive engagement. The new research strengths of molecular systematics and plant-insect interactions appear to be still somewhat outside the teaching strategy of the department. The research group on the Evolutionary Ecology of Plant-Insect Interactions has been very successful in attracting Master's students (8 students enrolled since 2017). The Nordic masters program NABIS (mentioned above) is currently coordinated from Lund and its curriculum fits very well with the focal research areas in systematics, genomic evolution and phylogenetics.

### **Department of Biology**

The Panel acknowledges that the department has a suite of well-balanced joint annual activities that serve as a glue for Biology as a whole. Indeed, the Panel concluded that organisation at this level is well functioning and the leadership is appropriate with a management group and various other subgroups and subheads. The Panel completely shares the opinion that decisions on long-term and overarching strategies for recruitments and investments in infrastructure should be taken at the Department level, which is responsible for the budget and the working conditions in general. This includes responsibility for running education and research training (although, several of the UoAs claimed that they were running courses and master programmes).

### Department subunits and balance between central and unit levels:

This said, the Department of Biology with almost 300 employees is, of course, too large a unit for daily interactions and collegial processes, and this was already obvious to the leadership when the Department was formed 10 years ago. Subdivision into working units that are responsible for daily issues, such as arranging seminars and workshops and providing meeting places for spontaneous interactions (coffee and lunch rooms), is necessary. Whether or not the subunits should also organise the distribution of available common resources (laboratory space, offices, smaller infrastructures) and take responsibility for introductions of new staff can be discussed but needs to be made clear. The Panel got the strong impression that the current Department sub-sections vary in the extent to which they care of these tasks, including mentoring of staff. With respect to mentoring, the Panel strongly recommends that the Department take responsibility for ensuring that mentoring and training of all staff, including senior academic staff, are well-organised and functional and that these activities are monitored and their effectiveness assessed.

Only one UoA evaluated by this Panel exactly mirrored the department sections (Aquatic Ecology). However, we got the impression from several UoAs that the current subdivision into sections were not always appropriate and may be in need of revision, which is not surprising, since it is 10 years since the current organisation was launched. There are likely very many different ways of organising such a revision of subunits, but one model that the Panel finds attractive is the "Helsinki-model", where the Faculty of Biological and Environmental Sciences previously suffered from an imbalance in size and quality of the subunits. The faculty oversaw an analysis of core research areas and their keywords, and based on this

proposed three thematic research programmes. After this, each PI was free to choose which research programme they affiliated with, which still resulted in three roughly equally-sized units. The research programmes are largely responsible for their own recruitment strategies and teaching, and their own governance structure. Steering committees oversee much of the decision-making but joint matters such as recruitment strategies are discussed in monthly PI fika. Research collaboration, teaching and development of training and mentoring of early career researchers are jointly discussed with all members in annual retreats. The current structure and organization are more bottom- up than previously and has improved communication among research groups. The current Dean of the Faculty could potentially provide more insight into the process, and the outcome now that the programmes have been running for some years.

One issue that was raised by several of the units assessed was the demand for technical support. This issue should be addressed at the departmental level, even if the funding of new technical staff might, ultimately, be shared between the UoAs and the Department. A possible solution is some kind of co-funding in which a technician is funded jointly by a research group and the department, as is the case for PhD student positions. The Panel was concerned about the potential loss of technical skills and expertise if most of the responsibilities and expertise for equipment, facilities and techniques are in the hands of postdocs and PhD students on relatively short-term contracts.

# Recruitment strategy

The Panel would have liked to have had a better understanding of how the department leadership selects the areas for future recruitment and how a balance is achieved between promoting the careers of talented young scientists already at the university and external recruitment.

The Panel strongly concludes that design and implementation of a Departmental research strategy is required to provide the context for strategies of the constituent research units. At one extreme, appointment of staff on the basis of research quality alone, regardless of research area or expertise, might be appropriate in a system in which research funding and teaching requirements are unspecified. However, in situations where funding is directed towards certain types of research (fundamental, applied, policy-driven), towards certain research areas (climate change, antimicrobial resistance, diversity) or to exploit new techniques (omics, imaging, spectroscopy), strategic vision is required to assess future requirements and maximise potential, competitiveness and sustainability. Strategic vision was displayed by some units, but not all, and none related their research strategy to a central, departmental strategy.

There was also a lack of strategic approaches to other activities, e.g. publication and career development. Training and mentoring were provided to enhance career development at postgraduate and postdoctoral levels but not, apparently, for those in established positions, including senior positions. Career advice and training are important at all career stages, with two-way benefits. For example, ensuring that senior staff become involved in advising on and determining future policies of funding bodies can provide invaluable intelligence and advance warning of critical importance in determining research strategies.

# Equality

Equality, diversity and inclusion were discussed only in terms of gender and international recruitment and ignored other aspects of diversity. Culture and ethnic diversity relate, mainly, to recruitment at postgraduate level, which is not unusual but, at other levels, international recruitment was sometimes seen as potentially disadvantageous with respect to teaching activities. Monitoring and benchmarks are important in identifying potential bias and discrimination, and in understanding underlying causes of inequality, but not as targets for positive discrimination. In this respect, there was no indication of mechanisms used to avoid bias in selection or treatment of staff with different gender or other aspects of diversity, and no data on the latter. Positive discrimination and removal of 'quality' as the major criterion for appointments can mask endemic problems, prevent identification, understanding and mitigation of underlying causes and, therefore, be counterproductive.

# Stress and care for the health of research staff

The Panel was struck by the fact that only the leadership in the Aquatic Ecology unit voiced concerns over the potential for stress-related conditions resulting from the many pressures placed upon employees. This problem is likely something that the Department leadership is well aware of, and so the issue might be how to spread the concern throughout the Department and make all staff members involved in its solutions.

# Recommendations

Below the Panel summarises main recommendations, but we also refer to the text above for more details.

# **Biodiversity**

# Recommendations for immediate attention:

- Faculty borders are a concern for multidisciplinarity, not least teaching of joint courses. Involved faculties need to consider ways of facilitating the organisation of multidisciplinary teaching involving staff from social science and natural science departments.
- The university would benefit from supporting and stimulating increased collaboration between CEC and LUCSUS.

# Recommendations for long-term attention:

- Long-term strategic consolidation of the expansion and functioning of this unit in a manner that aligns with the strategic development of the Department. The unit is very different in size, structure and even function to the other UoAs, which can create both challenges and opportunities.
- One of the key current challenges faced by the unit is the development of a truly interdisciplinary research focus. A core aspect is the building a sustainable critical mass in social sciences. Opportunities to strengthen these aspects should be explored by increasing university-wide collaboration and by considering joint faculty appointments that allow researchers to participate in both interdisciplinary work and to focus on their own core discipline.
- Securing funding of infrastructure in the long-term would consolidate the unit.

# **Microbial ecology**

# Recommendations for immediate attention:

- Currently the area of microbial biology/soil ecology is distributed over three of the Department sub-units: MOCEB with microbiology, MEMEG with microbial ecology, and Biodiversity and Conservation with soil ecology. This organisation seems sub-optimal as it does not take advantage of a potentially unique research competence spanning microbes in petri dishes to the interactions of the microbial communities with larger organisms in the soil environment. The Panel strongly recommends a revised subdivision of the Department subunits to address this issue including relocalisation with a common fika/lunch room.
- The microbial ecology group (the UoA) evaluated by the Panel is a rather small group that after retirements over the next few years will include only three senior researchers (professors/lecturers). The Panel suggests immediate initiation of discussions of a plan for new recruits. The unit, not

least those that will not retire, should come together with the Department leadership to discuss recruitment strategy and required competence areas to be targeted in new recruitments. In doing this, it would be advisable to also consider competences that connect to the other microbiology-soil biology competences of the Department and extend the discussion to include these groups, in line with the suggestion above.

# Recommendations for long-term attention:

- Establish a long-term strategy for recruitment (building on the immediate measures suggested above). The UoA in their self-assessment indicated other potential research competences and areas available at the Department and Faculty levels whose closer association would be beneficial, and of course, also build on the already established links to Max IV and ESS. The ways in which new recruitments might fit into this picture need to be analysed by the faculty staff, involving not least the younger PIs, and discussed with the Department leadership.
- Identity and also recruitment of graduate students would benefit from this UoA being more involved in graduate level teaching. A high-profile course in biogeochemistry is suggested as an opportunity by the UoA, and the Panel strongly supports this idea. Such educational programs not only recruit interested students but also promote increased collaborations and form new links to faculty in other areas.

# **Aquatic Ecology**

# Recommendations for immediate attention:

- The Panel applauds the joint action to stimulate and develop grant applications by joint discussions and coaching, and the Panel also thinks that the time is ripe for developing a set of large grant research applications, either jointly or by joint support for an individual PI. This would likely foster the research agenda of the section, even if funding were not initially successful. For example, it will highlight gaps of competence and possibly also infrastructure that the unit should strive to fill.
- The self-assessment indicates a too high teaching load for several lecturers. This might result partly from hiring researchers instead of new associate lecturers. Out-of-the-box solutions may be necessary, and a discussion with the Department leadership of funding associate lecturer positions partly on soft money and partly funding for teaching but backed up by soft money, might be one way to lower teaching load on lecturers and open up a few new positions for young researchers hired on contracts as technical staff.
- The Panel recommends action (with the rest of the Department) to try to find (professional) ways to deal with a high stress levels among research staff. This will of course not only improve the working situation for everyone, but also reduce costs of sick-leave.

# Recommendations for long-term attention:

• A plan is required that not only takes care of vacancies over the coming 2-4 years but also strengthens the overall long-term competence of the department. Over the past strategic period, only one category of staff has expanded, and only in terms of "researchers" (from 1.5 positions to 6.5 positions). As the UoA also reports a successful strategy that has led to increased external funding (from 9.7 mSEK in 2014 to 18.8 mSEK in 2018) the Panel concludes that much of this external funding has gone into research positions, although some of these are *de facto* postdocs, and there is an increasing trend of hiring PhD students (as communicated in a letter to the Panel). However, as stated in the self-

evaluation and raised during the interviews, there is an urgent need for trained technicians, and so the Panel raises the question why some of the funding has not been used to hire 1-2 technicians on long-term (permanent) contracts that are shared among the PIs?

• Recruitment of new associate lecturers and lecturers is perhaps the one strategy that means most to the development of a research environment. The unit informed the Panel that the current strategy was to recruit broadly and pick the most outstanding applicant, whatever the area of competence. The Panel believes this has benefits, but an alternative is to try identify which competence will be needed to enable development of new potentials for the existing groups of the UoA. One way to do this might be to start the discussion of an application for a larger joint grant that includes an analysis of shortages in competences needed for a new project. To give a concrete example, the strategic recruitment of a spectroscopy competence to the Microbial Ecology research group some years ago, immediately boosted the whole research group and generated many new and innovative directions of research. For the aquatic ecology environment, it might be worthwhile thinking along these lines and communicating their visions to the Department leadership. Is there, for example, a need for a new competence to enable benefits arising from the large infrastructures (MaxIV and ESS) in which the university is heavily involved? This said, quality of applicants is of course always the priority criteria for hiring new people on long-term positions.

# Systematics and Plant Ecology

### Recommendations for immediate attention:

- The unit has recently recruited additional members, considerably strengthening the team. To facilitate smooth integration of the newer staff and of this relatively small unit, communication is strongly encouraged, on both practical matters and research interactions at the Department level. Department-wide transparency in issues such as space use and recruitment strategy is essential for a well-functioning research community.
- The lack of resources and uncertainty regarding the fate of the museum are unacceptable. The situation places the head of the museum under pressure, takes up time and is a considerable source of stress. The unit must be provided with resources to run the museum or, alternatively, the Department/ Faculty should work closely together with the museum leadership to find other solutions. Globally, museums are increasingly recognized as important components of biodiversity research infrastructure, and there may be opportunities to integrate this function with the strong biodiversity focus at the Department to create an even stronger platform for biodiversity research.

### Recommendations for long-term attention:

- The relatively recent recruitments have considerably strengthened the unit with the non-overlapping yet complementary expertise of new faculty staff. The unit is strongly encouraged to work toward long-term strategic thinking that places it in the best position possible to meet future challenges related to research, teaching and running of the museum. Long-term recruitment strategy that emphasizes research competence and complementarity to current faculty is encouraged.
- A strategic decision regarding functioning of the museum needs to be taken without delay but it is foreseen that the refinement of these plans and, for example, potential integration of the museum into a faculty level biodiversity platform, forms an essential component of a longer-term strategy.

# **Department of Biology**

In addition to the specific recommendations for the UoAs, the Panel has the following recommendations to the Department at a unit of research:

# Recommendations for immediate attention:

- Find ways to obviate or deal with stress-related problems among staff, including PhD students
- Organise appropriate mentoring and training of all staff
- Initiate a discussion with existing sections of the rationale and efficiency of the current units, the potential need for restructuring in line with Departmental strategy and mechanisms by which this can be achieved
- Discuss the need for technical support and how this should be financially resolved with the research sections and research groups
- Establish a format for discussions of coming recruitments at lecture and associate lecture level that involves all PIs
- Broaden equality and diversity to include monitoring and consideration of aspects other than gender

# Recommendations for long-term attention:

• Establish a long-term recruitment plan including an analysis of the need (if any) for strategic recruitments of specific competences

On behalf of the Panel, 22 August 2020 Kerstin Johannesson (panel chair)

# 8. Faculty of Science and Faculty of Engineering – Joint Panels (N+LTH)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 3	TOTAL NO UoAs: 22
SUBJECT PANEL NAME	UoA NAME
Physics	Atomic Physics
	Astrophysics
	Computational Biology and Biological Physics
	Combustion Physics
	Solid State Physics
	Nuclear Physics N
	Nuclear Physics T
	Mathematical Physics
	Particle Physics
	Physics Education and Physics Library
	Synchrotron Radiation Research
	Theoretical Particle Physics
Chemistry	Applied Life Science
	Analysis and Synthesis
	Molecular Protein Science
	Chemical Physics, Physical Chemistry and Theoretical Chemistry
	Chemical Engineering
	Food Technology
Mathematics	Applied Mathematics
	Mathematical Imaging Group
	Mathematical Statistics
	Pure Mathematics

# Foreword by the faculty leadership

See Faculty of Science and Faculty of Engineering

# External panel reports

# Physics

# Panel overview

Physics as a subject is the main topic of the Department of Physics, the Department of Astronomy and Theoretical Physics and the Unit for Medical Radiation Physics. Together they form Physics in Lund. The present panel is concerned with the research at the Department of Physics (FI) and the Department of Astronomy and Theoretical Physics (ATF).



The two departments together have around 480 staff (450 full-time equivalents), 390 at FI and 90 at ATF. The 2018 turnover was 541 MSEK (FI: 466, ATF: 75), out of which 464 MSEK (FI: 398, ATF: 66) were within research and 77 MSEK (FI: 68, ATF: 9) within education. ATF belongs to the Faculty of Science (N-fak), while FI is a department common to N-fak and the Faculty of Engineering (LTH).

# Department of Physics

The department – the second largest at LU – has seven research divisions. Two of them – Particle Physics and Synchrotron Radiation Research – are located entirely at N-fak, three entirely at LTH (Combustion Physics, Solid State Physics, and Atomic Physics), and two, Nuclear Physics and Mathematical Physics, are common to both faculties. The department has a unit for the common administration, including the services for undergraduate education and the National Resource Centre for Physics Education. Direct faculty funding is 220 MSEK, of which 68 MSEK are for the undergraduate education. The remaining funds of 250 MSEK are external grants obtained in competition. The main funding agencies are the Swedish Research Council (among others presently two Research Environment Grants), European Commission and European Research Council (among others presently seven ERC grants), Knut and Alice Wallenberg Foundation (presently two Wallenberg Academy Fellows, two Wallenberg Scholars and seven Wallenberg project grants), Swedish Energy Agency, Foundation for Strategic Research, and the Crafoord Foundation. The Department's divisions have a strong involvement in cross-unit and cross-faculty activities such as the Lund Laser Centre and the Swedish Strategic Research Areas NanoLund, BECC, and Merge. Likewise, the Department is heavily involved in several large research infrastructures, especially MAX IV, CERN, and FAIR. Activities towards the European Spallation Source (ESS) are being built up.

The fact that the Department belongs to two different faculties is a strength rather than a weakness. While it might look confusing from the outside, it poses few practical problems in the daily work of the Department. The communication between the two faculties is good and there is a strong will to find common solutions to common problems. The belonging to two different faculties has led to a very considerable strengthening of cross-faculty activities, with benefits not only for Physics, but for other departments, as well. Highly illustrative for this fact are the strong research environments Lund Laser Centre and NanoLund. Without the strong connection between the two faculties *within* the Department of Physics, it is unlikely that these research environments spanning over several faculties and departments would have emerged.

# Department of Astronomy and Theoretical Physics

Research at the Department of Astronomy and Theoretical Physics is organised into three separate units: Astronomy, Theoretical Particle Physics, and Computational Biology and Biological Physics. The departmental funds from N-fak are not distributed to the units, but held at the department level. The academic staff with permanent contracts (professors, senior Lecturers and tenure-track associate senior lecturers) have their employment and salaries at the department level. In contrast, external grants and staff employed on external grants are managed at the research unit level. Administrative costs as well as overhead income from grants are all carried at the department level; this way the budgetary surplus is held at the department level and this facilitates strategic spending of surplus funds.

ATF has a total external grant income per year of approximately 45 MSEK from a wide range of sources. We hold three grants from the European Research Council (one in Astronomy and two in Theoretical Particle Physics). We coordinate a large Innovative Training Network grant from the Horizon2020 (H2020) MSCA program. We have also been successful in achieving grant income from the Knut and Alice Wallenberg Foundation (KAW), having been awarded two Wallenberg Academy Fellow grants and one Wallenberg Scholar grant since 2012 as well as four Wallenberg project grants. Other important sources of funding are the Swedish Research Council (including a prestigious Environment Grant in Theoretical Particle Physics) and the Swedish National Space Agency (Rymdstyrelsen).

### Challenges for the future

The present Swedish research funding system poses a considerable challenge to our research quality. The dependence on external grants is very high, with *on average* 40% of the salaries of professors and lecturers at our departments being paid from external funding. PhD and postdoc positions are paid from external grants to the largest extent. At the same time the success rates have dropped below or even well below 20% for applications to all major funders. Today's funding situation is characterised by a substantial uncertainty for the individual researcher whether they will be able to continue their research in the future. This is counterproductive for the well-being of the researcher and the willingness to take scientific risks. The suggestions of the Swedish Commission of Inquiry on Governance and Resources might make things even worse, since they may lead to a redistribution of governmental research funds from research-intensive to teaching-intensive universities.

Physics depends on expensive equipment. A significant amount of our capital is bound in such equipment, and the fact that the university does not allow its faculties to have more capital than 15% of the annual turnover is burdensome for us. The uncertainty of the funding situation and the large dependence on external grants makes its necessary for us to keep a reserve in the form of capital. This reserve is strongly reduced by the inclusion of equipment in the allowed limit, since it cannot readily be converted into liquidity.

A great challenge for the research quality at LU (and other universities) is that the administrative burden given rise to by rules and routines determined by the Swedish state, central university, faculties, and external stakeholders has increased very substantially during past decades. Most severely, the increase of administrative routines can be taken as a sign of mistrust towards the lower-level leadership and the individual employee. While misbehaviour, of course, does occur, it is detrimental if such individual misbehaviour leads to the implementation of rules and routines that makes work life more difficult for everyone. Realistic cost/benefit analysis for changes such as new routines, new administrative systems, new software platforms should always be made in order to keep the university productive and efficient.

The administrative burden implies that it is difficult to find researchers who are willing to take on leadership roles at the departments and their divisions, since it makes it extremely hard, if not impossible, to sustain research activities. Ways have to be found to either lessen the burden, manage it or offer academic leaders attractive ways of returning to research when their missions end. We have also seen that a larger and larger share of our funds has to be used to employ additional administrative staff, most recently in conjunction with the transition to the services of the National Government Service Centre.

A critical issue for our future research quality is the existence of a pool of talented students that are willing to engage in a research career. ATF and FI agree on a close collaboration in physics education, and they strive to provide an education relevant for the modern needs of the students, giving them the skills they require to contribute, for example, in high-technology industries or scientific research careers. Equipped with a potent combination of practical, mathematical and computational skills, our alumni will be able to play an important role in addressing some of the most critical societal challenges. As the needs of the students evolve, so must the education that Physics in Lund provides.

### Science Village Scandinavia

Lund University has an ambition to establish itself in the Science Village Scandinavia (SVS) area between the MAX IV Laboratory and the European Spallation Source (ESS). In this discussion the question whether Physics in Lund or parts thereof should move to SVS has played and plays a central role. Naturally, the question is of central strategic importance for Physics in Lund, but an explanation of the positions of the two departments and of the challenges connected to SVS is highly complex. We welcome a discussion of this point during the panel meeting in May 2020.

### Infrastructure

Physics in Lund depends very strongly on both local, national and international infrastructure. Among these infrastructures are the local research laboratories such as the Lund Nano Lab, scanning probe laboratories, Lund Ion Beam Analysis Facility, Lund High Power Laser Facility, and Humanities lab and national and international infrastructures such as LUNARC/Swedish National Infrastructure for Computing, MAX IV Laboratory, FAIR, CERN, ESA, ESO, ICOS, synchrotron radiation and neutron facilities around the world and in the future the ESS. It is of central importance for our research that funding schemes for medium expensive, expensive and large-scale infrastructures and access to these infrastructures exist even in the future.

# External panel report

# Executive summary

Physics and astronomy at Lund University (LU) stand very strong, with some research clearly internationally leading.

The present organization is not suitable for taking long-term strategic decisions. It is very much decentralized and the different units (divisions) are heterogeneous. The decentralization has some benefits, but if physics and astronomy shall remain internationally visible (and in some cases leading) during the next decades, a reorganization is recommended. If not, Lund University may lose out to other universities that can tackle challenges better.

One should preferably bring all physics units into one, single department taking responsibility for strategic developments of research and teaching. The academically important bottom-up structure should then be provided by divisions for major physics research areas, being large enough to form collegial environments that can initiate new research and expose young researchers, graduate and undergraduate students to an internationally developing research frontier.

The merger of LTH and N-fak should be considered, although the panel is well aware that this would involve quite a complex process.

Strategic initiatives are in particular important in terms of recruitments, both at the junior and senior levels. International recruitments should be seriously considered, and all recruitments should preferably include a start-up package. To address the gender imbalance, the departments should actively go 'head hunting' and identify suitable female candidates, provide support and advice, and encourage them by hosting agreements and matching grants to apply for start-up grants.

The potential move to the Science Village is an opportunity to make strategic changes. The pros and cons of moving (parts of) physics to the Science Village must be thoroughly evaluated by the physics and astronomy units in concert with the faculties and central leadership of Lund University.

The Lund University must make greater efforts to align the services of the central administration with the needs of the research units and to support the academic environment. The present lack of trust must be addressed and communication between administration and research units needs to be strengthened.

# Introduction

The units of assessments (UoAs) assigned to this panel comprise most of physics and astronomy at Lund University. The panel is one of the largest in RQ20 and is composed of scientists from Sweden (5 including the chair), Europe (6) and the US (1). After the chair meeting in Lund on January 9, it took just over a month to distribute responsibility for the different UoAs among the panel members. Typically each member was assigned one unit, with a few exceptions.

The coordination of the panel meeting started in early March, but with the rapid break out of the Coronavirus pandemic the site visits planned for May 4-8 had to be cancelled and were fully replaced by video meetings.

The Zoom meetings during May 4-7 went without any technical difficulties. Zoom worked surprisingly well, but site visits would have been preferred for obvious reasons. We missed the informal discussions outside scheduled meeting hours with individuals, in particular young researchers, and within the panel. Using Zoom, the panel met some units for which the unit members were physically together in one room, whereas other units preferred to participate individually. Both formats worked well. The panel chair participated in all Zoom meetings, and the panel was very active; all meetings had >50% member participation. After the Zoom week ended, questions for a few units were collected and sent to Lund University. Answers were provided by June 12. The missed informal discussions required additional work in terms of two Zoom meetings with the panel, one in June and one in August.

# **Global Observations**

To put the UoAs in a national perspective, the organization at Lund University is unique and not found elsewhere in Sweden. Faculties of Engineering at universities that also have Faculties of Science (or similar), have either a joint faculty, as Uppsala University, or separate faculties with no joint departments as at Linköping University. In Stockholm and Göteborg, the Engineering Faculties are at the Royal Institute of Technology and Chalmers University of Technology, respectively, whereas the Faculties of Sciences are at Stockholm University and Göteborg University. Although physics departments in the two cities are geographically located in the same or adjacent buildings, the organizations are separate. At Lund University, the seven research divisions of the Department of Physics either belong to the Faculty of Engineering (LTH) or the Faculty of Science (N-fak), or both. The smaller Department of Astronomy and Theoretical Physics belongs only to the Faculty of Science. The organizational structure of physics at LU is unique in a national perspective, and there could be both pros and cons with this arrangement. Although the panel did not experience strong complaints from the units on this organization, we think that one should consider possible changes to optimize for the future. The panel is aware that teaching is handled differently at LTH and N-fak, being centralized at LTH, whereas it is handled at the department level at N-fak. The panel gained the distinct impression during the discussions at the faculty level that work is in progress to lower the barrier between LTH and N-fak. Given the size of LTH with respect to Lund University (25%), a merger with N-fak would be a problematic, complex reorganization, but it may have advantages.

The organizational structure of physics at Lund University seems to be more complicated than elsewhere in Sweden, mainly for historical reasons. There is nothing wrong with this, of course, and the panel has the impression that the present organization by and large works and suits everybody. At the same time the task of this panel is to consider the longer-term future, and in such a perspective the present organization may not be optimal. This has also been realized by the leadership of the Department of Physics, since they have appointed John Renner Hansen to overhaul the organizational structure and find the form that would ensure the most positive development of the activities at the department, including research, education and administration. The panel had the chance to meet J.R. Hansen during a 30 minute Zoom meeting, which gave valuable additional information. The panel was for example unaware that IT support was strongly decentralized even below division (unit) level, an arrangement that seems clearly suboptimal.

One of the major topics discussed by all units concerned the question of the localization of departments, or parts of the departments, to the Science Village (SV) at Brunnshög, between the European Spallation Source (ESS) and MAX IV. The panel recognizes the critical as well as difficult character of this question. The localization of a synchrotron radiation source with state-of-the-art multi-bend achromat lattice (MAX IV) and the world's most powerful neutron spallation source (ESS) within close proximity is an unusual combination of geographically localized photon and neutron sources to be found only at a few other places in the world. This offers particular possibilities for Lund University, with the prospect of creating a unique scientific environment. It also constitutes a risk that must be assessed. A move to new buildings usually incurs increased costs for office and laboratory space, although this is also dependent on the rental system applied by the university. If unit rent is applied, this may not be a problem. A bigger problem could be that physics in Lund will be divided, with some units moving to SV and other units remaining on the city campus. This would be a most unfortunate development and could lead to isolation and subcritical mass both at SV and in the city campus. The combination of possibilities vs risks was emphasized by almost all physics units.

A complication is that MAX IV is a Swedish national laboratory hosted by Lund University, whereas ESS is a European Research Infrastructure Consortium (ERIC), with Sweden and Denmark as host countries. Lund University is ultimately responsible for MAX IV, whereas the Swedish Government has the national responsibility for ESS.

One of the most severe financial risks is related to rent. Most university buildings in Sweden are owned by Akademiska Hus, which is a wholly owned Swedish Government enterprise. Thus, the ownership of university buildings is highly centralized in Sweden. Although not stated explicitly, Akademiska Hus will most likely build and own most of SV at Brunnshög.

The instructions from the government to its company that it should be operated in a businesslike manner, by applying market rents, have put the rent for individual departments, and even divisions, at levels which are unhealthy for the core activities at Swedish universities, with Lund University being no exception. Smaller units conducting fundamental research, with less access to external funding, stand a risk of being seriously hurt financially by moving to new and more expensive buildings. The experience from other universities in Sweden suggests that such a move is possible without being detrimental for financially fragile units, but there are also examples of the contrary, so a well thought out strategy will be required.

There are several international examples of how an intellectual infrastructure is beneficial for the science at a large scale research infrastructure. The Center for Free-Electron Laser Science in close proximity to the European XFEL in Hamburg is one example; the Stanford PULSE Institute on the premises of SLAC National Accelerator Laboratory is another one. These two examples can be used as role models for Lund University.

Thus, an intellectual support structure for MAX IV and ESS should not be the sole responsibility for Lund University, but a joint venture between the Swedish Government (possibly through ESS) and Lund University.

Some themes came up in essentially all assessments and meetings with the units, and for this reason they are removed from the observations of the units and collected here.

All units experience a challenge to attract external funding. This is a problem on the national level in Sweden (and elsewhere), and what makes the situation difficult for Sweden in particular is that quite a substantial part of salaries (40% for physics at Lund University) for professors and lecturers is paid by soft money. Finances and personnel are handled at the division (unit) level, whereas the mandate to take decisions remains at the department level. The units at the two departments seem very independent, the larger ones being comparable to smaller departments. Better inter-division and division-department interactions could result in possibilities for long-term strategic initiatives on a scale not possible at the division level.

Many units and also the panel Overview expressed problems in the relationship with the central administration. The overall administrative burden increases, partly due to instructions from the government level to the universities. There are, however, also routines and rules stronger than foreseen by the government implemented locally at Lund University as a remedy for isolated problems. It was questioned whether this is the most effective way to deal with problematic but rare events. Several units also expressed a feeling of mistrust by the central administration. They consider various administrative routines not to serve the activities in the different units, but to monitor and control them. This is a problem not only at Lund University but also elsewhere in Sweden (and internationally). It is difficult for the panel to be specific on this issue since no information has been provided on the operation of the central administration. However, it appears that RQ20 has the potential to allow Lund University to address these problems as they are experienced by the teachers and researchers in the UoAs, and provide national leadership in building trust in the central administration.

The increased administrative burden causes a problem in finding faculty willing to take leadership at the department and division levels. Somewhat paradoxically, it seems as if the transition made by Lund University to make use of the National Government Service Centre has forced the departments to employ even more administrative staff, which has increased the administrative cost at department level. The paradox is that the Service Centre was set up by the Swedish Government to help make the administration of its agencies (including the universities) more efficient. A report from the Swedish National Audit Office reviewing the Service Centre does not contradict the experience by the physics and astronomy units at Lund University.

The units in general seem to have an appropriate size to carry out collegial research in a specific field. However, it seems difficult to take strategic decisions (high-level recruitments, new research directions) on the Department and Faculty levels when, as it appears to the panel, the initiatives mainly come from the unit level in a bottom-up type process. The unit, understandably, is focused on its current activities and research priorities, and is often too small to take a wider view on where physics is going. This could result in a loss of international competition for excellent people.

In the text that follows, the terminology unit and division is used synonymously.

# Atomic Physics – Observations

### Leadership

Atomic physics in Lund has very old traditions, going back to Johannes Rydberg and his famous formula. During the 1930s and 1940s, Lund became a centre for atomic spectroscopy, with Bengt Edlén's identification of the carriers of the solar corona lines (highly charged ions) as a scientific high point. When LTH was created in 1961, atomic spectroscopy became a research activity also at LTH. When Sune Svanberg took leadership at atomics physics, LTH, lasers became the common theme at the division, and several strong research directions, some of them applied, were started. Leadership was effectively transferred to Claes-Göran Wahlström after Svanberg's formal (but not practical) retirement, and the research in the Atomic Physics division is now by themselves characterized as laser and light – matter interaction. The research in the division has made smooth transitions, with some activities phased out whereas others have grown. This has occurred not because of decisions top down, but rather as a natural dynamic process characteristic for a healthy research environment. A change in division leadership can be anticipated within the next five years, but should not pose any problems owing to the strong next generation of professors active in the division.

The research portfolio includes very strong activities in laser- and free electron laser-based ultrafast science, quantum sensing, and laser wakefield acceleration of particles. In particular the attosecond physics group under the leadership of Anne L'Huillier has a very high international visibility.

The unit is well integrated with the teaching at LTH, which, apart from the financial benefits, also provides a link between the undergraduate students and the researchers in the unit.

### **Collegial culture**

The research groups in the unit are constructed so that there are at least two faculty members with tenure in each research direction. This guarantees a certain degree of stability, while at the same time causing some problems for early-career researchers. They must show independence in order to obtain external funding in an increasingly difficult funding climate, while at the same time being dependent on research infrastructure built up by their more senior colleagues. The lack of start-up funds is clearly an obstacle in this respect.

The unit has been successful in keeping a fairly constant number of professors of high international standing over an extended period of time, however, they have almost always been recruited internally and during recent years there is not a single external recruitment. The problem to recruit externally is less a reflection of problems in the unit, but rather indicates that faculty positions at LTH (and the Science Faculty) are less competitive in an international perspective. In the section *Global observations* it was noted that as much as 40% of the funding of professor and lecturer positions must be brought in externally. This makes aggressive recruitments difficult, as discussed in the *Global* section.

A strong point for the unit is its leadership role in the Lund Laser Centre, and through the centre its visible and active role in Laserlab Europe. It was somewhat more difficult to understand the functioning of the Lund Laser Centre locally at Lund University.

The involvement of the unit in ELI-ALPS in Szeged, Hungary, will be very interesting to follow, and it is reassuring to see several members of Lund Laser Centre in the ELI-ALPS Scientific Advisory Committee. The facilities in Szeged offer exciting scientific opportunities, but they are placed in a city with no previous experience of operating a major international research facility.

Whereas the unit has a broad international distribution among its staff, it suffers like so many other physics research environments, from a lack of a substantial fraction of women.

The unit has a consistent production of scientific papers in reputable peer-review journals, with some publications of breakthrough character.

### Quality ecosystem

The panel agrees that the unit has correctly identified its strength. The feeling of a collegial spirit was amplified during the panel's meeting with members of the unit. It is also clear that making the transition from a strong leadership that has built up a research environment to the next generation is not easy, and there are certainly examples when this has failed. In the present case, the transition has been very successful and without causing any visible tensions.

The unit has considerable responsibility for research infrastructure, also on a European level, and a shortcoming is definitely the limited support of research engineers. When this point was brought up by the panel, it was clear that it is up to the individual unit how to use the resources provided by the department. While the panel can understand the rationale for this, it nevertheless creates vulnerability which must be identified at department and faculty levels.

The move to the Science Village (SV) is a critical issue for the unit. In the eyes of the panel, for a unit with such strong presence in photon science, it is difficult to imagine that a move in the long term perspective would not only be beneficial for the unit and SV, but also for the large infrastructures under construction or in an early science phase at Brunnshög.

# Astronomy – Observations

### Leadership and Organization

The Astronomy unit is – despite its relatively small size – recognized internationally as a strong research group with a research focus on the formation and evolution of the Milky Way. The research activities are subdivided into four key research areas: 1. Formation of the Milky Way, 2. Characterisation of stars, exoplanets and stellar populations in the Milky Way, 3. Formation and evolution of planetary systems and 4. Extreme astrophysics (black holes, neutron stars and compact binaries). The research includes observational activities with a major component on development and use of research infrastructure (on ground and in space, as well as computing infrastructure) and handling huge data sets (data mining).

The work in the Astronomy unit is organized and structured based on a clear strategic plan formulated in 2013 including an updated vision for 2018-2020. The strategic plan includes external funding as well as recruitment of additional staff and PhD students and postdocs. The scientific output of the group has increased in recent years partly due to an increased level of funding via external grants. The unit publishes about 60+ papers per year with several highly cited papers in high-impact journals. The activities in relation to international astronomical research infrastructures (e.g. Gaia, 4MOST, PLATO, LISA, ESO (VLT/ELT)) and in Lund (e.g. COMPUTE/eSSENCE) provide a large number of opportunities for the unit. The involvement in all those activities – also at a formal level with important deliverables – might potentially become a threat due to the fact that the involvement also in the future will require significant allocation of resources over an extended period of time.

The weaknesses for the unit are similar to those for most research groups in Sweden and abroad, such as maintaining the level of external funding, challenges in relation to diversity and creation of attractive positions for the next generation of scientific staff. The educational activities are focused on the Master's programme and the unit is working on offering more teaching in the physics Bachelor's programme – and this is also the basis for recruiting students for the Master in Astrophysics.

### **Collegial culture**

The culture in the unit has a focus on stimulating collaboration outside the small local research team where a given student or staff member is working. There is a large number of seminars, science meetings as well as smaller and larger workshops. The Department also supports the organization of conferences in Lund (e.g. the well know "... for All" workshops). Resources are generally shared when possible and the unit works on organizing and ensuring access to external facilities and resources (locally in Lund as well as internationally). Research integrity and ethics are discussed in the unit also involving the PhD students and focus is on diversity (formally at the department level). The data policies in relation to applications and publications ensure that data can be shared and distributed between students, researchers and collaborators in Lund abroad.

### Quality ecosystem

The educational portfolio for the Master's programme is closely linked to the research activities in the unit and offers both observing activities and data processing activities, modelling, HPC, theory and research planning. The SWOT analysis performed by the unit has a focus on research and funding but also collaboration and general university strategies and support are considered. The Astronomy unit has some connections with industry (camera development) and the research network connected to the unit is extensive and includes teams and research groups connected to larger observational surveys as well as groups at universities all over Europe and in the USA and Australia. The open data policies within astro-

physics ensure that a relatively small research unit like the one at Lund University will have access to all relevant original data. The national membership of ESA and ESO ensures that access to research facilities is stable and open and this allows long-term planning of research activities.

The Astronomy unit indicates that they do not see any advantages in moving to the Science Village and sees a potential move as a threat due to the financial impact for the unit, significant interruption to normal activities due to the reorganisation and the unknown risks of being embedded within a large new organisational structure at the Science Village.

Throughout the RQ20 interviews, it became clear that the individual units are organized as very independent units with significant influence on strategic development, resource allocation priorities, recruitment and hiring as well as education and teaching planning. This is excellent in many situations and the astronomy unit is organized in order to optimize the research and educational output within those boundary conditions. However, the extended independence is a challenge when the unit is handling questions or decisions that will influence other units and/or are of a more general nature and often linked to strategies at university or faculty level (e.g. the decision to establish Science Village).

# Computational Biology and Biological Physics – Observations

This is a small unit, collecting individual PIs that have common interests in applying physics-based modeling and machine learning to biological/medical problems. A significant part of their work is done in long-standing collaborations with outside groups, where a PI from the unit typically contributes modeling and analysis tools and the collaborator contributes experimental data. The unit is strongly involved in undergraduate teaching in a collaborative manner. While the PIs are successful at what they are doing, the heavy reliance on outside collaborations means that they have found themselves in a large measure unable to compete successfully for individual grants at VR, KAW or the ERC. A related consequence is that, while the individual PIs may have good international visibility and standing in their respective research communities, the unit as such is largely invisible outside LU.

The PIs are generally happy to belong to the unit and with the unit's geographical location, close to their main collaborators in the Medical faculty. The whole unit stands behind the idea that their immediate top priority is to strengthen the Machine Learning group by recruiting a new tenure-track Assistant Professor (BUL). This recruitment makes good sense to the panel, not the least because the Machine Learning courses and Master projects offered by the unit are very popular in the Natural Sciences and Engineering study programmes. Considering the high demand for talent in this area, both in industry and academia, it is unfortunate that the unit does not appear to have the means to provide a competitive start-up package, underscoring the need for procedures to take (and fund) strategic decisions on the Department and Faculty levels.

# **Combustion Physics – Observations**

# Leadership

Since its origins within the Atomic Physics division the Combustion Physics division has benefited from strong and innovative leadership who established the division largely by external funding with minimal financial support from the university. This strength has been maintained until the present, and external engagement with funding and international, as well as internal, collaborations remains strong. The unit is responding well to the changing environment related to fossil fuel combustion and is actively diversifying into other applications of the science and technology developed within the division. Specifically, the following areas have been identified for future activity: combustion of biomass and new fuels including

metals; catalysis; plasma-assisted combustion; medical, environmental and agricultural applications of laser-based measurements; modelling and analysis capability in atmospheric chemistry. The overall research strategy is soundly based on exploiting the core strengths of the unit in applications of current and future societal importance such as environmental physics and bio-photonics.

# **Collegial culture**

The unit has a good track record of promoting and mentoring early career researchers within its membership. It experiences a problem common to other units also that such early career individuals must establish independence of research activity whilst also seeking external funding on the basis of a relatively short experience of independent work. The unit overall is working hard and effectively to exploit its research strengths to ensure a sustainable future. It has been very successful in utilizing European Union and other international networks for collaboration in research. It also shows awareness of the issues of diversity regarding age profile and gender and this is reflected in its approach to recruitment. The unit is highly regarded internationally and this is reflected in the willingness of world-leading academics to collaborate with researchers in Lund as well as to make use of the facilities. A substantial record of high quality publications in peer-reviewed journals has been maintained.

# **Quality ecosystem**

The unit's SWOT analysis has identified accurately each aspect and the panel noted the detailed responses to specific issues under each heading. The maintaining of the close relation between fundamental or basic research and applications with industrial involvement is a major strength. This can stimulate original thinking and focussing on applications can also be motivational and encouraging as well as creating career paths for early career scientists. In addition, important work is done for societal benefit as industries react to problems requiring solutions such as the shift away from fossil-fuels and increasing attention to alternative energy sources and environmental concerns. The diversity of applications of the novel techniques developed for combustion problems is a valuable by-product of this research. Relating the strength in research to education of undergraduates is a weakness compounded by the low exposure of students to the research activity of the staff. The opportunity afforded by the potential move to the Science Village is seen as problematic if it involves separation from other divisions within the Department of Physics. However, on balance, the benefits may outweigh disadvantages especially if all, or most, of the other divisions also move and thus facilitate continuing collaborations. External research collaborations indicate strength and opportunities for sustainable development. The links with China are potentially helpful and seem to have been well managed. Ethical issues involved in cooperation with countries with a questionable human rights record require policy decisions to be made by the University at a high level (see Global Recommendations).

# Solid State Physics – Observations

The Division of Solid State Physics is a unit within the Faculty of Engineering (LTH) and employs 20 highly interacting faculty members. Its research areas cover materials science, exploratory nanotechnology, and fundamental physics with applications e.g., in energy, life sciences and nanosafety. Within the division there is a strong culture of collaboration and sharing of equipment. All of the faculties are engaged with NanoLund, a wider research consortium covering a broader range of disciplines that was initiated by the Division of Solid State Physics in 1988. The division also runs and develops Lund Nano Lab (LNL), which is a university wide world-class semiconductor cleanroom user facility that is part of the MyFab – the Swedish national infrastructure for micro- and nanofabrication. The division has been very successful in obtaining sustained external research funding. It is highly motivated and engaged in the creation of a future Lund University campus at Science Village, neighbouring MAX IV and ESS that includes the planning of a new and larger cleanroom facility that will replace LNL.

# Observations

- The Division of Solid State Physics is dynamic and collaborative with a high international research presence in many interdisciplinary projects and broad range of topics including material and nanoscience, quantum physics and application oriented research in energy topics, biomedicine and nanosafety.
- The panel was impressed by the scientific excellence and resources. The research is of very high quality, world-leading in several areas, and highly productive (~70-80 papers per year in leading journals).
- The division is highly successful in attracting external funding, partner of 13 EU-projects (6 of them were coordinated by the division) and industry. Currently 60 % of total funding is external.
- There is a culture of sharing of equipment and collaborations, both locally within Lund University and internationally, in many cases in interdisciplinary projects.
- There is a strong emphasis on synthesis, fabrication and characterization of materials and device structures with a core focus on semiconductor-based nanostructures.
- This flagship division is the largest unit in the broader and highly successful research consortium NanoLund, which involves multiple departments and a broader area of research.
- The division is highly engaged in developing and operating the important state-of-the-art nanofabrication facility Lund Nano Lab, which is open to the entire Lund University as well as to other universities and industry. It has a support team of 15 highly qualified research engineers and technicians employed by the division.
- The division sees the planned new nanofabrication laboratory at Science Village as an excellent opportunity for acquiring new capabilities, broadening of interests and allowing for desperately needed expansion of the cleanroom space.
- The division is very self-reflective and has identified areas that need improvement including organizational structure, gender imbalance, and communication.
- The plan for more active recruitment efforts for Master students is applauded.

# Nuclear Physics N+T - Observations

The nuclear physics division has five research groups doing seemingly rather different physics and has staff belonging to two different faculties (Science and Engineering). This does not seem optimal for scientific productivity through coherent collaborations, nor for the administration which is "hit heavily by ever-increasing demands on reporting, control and follow-up".

### **AEROSOL** group

The AEROSOL group is a large group, with a total personnel number, as of 1 May 2020, of 15, of which 4 are PhD students, but 2 of the positions still were to be filled. There are two professors, who are both over 60 and the oldest of them is part-time retired. There are also two senior lecturers, with one of them close to 60. Furthermore, there are 4 associate senior lecturers, with one of them over 40 and the other 3 in their thirties. The future of the group, in terms of professors, seems therefore consolidated.

The research focus of the group is on atmospheric aerosols and their effect on climate and air quality. The research within the group concentrated in the past on experimental aerosol physics and chemistry using ion-beam techniques originally developed in nuclear physics and various other measurements, but in recent years, a substantial modelling component has been added. The future strategy is to combine measurements and modelling.

The group stated in its Self-evaluation report: "In the international context, we are a relatively small research group and many research foci depend on one scientist. This vulnerability is a WEAKNESS. There is also lack of manpower for data analysis and to develop and use our atmospheric models and field data."

The group was and is involved in many scientific collaborations, and that at the international, national and Lund University level (i.e., ICOS, ACTRIS, IAGOS-CARIBIC, the cities of Malmö, Gothenburg and Landskrona, LUCCI, MERGE, and CAST) and it is planned that the collaboration at the different levels will continue in the future. At the Lund University level, there is since some years strong collaboration with the BAR (Biospheric and Anthropogenic Radioactivity) group, in particular for 14C-analysis of aerosols. The group is responsible for the ACTRIS part of the Hyltemossa Station, and measures the following three aerosol parameters there continuously by requirement: particle number size distribution, light scattering and absorption; also some additional variables are measured there, which is commendable.

The group has a good teaching record and it has a very fine publication record, with a total of 102 peer-reviewed publications in the period 2014-2018, and it also can boast with a recent high-level publication (P. Roldin et al., Nature Communications, 10:4370, 2019).

With regard to OPPORTUNITIES, the AEROSOL group mentions the following as examples: the possibility to grow within many existing or potentially emerging "hot" research fields within climate and air pollution research; to make use of MAX IV to learn more about aerosols, especially aerosol surfaces; to further develop combined ecosystem/atmosphere modelling and bridging over modelling scales and between modelling and measurements.

As to the question whether the group plans to relocate to the Science Village, the group answered that such move is an open question and that no decisions are presently made. As a general answer the group refers to the vision document approved by the department board. It is further stated that the AEROSOL group at nuclear physics is sharing an excellently equipped aerosol laboratory in the design building (IKDC) with other groups and any possible decisions about a move of this lab strongly involve also other departments.

### AstroGeoBiosphere (AGB) group

The fact that one can obtain information about meteoroids and the asteroid belt from the Earth's sedimentary record is very interesting, and has been exploited very successfully by the AGB group. This research activity has relied heavily on external funding, and has not been able to get access to funding through teaching. The PI, Birger Schmitz, has been the scientific driver behind the AGB group, and has collaborated with several leading international groups.

### **Biospheric and Anthropogenic Radioactivity (BAR) group**

The BAR group is a small group, with a total personnel number, as of 1 May 2020, of only 3, of which 1 is a professor, 1 a senior lecturer, and 1 a post-doctoral fellow. Although there are no PhD students with BAR, there is one student researcher from radiochemistry working with BAR. The small size of the research group (and its dependence on the group leader) is definitely a WEAKNESS.

The main research topics of the group are man-made environmental radioactivity, radioecology and internal dosimetry. It is focusing on research related to radiation-related and nuclear facilities (ESS and the nuclear power plants) and on internal dosimetry related to such facilities. Measurement technologies for difficult-to-measure radionuclides are prioritized. The group does analyses of man-made radioisotopes in, for instance, human cells as well as the environment, using radioactive decay techniques or accelerator mass spectrometry – from where the field evolved within the Division of Nuclear Physics.

The STRENGTH of the BAR group is its interdisciplinarity, and also the diversity of research fields. The BAR group is involved in climate and aerosol research with scientific collaborations, and this not only within the Division of Nuclear Physics, but also in collaborations at the international, national and Lund University level (i.e., ICOS, ACTRIS, ESS, SSM, Saint, LUCCI, MERGE, and CAST).

Taking into account its small size, the group has a very good teaching record and a fine publication record, with a total of 22 peer-reviewed publications in the period 2014-2018.

### **NEUTRONICS** group

The NEUTRONICS group is a group of a good size, with a total personnel number, as of 1 May 2020, of 10, of which 1 is a professor, 1 a senior lecturer, 2 are researchers (tenure), 2 are research engineers, 2 are post-doctoral fellows, and 2 are PhD students. Furthermore, there is one adjunct professor (from industry, under evaluation). The professor of the research area will retire within five years. Before then, it is foreseen that the existing senior lecturer is promoted to professor and that the existing researchers are promoted to senior lecturers. The future of the group seems therefore consolidated.

The group is the result of the very recent fusion of the LTH LIBAF Group (which operates the Lund Ion Beam Analysis Facility) and the N-fak Source-Based Neutron Irradiation Group (which operates the Source-Testing Facility) to streamline and facilitate their common research goals and thus future under a neutron-related umbrella.

Among the STRENGTHs of the group are its user facility capable of around-the-clock operations, its more than a decade-long relationship with several groups from the ESS Science and Instruments Division, and its well-established collaborations with industrial and large-scale research partners. In the current Swedish research landscape, the group is unique.

The group stated in its Self-evaluation report: "Our primary WEAKNESS is our unfolding migration from our past in the fields of classical experimental and applied nuclear physics to our future providing core nuclear techniques to multidisciplinary research, of which the potential complementary disciplines are rapidly evolving and multiplying. "Reinventing" ourselves is necessarily a time-consuming process, and one where we lack a clear and well-established scientific mission."

The group was and is involved in several scientific collaborations at the international and national level (i.e., HIBEAM/NNAR, ESS, SKB, CNG, LINXS).

The group has a very good teaching record and it has also a fine publication record, with a total of 63 peer-reviewed publications in the period 2014-2018.

A potential relocation of NEUTRONICS to the Science Village is seen by the group as a huge OP-PORTUNITY, as it will facilitate the restructuring under a neutron-related umbrella. The group only sees benefits in the creation of a neutron-focused cross-disciplinary physics division based near ESS and MAX IV. On the other hand, the LIBAF facility will not be moved. During the next 5-10 year period a continuation of the work with it is foreseen both with general macro-PIXE on demand, focused-PIXE and focused NRA.

### **NUSTAR group**

At first sight, the NUSTAR research activities may seem somewhat diverse, but there is coherence based on common scientific goals and modes of operation. In particular, one has aligned detector R&D in a joint laboratory and participates in various experiments at international accelerator facilities in both long-term large collaborations and distinct experimental campaigns in smaller groups. The research output is thereby quite high for this relatively small research group. This is also reflected in the present substantial external project funding, whereas basic funding for the local detector laboratory needs an improved long-term basis. The main activities are at FAIR and CERN and this focus should be kept for the coming years motivated by scientific excellence and the fact that these are central activities at the European level. The Swedish nuclear physics community supports FAIR and has commitments to FAIR. NUSTAR has already delivered in-kind contributions for FAIR phase-0 experiments with first results expected 2021. Other contributions are being developed and tested in experiments at other facilities before moving to FAIR for its next phases. This illustrates the group's strategy to develop specialized, flexible detector systems that are used to access beam time at different facilities and thereby maximize scientific output.

In addition, NUSTAR has a potential for doing basic fundamental physics research at ESS; neutrino physics of interest for e.g. explosive stellar phenomena and neutron-antineutron-oscillations as signal for new fundamental physics. Particularly noteworthy is an already started collaboration with the particle physics unit on dark matter search with the LDMX experiment.

NUSTAR, with its fundamental subatomic physics research at international accelerator centers, should have more in common with experimental particle physics and therefore fit better in a joint division for Nuclear and Particle physics.

# Mathematical Physics - Observations

The Division of Mathematical Physics documents a highly successful research activity. Considering the relative small size of the division (presently ten faculty members, five postdocs, and fifteen PhD students), the breadth of activities is impressive, covering a wide range of problems within quantum manybody theory – from time-dependent phenomena in the solid state to the physics of confined systems such as nuclei, quantum dots and cold atoms. As for specific strengths and weaknesses/threats, the panel made the following observations:

# Leadership

# Strengths

- Highly successful research activity as measured by publications in leading journals, citations, and external funding.
- Strong record in PhD production, as well as in teaching at the Bachelor's and Master's levels.
- The small size of the division and its efficient management ensure a smooth every-day operation.

# Weaknesses

• Several upcoming retirements and need for rejuvenation.

# **Collegial culture**

# Strengths

- Focus on performing first-class 'curiosity-driven' research, with early-career researchers encouraged to develop their originality and independence.
- High quality in grant applications as evidenced by 2 (1) large individual grants from KAW (SSF); an exceptionally strong showing of individual VR project grants (8 of 10 faculty members); participation in 5 KAW network grants.

# Weaknesses

- Few people in the division are working dedicatedly within the same circle of problems, making it hard to initiate or become a viable partner in larger international networks and funding schemes.
- Gender imbalance.

# Quality ecosystem

### Strengths

- A rather unique breadth of research activities, covering a large range of topics in quantum manybody theory and quantum technology, well reflected in the educational portfolio.
- Good synergy with experimental activities at the Department, with joint scientific applications and funding, opening of new research endeavors, and joint teaching/supervision tasks.

### Weaknesses

- An unhealthy dependence on external funding and lack of long-term financial stability.
- Inflexible rules imposed by funding agencies and the central university administration encumber optimal use of external grants.
- An increasing level of university bureaucracy and teaching administration that snatch time away from research.

# Particle Physics – Observations

This unit has, through a very well developed strategy with good planning and priority setting, an excellent position in the high energy physics research frontier. The group is one out of four in experimental particle physics groups in Sweden. Together the four groups decided to join the ATLAS experiment already when the Large Hadron Collider (LHC) at CERN was planned, in order to collaborate and to maximize the possibility to get funding. Unique for Lund is that some members involved in Heavy Ion Physics decided to join ALICE, another experiment at LHC. LHC will run at least until 2035 and will be upgraded in the mid-20s in order to give higher luminosity (HL-LHC), a project which has the highest priority within the particle physics community in Europe. The group members are strongly committed to take part in these experiments and are heavily involved in the detector work and analysis. This includes taking part in the needed upgrade of the experiments for the HL-LHC. Some members of the group also play a very important role in the development of software tools needed for these large experiments. Group members have also got involved in a smaller experiment, the LDMX (Light Dark Matter Experiment), and others look at the possibility to work on the Heavy Ion experiment sPHENIX at Brookhaven National Laboratory, the successor to PHENIX where the Lund group was strongly involved for more than 20 years. This participation in other coming experiments is a strength for pursuing the unit's research strategy. There is also an interest in the possibility to use ESS for fundamental research; however, that is for the far future.

Particle physics is by default built on networking and collaboration and the members are very active within the big collaborations. The impact the group has in the collaborations is shown by the leading roles that members of the group have within the collaboration. The group members show an impressive list of important assignments in ATLAS, ALICE and LDMX. Apart from the publications within AT-LAS and ALICE several members in the group have also published independent reports.

The unit is one of the founding partners of the eSSENCE SFO which was crucial for creating the software for the World LHC computing GRID. Right now the focus in eSSENCE is on interdisciplinary projects which are not so useful for the unit.

The only possibility for funding in Sweden for particle physics is from VR, KAW, ERC and EU. The group has indeed been very successful in getting funding, even if the funding from VR has decreased during the last years. One reason for this is that VR has changed from group funding to funding for individuals with novel ideas. The members have changed their strategy for applications accordingly. As mentioned above, scientific considerations of the group has recently led to engagements in smaller ex-
periments to work on in parallel with the LHC experiments, which is also along the lines of VR's more individual targeted funding schemes. A general problem for experimental particle physics is that the projects run for tens of years, but the project funding is only for 3-4 years.

The members of the unit are mostly rather young with only two professors and one of them will rather soon retire. The unit has been very successful in recruiting young very talented, international researchers. It has in the last years recruited three associated senior lecturers, all three women of very high standard. All three got external funding in very high competition. One lecturer has been promoted to professor and several of the other lecturers are working towards getting promoted in the near future. The young researchers show large independence following their own research interest. They apply for their own funding and they have been very successful.

The balance between teaching and research seems to be reasonable; however there is room for the group members to take a larger part in teaching undergraduate students. The division is also active in outreach activities of several kinds.

## National Centre for Physics Education – Observations

#### Leadership

The National Centre for Physics Education (NRCF) is one of five Swedish national resource centres that offer professional development for in-service teachers at all levels. The NRCF is located in the Department of Physics, and it is led by associate professor Urban Eriksson. The centre's members are part of a research group, LUPER, which includes faculty members involved in Lund University's teacher education programme. NRCF thus offers services to in-service physics teachers, while the collective LUPER offers courses to pre-service physics teachers.

The NRCF's connection to the Department of Physics is a clear strength, as the connection provides links to cutting edge physics research and research infrastructure. Further, the Centre Leader (Dr. Eriksson) has a clear aim to strengthen the interactions with the physicists at the Department, e.g. by offering courses to physics students as well as offering science communication/pedagogy courses for members of faculty. Establishing this improved integration is an important **priority** for NRCF.

The NRCF has a healthy **publication pattern**, even though it is not mandated to do research by its national mission. The panel commends in particular the on-going efforts to co-publish research with education professionals. However, even though the NRCF has been successful in securing **external funding for research**, the number of staff members at NRCF is still below the critical mass needed to fully take advantage of the Centre's unique position at the intersection between physics research, physics teaching, and teacher professional development.

The overarching research strategy of the NRCF seems especially well suited to the specific position of the NRCF, as it focuses on how semiotic resources used in physics research are reproduced (or 'transducted') into educational contexts. Not only does this theoretical framework provide a strong general background for NRCF's particular opportunities for research, it is also well represented at the forefront of the international science education research literature.

#### **Collegial Culture**

The NRCF has a strong and inclusive collegial culture, judging both by the **opportunities** of early career researchers with the Centre to **develop their original ideas**, and by the Centre's established **networks** across both countries and formal/informal contexts. The limiting factor in growing these networks seems to be the scarcity of time of the small number of NRCF's research staff. Finally, the panel commends the

initiatives taken to promote **inclusion and equity** in the NRCF's teaching activities as well, promoting open and gender-diverse physics classrooms.

#### **Quality Ecosystem**

As mentioned, the NRCF inhabits a crucial place in the Swedish physics education ecosystem, and to the maximum extent possible, draws on its particular institutional placement (including research infrastructure) to provide high-quality, research-based education. This education portfolio will be expanded and further qualified as the NRCF hopefully grows. There is clear evidence of the potential for external research collaborations to support this expansion, and clear plans for the management of the research integrity and ethics components of these collaborations.

## Physics and Astronomy Library – Observations

The Physics and Astronomy Library ('the Library') is an institutional infrastructure to support physics and astronomy research and education. It has a range of resources, including a historical archive, support for data management, verification of publications, acquisition and maintenance of relevant sources and databases, and courses at the basic, advanced and PhD levels. It is a decentralised unit, catering directly to the Department Physics and the Department of Astronomy and Theoretical Physics, and supports the activities here in a bespoke and just-in-time manner. In this way, the Library provides an important and significant service to the research and education ecosystem of the Departments, to a high level of satisfaction. At present, the number of Library staff and availability of resources seems sufficient to cater to the requests for assistance, but increased awareness of the Library's excellent services among researchers, teachers and students may well cause the need to increase beyond the present capacity of the Library.

The high level of expertise and good practices required for the Library's quality services are achieved and maintained by the Library through its prioritisation of networking activities with the other decentral library units at LU, ongoing work with LU's course catalogue, internal and external developmental projects, and even international projects and conferences. The panel commends the Library staff for prioritising these activities, and acknowledges that it is difficult to fit such activities into staff members' busy schedules.

## Synchrotron Radiation Research – Observations

The Synchrotron Radiation Research unit, which is part of the Department of Physics and includes 60 employees of the faculty, shows a high investment of its members in the large-scale facilities MAX IV and ESS. The unit research expertise aligns with MAX IV and ESS capabilities.

A stronger link is aimed for as a suggested physical move of parts of the Department of Physics to the new Science Village that is being constructed between the two facilities.

#### Scientific, technical and educational aspects

- The interactions with the facilities concern accelerator, instrumentation and methods developments as well as use of synchrotron radiation (ESS is not yet open to users).
- The scientific interest is focused on the physical, chemical, structural and dynamical properties of materials using high brightness sources of X-rays and neutrons. The unit participates strongly in interdisciplinary research at Lund University and abroad, and has developed long term international collaborations. A very good record in quantity and quality of publications has been reported.
- Very nice highlights in surface science and chemistry using ambient pressure XPS, in gas phase with photoionization and fluorescence, on the study of nanoparticles by nano-X-ray diffraction, advancing the knowledge of catalysts by nano-imaging combined with short pulses, have been reported.

- The research trends are moving towards complex materials and dynamics with enhanced spatiotemporal resolution.
- In order to tackle new scientific challenges related to nanostructures, hybrid systems, materials for more sustainable and renewable energy and advanced computing, one needs *in situ* and *operando* techniques, electrochemical cells and also material synthesis and nanofabrication as well as complementary characterization techniques provided by Nano-Lund (SFO), the Lund Laser Centre (LLC) and the Scanning Probe Microscopy laboratory (SPM) and facilities for diffraction imaging and spectroscopy.
- The unit shows a good age structure with a good working environment and very good attractivity for PhD students and post-docs. It is located now in the old physics complex in the north end of Lund and partially at MAX IV. Moving this unit to the Science Village (SV) between MAX IV and ESS should have obvious advantages as the opportunity to move to new modern buildings and the opportunity to bring expertise closer to the world of X-Rays and neutrons, the opportunity to develop a stronger link of the facilities to students, the opportunity to increase the local high level of experimental complementarity to large facilities since SFO, LLC and SPM are moving.

## Organizational and economic aspects

- The activity of the SR unit is centered on atomic and molecular physics and chemical reactivity and condensed matter physics and chemistry as well as bio-crystallography.
- As mentioned in the general introduction of the general report, there is a financial issue related to the rent of the buildings, the financial strategy and the statuses of the facilities.

# **Theoretical Particle Physics – Observations**

This unit is internationally very well established based on its very good to excellent research, as also demonstrated by good to outstanding citation records. The approach is phenomenology, i.e. based on available theory and own model developments perform calculations of direct relevance to experiments, which is important for extracting physics results from data. In particular, the group's computer programs for simulating particle collisions have made the group a world-leader in this specialization.

Phenomenology, with roots in the 1970s, was initially seen by some established theorists as not proper theory but rather a support activity for experiments. This has changed as computerized methods in general have become common in theoretical physics and simulations particularly important for extracting particle physics results from complex experimental data, with essential contributions from the Lund group.

The stated main goal to be "a world leading group in particle physics phenomenology in a broad sense" is ambitious, but also realistic. Here, the "core activity further development and maintaining of Pythia" is an essential part. Combined with their strategy "to use new hirings to preserve this core but in addition extend the scope of activities in particle phenomenology", it is well-motivated and realistic provided proper support from university and continued external funding. Since the previous assessments (RQ08, RQ14), increased external funding (VR, ERC, EU, KAW) has resulted in a substantial expansion of staff and research scope. Given the research focus on fundamental physics with essentially no applications, one is limited to only a few funding agencies and therefore need a stable faculty basis.

The efforts have mainly been on physics within the Standard Model, in particular strong interactions, at high energies as well as intermediate energies with precision hadron theory. In this area, the unit is internationally very well established with an excellent reputation. Through recruitment of new staff the unit has widened its scope to also include physics Beyond the Standard Model (BSM). The present

strength of this development is very good and it has an even stronger potential that should be exploited to widen the unit's coverage of the developing frontline of high-energy physics. Recent discoveries in astroparticle and gravitational physics have already opened new research frontiers and a possible discovery of new physics at CERN can be a game-changer for particle physics.

The unit's stated weakness of "relatively little collaboration on research papers by the seniors in the group" is noted, but not considered a real problem, partly because some such collaborations do exist and partly because a main role of the seniors is to lead subgroups on different research projects. Still, one should consider the potential for larger research efforts based on staff collaborations, e.g. towards extended research frontiers.

For recruiting new staff the unit has a policy including a preference to choose persons that fit the group, with the advantage to gain from additional coherence in the unit but with the danger of getting too little renewal. For early-carrier positions with only little start-up funding, it is wise to consolidate present activities, but with proper start-up funding a more open recruitment can broaden the research profile. Given the upcoming retirement of the leading professor (TS), one should consider a new recruitment at the professor level with potential to widen the research into related new areas at the particle physics frontier.

This unit has a history of being a main part of the Department of Theoretical Physics, which has then joined with Astronomy to the present department, including also Computational Biology and Biological Physics. This new department seems to function very well and the theoretical particle physics unit is happy to be part of it. However, considering direct research collaboration, with common projects and external funding, it is closer to the unit of experimental particle physics. This collaboration could be further strengthened if they belonged to same department, but would certainly suffer if separated geographically by one of them moving to SV. There are also potentials for future collaborations with the unit of mathematical physics in the Department of Physics.

#### **Global Recommendations**

Given the Observations regarding departments/units belonging to two separate faculties, one should consider a possible merger of LTH and N-fak, in spite of potential problems. The recommended way forward is to evaluate pros and cons as basis for possible decisions. The present development of ESS and MAX IV together with an associated Science Village motivates that this is the time to evaluate the organizational structure and make forward-looking adjustments. This may be even more important for the departmental organization of physics at LU. Here, one should in particular consider the advantages of having a common overall structure, e.g. one department, for handling the interests of physics as a whole, in particular strategies for future research and renewal through external recruitments. However, to keep the academically important bottom-up structure, one still needs a divisional structure based on common research interests. Such divisions/units should, in our view, not be very small but large enough to facilitate developments of future research collaborations and exposing young researchers and graduate students to a wider research frontier.

Strengthen the role of the department and faculty in taking strategic initiatives when resources are freed up due to, e.g., retirements or faculty leaving LU. It must not be a given that resources should remain forever within a given unit, or even department.

Strategic initiatives are in particular important in terms of recruitments, both at the junior and senior levels. International recruitments should be seriously considered, and all recruitments should include a start-up package. To address the gender imbalance, the departments should actively go 'head hunting' and identify suitable female candidates, provide support and advice, and encourage them (by hosting

agreements and matching grants from the Department of Physics and the Department of Astronomy and Theoretical Physics) to apply for start-up grants from ERC, KAW, and VR.

The weaknesses identified above are common to most research groups in physics and astronomy, be it at a Swedish university or internationally. This does not absolve Lund University and its Faculties of Science and Engineering from taking action. To the contrary, the prevalence and severity of the problems require expedient attention right at the local level, lest Lund University may lose out to other universities who can tackle these problems more efficiently.

The panel recommends that the visibility of the Library and its many offers and services be increased among leadership, researchers, teachers and students at the departments.

Given the fact that essentially no information was provided concerning the Science Village, it is difficult for the panel to provide recommendations on this issue. However, it is very clear to the panel that the leadership of Lund University must be involved in the process. It is too important and complex a question to be left only to the department or division levels. Since the Science Village not only will host research units but also act as an intellectual support structure for MAX IV and ESS, a joint venture between the Swedish Government (responsible for ESS) and Lund University (responsible for MAX IV) should be considered.

More than half the units mentioned the MAX IV storage ring in their self-assessment reports, although only one third included MAX IV also in their presentation slides. Lund University has a strong international visibility in the photon sciences, and members of different units are already taking advantage of this powerful light source. With careful coordinated planning, Lund University can become one of the world centres in the photon sciences.

The ESS was mentioned in about half of the self-assessments, and three units seem to be actively pursuing a future use of the source (Solid State Physics, Nuclear Physics and Synchrotron Radiation Research). The number of researchers the panel met that could arguably be considered as neutron scientists was quite limited.

Regarding ethical issues, a University-led policy on involvement with countries with a questionable human-rights record would help each unit formulate its own collaborative activities.

The panel recommends Lund University to make a concerted effort together with the central administration and the units in building a trust between the administration and the researchers and teachers.

### Atomic Physics – Recommendations

The panel recommends an international recruitment in attosecond science. The recruitment must be facilitated by financial means on the department or faculty level, including a start-up package.

The division is almost sub-critical in terms of research engineers. This is not an issue that should be left entirely to the division to decide upon, but is an issue for the higher level. The division is highly successful and has responsibility for advanced laser equipment. Recruitment of a research engineer with a PhD should have high priority.

The division should seriously consider taking a leadership role concerning the Science Village. It would benefit from the move, and presently there is a lack of leadership at the university level. A bottom-up process could be beneficial, but must also involve the leadership of Lund University.

### Astronomy – Recommendations

It is recommended that

1. the Astronomy unit continues to focus on and develop the research under a broad umbrella (stars, exoplanets and the Milky Way) within a diverse set of key activities involving theory, observation, data analysis, and participating in large international projects.

- 2. the requirements for long-term funding for the large international projects should be assessed and that potential risks are identified. It is recommended to make a plan for how to ensure stable funding of each activity as well as a plan for how to handle support of those activities in case of a lower funding level than expected.
- 3. the goal of expanding the involvement in teaching at Bachelor level is being further developed with the aim of being active in Physics education at Bachelor level as well as ensuring a stable recruitment of students for the Master's programme. This will require coordination at department/ faculty level.
- 4. the aims in relation to diversity (and possibly integrity and ethics) are supported by bench marking goals, plans and allocation of resources to allow development and to increase the likelihood of reaching the goals.
- 5. the high level of freedom and influence on strategic development, resource allocation priorities, etc. will be continued, but that the organizational structure and management at unit level will develop a model that ensures a more coherent discussion of activities above the unit level e.g. in relation to the establishment of the Science Village and general educational priorities and goals.
- 6. in relation to the establishment of the Science Village, the Astronomy unit should develop a specific plan for how this new environment (if Lund University decides to implement the move to the Science Village) can improve the collaboration between astronomers and staff at the department level in general, improve education and coordination between the different units.

## **Computational Biology and Biological Physics – Recommendations**

The panel recommends that the appointee in machine learning is chosen with an eye to his/her ability to establish a strong, independent research activity that can attract its own grants. We note that such an appointment will increase the relative weight of the Computer Science component within the unit.

## **Combustion Physics – Recommendations**

It is recommended that the University considers how best to support younger researchers at early stages of their career as well as creating a financially supportive environment to attract talent internationally.

The proposed move to SV needs significant consensus from those affected and a suitable channel of communication and representation on decision-making committees is recommended.

Recruitment of overseas academics may be facilitated and encouraged by a more supportive financial structure for salary and research set-up costs and simplifying some of the administrative steps by ensuring use of English on forms at all stages of the process.

Regarding ethical issues it has been suggested by other divisions that a University-led policy on involvement with countries with a questionable human-rights record would help each division formulate its own collaborative activities.

## Solid State Physics – Recommendations

• Funding for new equipment and operation is an issue. At present, external funding is not available to cover larger infrastructure purchases. Furthermore, it is particularly difficult to get funding for the continuous upgrading and replacement needed for LNL to remain a state-of-the-art facility. There are also very limited local funds for startup packages for new faculty hires. These issues need to be addressed to keep the division competitive.

- The current situation in the division is very favourable to think about new future directions and to make a long-term strategic plan on faculty recruitment.
- There seems to be a lack of opportunities for development of technical support staff, making it difficult to hire and retain some of the best talents.
- The move to the Science Village would strengthen collaborations with groups using MAX IV and ESS, increasing Lund University's exposure to the international scientific community as well as industry. Although the division has excellent collaborations with spin-off companies and larger international companies, the interactions with larger well-established Swedish companies could be strengthened.
- Although highly motivated, the division cannot drive the move to the Science Village on its own. This enterprise needs to be tackled by the university including assessing the overall impact on science, economy, and teaching.

## Nuclear Physics N+T – Recommendations

#### **AEROSOL** group

With regard to the AEROSOL group's complaints about its relatively small size: While there are aerosol research groups that are indeed substantially larger, such as those in the Department of Physics in Helsinki and at the Paul Scherrer Institute in Villigen (Switzerland), there are also many aerosol research groups in Europe of similar or smaller size than the one in Lund. The size of the Lund AEROSOL group is definitely OK. After all, is it not more important to do relevant research of high quality than to be a large research group? It is recommended that the Lund AEROSOL research group consolidates its current international and national collaborations, and, if possible still increases them, e.g., within the modelling area and for their research with remote sensing satellites. It is also recommended that the group looks for very novel OPPORTUNITIES within the measurements area; the use of MAX IV could be one of them, but it should not be limited to this; the group could also add more chemistry measurements to its research.

As to a possible move to the SV, considering that the excellently equipped aerosol laboratory in the design building (IKDC) is shared with other groups (and other departments), such move would make it challenging.

#### AstroGeoBiosphere (AGB) group

The hope to secure another ERC grant did not materialize, and with seemingly no interest from Science Faculty to support the group, the panel sees no other recommendation to give than the termination of the group with the retirement of Birger Schmitz in 2024.

#### Biospheric and Anthropogenic Radioactivity (BAR) group

Considering the small size of the BAR group, it is strongly recommended that the group looks for funding to hire one or two more postdoctoral researchers, that it tries to attract PhD students, and that it strengthens its existing scientific collaborations with other groups. It may also look for new collaborations with strong research groups at the national and international levels.

#### **NEUTRONICS** group

It is recommended that the NEUTRONICS group consolidates its existing international collaborations and, if possible, even extends them.

Since a possible relocation to the SV seems highly beneficial to the NEUTRONICS group, this move is definitely recommended. As to further work with the LIBAF facility, it is thought that, after continuing

for perhaps another 5-10 year period, the work with it should be ended. After all, there is little new that can be done with ion beam analysis techniques, which exist already for over 50 years.

## NUSTAR group

Investigate whether a reorganization should be done where NUSTAR forms a division of Nuclear and Particle physics together with the present division of Particle Physics. This should form a stronger research environment and give a better basis for strategic decisions.

# Mathematical Physics – Recommendations

The Science Faculty (who currently finances the positions of the three theorists to retire in 2028) is encouraged to support an *early replacement program*, allowing for a rejuvenation of the solid-state research at the division and taking advantage of the new research opportunities to be offered by ESS and MAX IV.

A 'critical mass' of people within a specific subtopic may be achieved by *strategic hiring practices*, recruiting junior faculty who can contribute productively *and* independently to research programmes already established within the division. This must be done in a prudent manner, making sure that the junior faculty thus being hired can also develop their own line of research.

# Particle Physics – Recommendations

The unit discusses some weaknesses in their self-assessment and it also suggests how to improve. One main point is the importance of recruiting more postdocs. The panel supports such initiative. The panel would also like to stress that the unit should keep a balance between the number of projects that they want to get involved in with the number of people they can hire.

As the unit points out, a main role of the University is to facilitate efficient research infrastructure. In particular, at the faculty level one should consider this unit's need for such to deal with their large data volumes, since they are a forerunner to other research areas getting increasing data volumes.

# National Centre for Physics Education – Recommendations

- Clarifying the departmental anchoring of the NRCF with the Department of Physics, and integrating the Centre's activities better within the Department's activities, would provide stronger support for the excellent activities of the Centre, and would raise the awareness of both leadership and colleagues of the Centre (short term, departmental level).
- Prioritising the addition of tenure-track research staff to the NRCF would likely give a very strong return on investment, given the accomplishments of the staff members thus far, their success in securing funding for research, and the unique institutional position of the NRCF (long term, departmental or faculty level).
- The panel commends the priority given by the NRCF's leadership to integrating the Centre's activities better with the Department of Physics.
- The panel commends the efforts made by the NRCF to secure funding for research and to carry out and publish research with teachers.
- The panel commends the efforts made by NRCF to create inclusive physics education environments, both internally and externally.

# Physics and Astronomy Library – Recommendations

- The panel recommends that the visibility of the Library and its many offers and services be increased among leadership, researchers, teachers and students at the Department of Physics and the Department of Astronomy and Theoretical Physics.
- The panel recommends that the Department and Faculty continue to prioritise and support the Library's commitment to offering just-in-time, tailored support to researchers, teachers and students including increased support for the Library's activities, especially if and when the need arises.
- The panel commends the just-in-time approach offered by the Library to researchers, teachers and students.
- The panel commends the prioritisation given to the decentralisation and specialisation of the University's library units (the 'Lund Model').

# Synchrotron Radiation Research – Recommendations

## Scientific, technical and educational aspects

- The difficulty to get long term beamtime access to the facilities could be solved by developing stronger collaborations between the unit and the facilities that should be facilitated by the proximity and the new environment.
- Merging faculty positions and synchrotron/neutrons positions should attract more students from Lund University to the synchrotron and should help MAX IV and ESS have better academic connections.

In the new environment after a possible move, communities from Lund University and the MAX IV and ESS communities should make a dedicated effort to collaborate to achieve high quality research and education and mutual benefit. The major concern of the panel is more on the organization and financial sides.

## Organizational and economic aspects

- High care should be taken in building up an attractive scientific plan where synergies between communities with complementary experimental and theoretical expertise as well as strong educational ambitions are kept at the center.
- Together with a strong and attractive scientific plan, an economic sustainable strategy is needed. Moving will be expensive. There should be funding for this that should be part of Lund University and Swedish government strategies.
- The global financial strategy should prevent extensive delays in the move in order for the unit to benefit rapidly from the opening of the new capabilities of MAX IV and ESS.
- Creating a high level of technical, scientific and educational expertise next to the synchrotron and neutrons large scale facilities in Lund is a unique opportunity for Sweden, which the industrial world should join. We recommend that start-up companies move in SV as well.

# **Theoretical Particle Physics – Recommendations**

Given the upcoming retirement of the leading professor (TS), one should seriously consider a new recruitment at the professor level with potential to widen the research into related, new areas at the frontier of theoretical/phenomenological particle physics. To be realistic and competitive, such recruitment should have proper start-up faculty funding. Consider a merge with experimental particle physics and/or mathematical physics, as a suitable substructure in the same department, to form a larger collegial environment to facilitate developments of future research collaborations and exposing young researchers and graduate students to a wider research frontier.

# Chemistry

# Panel overview

World-class research in a creative, innovative and cross-border environment.

Within the Chemistry panel, researchers from a variety of research fields and specializations within chemistry gathers to understand, explain, and improve our world. Some of our key research areas are food and pharmaceuticals, renewable resources, water and wastewater engineering, materials, environment and energy. The research in the panel ranges from very basic to applied research. With the cross-border cooperation between different research groups, departments and faculties, and not the least with the industry, the panel researchers not only contribute to high-quality research and education, but often also to innovations and applications that benefit society. The location in the heart of the exciting and research intense Öresund region, is close to several major research and business parks and industries and the future research facilities MAX IV and ESS just minutes away, provides obvious optimal conditions for development, cooperation and innovation.

Research within the panel takes place in many different formations and research groups at our three departments. You find a brief summary of each departments research here bellow:

## Department of Chemistry

Research for the benefit of a sustainable society is our overall goal and can easily summarize the great width of research at the Department of Chemistry (KILU) in Lund. The department conducts both basic and applied research. Strong focus areas are environmental, renewable resources and health. KILU belongs to two faculties and is divided into four units, CALS, CAS, CMPS and Centre for Physical and Theoretical Chemistry:



Overall structure of KILU (Department of Chemistry)

## Department of Food Technology, Engineering and Nutrition

Today's advanced production of food requires considerable knowledge about the chemical and physical processes that interact when producing and storing foods, as well as knowledge about how different component influence the human organism.

The department of Food Technology, Engineering and Nutrition carries out research within most areas from raw material to the effects on the health of the consumers. The research is characterized by an interdisciplinary focus on processing with broad aim of optimizing food products regarding both convenience and quality as perceived by the consumer.

## Department of Chemical Engineering

Research at the department of Chemical Engineering is today focused mainly on resource-efficient technologies for sustainable development, and is carried out in collaboration with both national and international research groups and companies. The research can be divided into three areas: Green Chemical Engineering, Sustainable Process Technology and Environmental Technology.

# External panel report

## **Executive Summary**

The Panel notes that the scientific quality within the Units is overall high and includes research at the highest international level. The research activities cover both fundamental and more applied research, with many fruitful contacts and collaborations with industry. Exchange of ideas, inspiration and collaboration within and between Units were noticed, but *the Panel recommends that cross-fertilization both between and within Units is increased.* To achieve this, *the Panel recommends that interactions between Units are increased and that Divisions with complementary activities are merged.* The Panel further recommends that *joint economic and administrative rules and routines are introduced in the Faculty of Science and the Faculty of Engineering.* 

Access to state-of-the art infrastructure is crucial for all activities. The Panel recommends that a *long-term strategic plan for maintenance and renewal of infrastructure* is established by the Faculty.

Excellent scientists form the basis of a successful university. A well-thought strategy for recruitment of scientists combined with start-up packages and continuous adequate funding that allows to compete for the best talents is recommended to be a priority. New recruitments to tenure track career positions should be used as an opportunity for renewal and rejuvenation. The Panel recommends the University to strive towards having Faculty positions (assistant professor, associate professor and full professor) funded by the University. A vision for the entire University is desirable.

It is recommended that time and resources spent in carrying out *administrative tasks at all operational levels of the University are held at a minimum* to give maximum time for core activities, research and teaching; tasks implemented by the Central Administration need to be well motivated and explained.

Based on a consequence analysis of advantages and disadvantages, a decision has to be taken soon about who should move to Science Village Scandinavia.

Many of the suggested changes rely on measures taken by individuals and individual Units, but in order for the recommended changes to have the desired effect, they need to be promoted and implemented in the overarching organization – in the daily life of the University itself. The University should take up its responsibility by making perfectly clear that it strives for and rewards excellence in all domains and at all levels.

## Introduction

The Evaluation Panel consisted of the following members:

Jonas Bergquist, professor of analytical chemistry and neurochemistry, Uppsala University, Sweden

Jan Delcour, professor of food chemistry and biochemistry, KU Leuven, Belgium Vincenzo Fogliano, professor of food technology, University of Wageningen, the Netherlands

Karsten Haupt, professor of nanobiotechnology, University of Technology of Compiègne, France

Hanna Knuutila, professor of chemical engineering, NTNU, Trondheim, Norway Christina Moberg, chair, professor of organic chemistry, KTH, Stockholm, Sweden Ove Nilsson, professor of plant molecular biology, Swedish University of Agricultural Sciences, Umeå, Sweden

Bengt Nordén, professor of physical chemistry, Chalmers University of Technology, Göteborg, Sweden Annalisa Pastore, professor of chemistry and molecular biology, King's College, London, UK

Jouko Korppi-Tommola, professor of physical chemistry, University of Jyväskylä, Finland

John Woodley, professor of chemical engineering, DTU, Lyngby, Denmark

Three departments, divided into six Units of assessment, were evaluated:

The Department of Food Technology, Engineering and Nutrition and the Department of Chemical Engineering, both belonging to the Faculty of Engineering and each comprising a separate Unit, and the Department of Chemistry, comprising four Centres, each of them representing a Unit: the Centre for Applied Life Sciences (CALS), belonging to the Faculty of Engineering, the Centre for Physical and Theoretical Chemistry (CPTC), belonging to the Faculty of Science, the Centre for Analysis and Synthesis (CAS), and the Centre for Molecular Protein Science (CPMS), the two latter shared between the Faculty of Engineering and the Faculty of Science.

The Evaluation Panel received Self Evaluations from the six Units of assessment on January 31. The panel exchanged information by contacts via e-mail during February, March and April, and had a first preparatory video meeting on April 23. Thereafter the Panel's preliminary impressions of the various units, based on the Self Assessments and observations by the individual panel members, were collected in a preliminary draft of observations to be returned to later.

During the assessment week May 4–7, the Panel had video meetings with representatives of the Units (2–3 h long), with faculty leaders and Heads of Departments. By the end of each day, the Panel had short meetings summarizing its impressions from the interviews and discussions.

In a video meeting on May 8, observations and recommendations to be forwarded to Lund University were discussed. The final drafts were written in groups of 2–3 Panel members representing special expertise and thereafter jointly discussed and modified, via e-mail contacts and video meetings, held at June 5 and June 12, by the entire Panel. The report was submitted to Lund University on June 30. The final report, with corrections suggested by the Units, was submitted on August 31, 2020.

#### General Observations

#### Research

Research within the three departments covers the generic fields of fundamental chemistry, chemical engineering, and food technology and engineering. Activities are broad, ranging from the border to physics to the borders of biology and medicine, and include both experimental and theoretical research. The scientific quality level fluctuates somewhat within as well as between Units, but is overall quite high and clearly includes research at highest international level. Several Units have a focus on environmental problems, connected to the UN Agenda 2030, a focus area of Lund University.

While the activities within some Units are focused on either basic or more applied research, several Units show activities of both kinds, thus addressing fundamental problems as well as more applied research, with many fruitful contacts and collaborations with industries. An impressive number of 20–25 start-up companies were mentioned by members of the Units, but it did not become clear from the self-evaluations how many of these companies were founded during the reporting period. Apparently the start-up phase is supported by the faculty.

Several examples of exchange of ideas, inspiration and collaboration both within as well as between the Units were noticed, but the Panel was left with the impression that several activities would benefit from even further increased cross-fertilization both between and within Units. Some Units also expressed dissatisfaction over insufficient collaborations and communication. The Panel thus proposes that special mechanisms are installed that vitalize the exchange of ideas and acquisition of knowledge of mutual interest - not only within the chemistry departments but also to transfer knowledge from the fields of physics, biology and medicine. Promoting interdisciplinary research is thus a particularly important point that needs to be extensively addressed.

Obviously the different Units have somewhat different research structures and research cultures. It was interesting to see that different mechanisms lead to excellence in several units. CAS, for example, has relatively limited connections and collaborations between the research groups within the Unit, but instead fruitful collaborations with other Units; this has led to clearly excellent results. CMPS, on the other hand, hosts independent groups with different, but complementary competences, resulting in an excellent scientific environment with world-class research activities.

The research groups are generally quite small. Although the ratio of students (PhD and PD) / PIs has increased in several Units since RQ08, there is still an imbalance between the number of PIs and students. A major reason for the relatively low number of PhD students is a result of difficulties to fund PhD students (who have comparatively high salaries in the Swedish system). Not filling vacancies resulting from retirements and instead using surplus funding for financing PhD students has been recognized as an opportunity to adjust this imbalance.

#### Organization

The Units of assessment have different structures and different organizations. Some Units have divisions working as separate entities, keeping more or less strict borders between divisions (CPTC, CALS and, to some extent, Food Technology, Engineering and Nutrition), thereby possibly missing interesting opportunities for exchange and streamlined administration, whereas other Units have looser or no borders at all between the divisions.

The fact that two Units (CAS and CMPS) belong to two different faculties, with different funding systems, poses problems which seem unnecessary and which need to be handled within the Units. Despite this handicap, the Units have made impressive efforts to solve the most urgent problems, and even to some extent been able to take advantage of the different systems, but the activities would benefit from more similar organizations and funding mechanisms. The Panel vigorously encourages such a reform.

#### Infrastructure

Access to state-of-the art infrastructure is crucial for all activities. Access to modern equipment is largely available today within the Units of assessment, but a general worry that the present equipment level will be difficult to maintain was presented by many Units. It has not escaped the Panel's attention that aging equipment and insuffient funding mechanisms for expensive instruments seem to be a general problem in Swedish Universities, and this problem seems to have become more severe since the Universities took over the major responsibility for funding infrastructure. The problem needs to be addressed both by the University and at an overarching political level. In recent years the faculty and central LU levels have developed a coordinated approach for supporting infrastructure needs at LU, but the Panel recognizes that there is a need for a long-term strategic plan for maintenance and renewal of infrastructure at the department level, including possibilities to share equipment between Units/Departments and even Faculties; the Panel was surprised to notice that no such plans were presented, neither in the self-evaluations, nor during the interviews.

The storage ring MAX IV, mentioned in a majority of the self-evaluation reports, is an important asset which, finally, quite a few groups within the Units take advantage of in their research. The groups are encouraged to increase the use of this unique and powerful research infrastructure. The joint EC facility ESS has so far caught only weak interest by the researchers at the Units of assessment. Its scientific role seems to be distant and the University should be careful in becoming involved with costly operation of the infrastructure.

#### Recruitment

Several Units have experienced, or are experiencing, retirements of strong competence, creating opportunities for renewal and rejuvenation of faculty. It is the Panel's opinion that it is of utmost importance that the highest scientific level of competence is recruited, rather than trying to make a recruitment in the field of the leaving person, as illustrated below.

The Panel noted with interest that two Units, CAS and CMPS, have been practising very successful, albeit different, strategies for recruitment, leading to quite different structures of the research environments. Both Units use excellence and independence as lead criteria, but whereas CAS uses very broad calls and strives for recruitment of the most talented applicant, without consideration of the exact research area, CMPS recruits actively in specific areas that are complementary to those existing. This leads to different, but in both cases apparently successful research environments. In the former case the result is a Unit with different goals relying largely on collaborations with external partners. In the latter case a more homogeneous environment with independent researchers dealing with different problems but working towards common goals is established, and with better opportunities to reach high international level, which usually requires large research groups; the Panel notes that the size of research groups is less critical in the latter case as group members more easily benefit from the environment.

Generally a multicultural/international culture within the Units has grown into maturity both concerning acceptance of foreign students and hiring researchers from abroad. Most of the Units have fruitful long-term international research collaborations, reaching also in co-operation towards developing countries (e.g. African collaborations). However, in many Units the Panel recognized a need for increased external recruitment in order to hamper 'inbreeding' and favour renewal. Challenge of gender balance at senior levels could be addressed by a stronger career mentoring system.

In most Units senior scientists serve as 'mentors' for young principal investigators, who are encouraged to take on independent directions. The Panel vividly encourages all Units to adopt such procedures in order to avoid the risk for 'inbreeding' and lack of novel ideas and research directions.

#### Funding

Funding of research is generally good but relies to a large extent on external grants. This is particularly the case at the Engineering Faculty. The strong reliance on external grants makes many activities vulnerable and may hamper the choice for high risk/high gain research – it is difficult to maintain a long-term research profile when dependent on short-time funding/projects.

Faculty funding is used in different ways in different Units, and the percentage faculty funding used for salaries varies significantly between Units, but in most Units parts of salaries are financed by external grants (particularly at Chemical Engineering). This is a common, but unfortunate, situation at many Swedish universities. Decreasing faculty funding and increasing salaries, in particular for PhD students, is a problem at LU, as well as at Swedish research institutions in general.

#### Administration/Overhead

University overhead costs are in Lund based on total costs, excluding costs for heavy equipment, experienced during the preceding year. This poses obvious problems, in particular in case of shrinking activities since increasing fractions of the budget then need to be allocated to overhead costs. An alternative system, to avoid such problems, would be based on direct withholding on salaries. A transparent system showing how the overhead is used by the university would be welcome and might provide incentives to keep administrative costs low.

Lack of sufficient direct government funding and problems to cover the differences between actual overhead and maximum overhead allowed by some funding bodies are main challenges. The Faculty of Engineering finances this difference, or part of it, at faculty level for prestigious grants, whereas at the Faculty of Science, reshuffling of funds to cover actual overheads is left to the Centre or individual research groups to manage.

The requirement of costly open access publishing is also posing challenges and should be addressed at the faculty level, for example by more generous support to publications in high-impact journals.

Increasing bureaucracy and administration for researchers take increasing amounts of time and resources from the core activities – research and teaching – and valuable professional time is lost at many levels of decision-making and meetings. Transfer to digital systems for administrative routines which need to be managed by PIs contributes to this problem. Internal collegial activities also steal time from professional work. Different Units seemed to have different traditions in this respect.

Tasks implemented by the Central Administration are sometimes perceived as control activities rather than as the service or administrative help that is the basic meaning of the administrative organization. The Panel would welcome an AQ (Administration Quality) assessment with the aim to streamline and increase the efficiency (and possibly decrease) of the university administration.

#### **Outreach activities**

Some Units are apparently very active and successful in transferring knowledge to the surrounding society, e.g. in the form of popular science activities directed to the general public. In the present media-driven world such efforts are needed to convey a message of the central role of chemistry in many fields of everyday life and in safeguarding the environment.

#### Education

Research within the Units is well integrated in education and courses are generally well connected to research. Competences are well used in undergraduate teaching, but teaching duties are unevenly distributed.

Recruitment of graduate students from LU (and probably from other Swedish Universities) poses sometimes problems due to the student's poor background in mathematics and physics. The problem seems less pronounced, although still not negligible, at the engineering curricula (LTH). An opportunity for teachers from CPTC to teach within the engineering program could facilitate recruitment from that program and at the same time serve as useful cross-fertilization between the curricula. Undergraduate education in chemistry at LU, as well as at other Swedish universities, also suffers from relatively poor background of the incoming students in high-school mathematics, physics and chemistry.

The Panel noted that some Units are not able to give all relevant PhD courses due to lack of resources.

#### Move to Science Village Scandinavia?

Decision concerning whether or not to move to Science Village Scandinavia needs to be taken within the near future. Not having the decision at the highest University administration level causes worry and uncertainty. To make such a huge investment, a thorough analysis of pros and cons is necessary: lost ongoing collaborations versus opportunities for new collaborations, actual cost of moving, increased floor costs, time needed for moving, etc. To form a solid basis for any move, there has to be a substantial number of research groups that have the common vision that a move would benefit their research and teaching. A move to Science Village Scandianavia, if planned carefully, could offer improved opportunities for multi-disciplinary research exceeding the borders of chemistry and increase activities joining physics-chemistry- biochemistry oriented research, in particular towards soft bio- and nanosciences. A key opportunity could be the possibility to design modern and up-to-date laboratory space provided sufficient funding be made available. One could envisage a common instrumental area open to all researchers, equipped with instruments (including maintenance) which would not be possible to obtain for a single unit or department. One example would be the creation of a state-of-the art facility for structural biology where synthesis and extraction of bio samples, their characterization with super high- resolution mass and NMR spectrometry and X-ray analysis as well as their spatial imaging at a few Angström resolution (ETEM, cryo-EM, SEM, HIM, and tip enhanced spectroscopic methods) become possible. Students (including student laboratories) need to move in case research will move. A move to SVS may also require the implementation of a modified organization. The alternative, remaining at the Chemical Centre (and potentially expanding into 'House 4'), has also to be analyzed in detail with respect to opportunities regarding saved costs, lost ongoing and opportunities for new collaborations, with e.g. physics and biomedicine departments remaining at the present campus, and economical balance that may then be exploitable for building up a forceful joint instrument park as envisioned above.

## A Strive for Excellence

In order to offer fruitful recommendations to Lund University, including the individual Units of assessment, the Panel has made an effort to identify criteria for excellence. The criteria are aimed at serving as a high-level benchmarking exercise and as inspiration in the Strive for Excellence:

New scientific knowledge usually emanates at the interface between disciplines, and evolving science takes new shapes that are not always easily put into existing boxes or onto labels. Research environments *promoting interdisciplinarity* are therefore often more successful than those keeping strict borders between disciplines.

Exchange of ideas and cross-fertilization largely rely on the spirit and initiatives of individual scientists, but also need to be promoted by the overarching organization. Mechanisms ensuring *exchange of ideas, cross-fertilization and inspiration* between disciplines are thus essential.

Excellent scientists with new ideas form the basis of a successful university, and there are many examples of how outstanding scientists have led their research to internationally established schools. *A well-thought strategy for recruitment of scientists combined with start-up packages* and continuous adequate funding that allows to compete for the best talents must be a priority for a University.

*Reliance on external funding for financing faculty positions does not stimulate risky research* but rather favours engagements in short-term projects not leading to genuinely new knowledge. It also makes the University less competitive in attracting the best national and international talents to new positions. Funding of faculty positions should, therefore, be the responsibility of the University.

Excellent research requires access to *state-of-the-art infrastructure* and technical staff for maintenance and service. A strategy and selection procedures for continuous renewal of instrumentation are needed.

Increasing *administrative duties* take time and efforts from researchers, and thus from core activities. Allow them to focus on core activities.

In order to identify measures that need to be taken, it can be illustrative to identify the factors that are significant for a successful University:

- Talented researchers capable of frontline (transformative) research; hardworking, open for unorthodox thinking.
- Training of the next generation; talented and engaged students.
- Freedom for scientists to engage in meaningful long-term scientific problems.
- Funding, governmental and external, that allows long-term high-risk research.
- Optimal working conditions; well-equipped facilities.
- Place to meet and discuss; opportunities to meet people from different fields, who think differently.
- Interdisciplinary collaborations; collaboration between researchers from different specializations.
- Diversity; international recruitment (sabbaticals in order to promote renewal)
- Supportive environment.
- "Soft" and inspirational leadership.
- A central administration focused on what is best for the core activities.

# Recommendations

## General

- Implement a medium and long-term strategic vision and plan, which all departments could benefit from.
- Extend research collaboration between departments and faculties. Promote interdisciplinary activities, such as department seminars where both department researchers and their visitors could present their latest results.
- Initiate the development of some newer research fields, following international trends in other chemistry and chemical engineering departments.
- Implement a continuous benchmarking exercise.
- Develop a strategy for dissemination and communication through popular science activities and blogs directed towards different target groups (potential new students, industrial partners, research partners) and channels in order to increase visibility.

## Organization

- A decision concerning the possible move to Science Village Scandinavia needs
- to be taken within the near future as the present situation creates uncertainty.
- In the short term, differences in funding and administration between the Faculty of Science and the Faculty of Engineering should be harmonized and joint economic routines introduced; in a longer perspective merging of the Faculties should be considered.
- Consider the possibility of merging Chemical Physics with Physical Chemistry and Theoretical Chemistry into one division, alternatively to move Chemical Physics to Science Village Scandinavia together with the rest of Lund Laser Centre (LCC).
- Consider the possibility of moving the Department of Food Technology to the Science Faculty.

### Funding

- A stable financial situation with fully covered faculty salaries should be developed. If senior salary support only covers down to 40%, recruitment of excellence will be very hard.
- *Faculty positions should be the responsibility of the University*, only non- faculty researchers (incl PIs) being the responsibility of departments/centres.
- Decrease the number of non-faculty researchers and use tenure track positions.
- Consider how possibilities to accumulate funds for e.g. recruitment packages and major instrumentation can be increased.
- A strategy to *increase the funding from the EC* (including ERC), should be established.
- Implement a system where OH costs are based on direct withholding on salaries.
- At the Science Faculty, implement a system where differences between actual OH and maximum OH allowed by some funding bodies are covered by the University, such as that used at the Engineering Faculty.

### Recruitment

- Use ongoing generation shifts as an opportunity for *renewal and rejuvenation* and to form new collaboration initiatives, e.g. between basic chemistry and engineering departments. Internationally competitive start-up packages are needed in order to recruit the best people.
- *Make broad calls at faculty level*, not necessarily in pre-determined areas or to replace retiring faculty. Excellence has priority over research area: avoid narrow descriptions when a position is announced open. This can be better handled at faculty level.
- An increase of external and international recruitments is recommended for some Units in order to *avoid 'inbreeding'*.
- Aim for *rapid assessment and employment procedures* at university level in order not to miss the best talents.
- Support for young researchers starting independent careers. Provide guidance, e.g. through peer review of grant applications, internally and/or externally. Additionally, it could be useful to establish an arena for young researchers to learn more about the grant application process, technically as well as learning from success stories.

### **Research groups**

- Young group leaders need to be guaranteed independence.
- The ratio of students (PhD + PD) to PIs needs to be higher in order to reach a critical size of research groups.

## Infrastructure

- At department level, *a long-term strategic plan for future instrumentation* needs to be made by listening to the needs of the divisions/units. There has to be a plan for technical support and maintenance of the instrumentation. A procedure to prioritize purchases of major instrumentation for the benefit of the research groups should be established.
- LU will need to *develop user-friendly* possibilities for data storage for ever increasing massive data flow from research laboratories. Efficient tools that automate and simplify administrative work should be implemented.

#### Administration

- Improved trust in central administration needs to be established; all changes need to be well motivated and explained.
- Centre heads and PIs should be given power (also economic) to run the activities they are responsible for with much reduced administrative work load as compared today's situation, at all levels.

## Centre for Analysis and Synthesis (CAS)

#### Observations

The self-evaluation report as well as the presentation during the interview of the CAS Unit seemed to have been prepared with a high degree of honesty and clear description of the actual situation. The report was rather critical to the RQ20 process itself, since the goals and outcomes were not very clearly defined. The Centre has tried to act as much as possible based on the recommendations from the RQ08 evaluation, but even their self-evaluation notes that the success of those initiatives (e.g. new recruitments) has not made any major impact so far. The leadership team seems to be well functioning and gives a dynamic impression.

On one hand one sees many scientific highlights from the Centre, but on the other hand that decline of university budget funding is a threat for basic teaching and doctoral training, the basis of future research. At CAS permanent staff belonging to the science faculty are fortunate to have nearly full budget coverage of their salaries, yet on the engineering side part of the salaries have to be taken from external funding. CAS has been able to balance the situation somewhat by making use of differences in research and teaching budgets of the two faculties, by frustrating administrative work. Unifying the two chemistry budgets in the future would reduce administrative load and improve strategic planning of research and teaching. Centre heads and the PIs should be given the needed power (also economic) to run the activities they are responsible for with much reduced administrative workload as compared to today's situation.

With top end personnel of 12 professors and 7 lecturers the division has 15 research groups and in addition 10 postdocs and 35 PhD students working in these groups. In average each group has a PI and three researchers working. By international standards a number of the groups are relatively small in size. In average a PI at CAS produces one PhD degree every two years, organic chemistry producing by far most of the total output.

#### Leadership

The Centre has quite a diverse research activity ranging from the study of natural product chemistry, organic, inorganic, materials and polymer chemistry to semiconductor research. One may ask how research in these fields can be maintained at international level with the staff available and how the individual groups benefit from each other. It seems that CAS consists of individual groups that amend their strength from co-operation to the outside world, research partners and companies, rather than trying to join forces within CAS. This has been accomplished by unifying the leadership of the Centre, and the present chair and the vice chair seem to manage this task very well.

One could consider forming bigger research consortia within CAS to apply funding for both larger long-term external funding and large-scale infrastructures. Joining forces with multi-disciplinary competence available in the entire chemistry department would improve chances of obtaining EC research funding (CAS reports one ERC grant). This would also increase interactions between the researchers of the department and create new openings. The Centre has seemingly reasonable funding situation with 12 running VR grants and three projects financed by the Wallenberg Foundation during the last five years. Present funding of CAS is at good international level.

By far the largest research and education activity originates from the organic chemistry groups. Some of the groups within the Centre have been able to rise substantial external funding and have grown both in size and scientific excellence (e.g. some organic chemistry research, polymer research and semiconductor research). However, there are also relatively small groups carrying out research on specialized research topics. To likely improve their chances of obtaining external funds and growth, merger towards larger units is recommended.

The plan to recruit a professor in the field of materials synthesis would be a move towards this direction by strengthening the activities of inorganic chemistry.

The costs of overheads on some externally funded projects as well as restrictions on accumulation of budget surplus were considered as a drawback. This aspect should be addressed at the faculty level and transfer of saved resources to create buffers to allow in particular for tenure track recruitments. The system, as it is now, is detrimental to any strategic initiatives and future plans. This could partly explain the small effects of the efforts made by the division based on the RQ08.

#### **Publication patterns**

Rather diverse publication output seems typical for organic and analytical chemistry, the number of papers is high but citations remain average or slightly better than average. PIs of two groups have citations (over the academic career) exceeding 4000, five exceeding 2000. Nearly 80 papers out of about 350 papers produced over the reporting period have appeared in well-known high-ranking journals. Fundamental contributions of CAS researchers in these papers remained somewhat unclear but revealed extensive co-operation. Scientific output is at very good international level, in some cases at the forefront.

From CAS' research activities, several stand out. Work requiring exceptional synthetic skills, theoretical vision as well as research leadership to organize important instrumental collaborations has resulted in synthesis and characterization of new ligated iron-based complexes that have shown unexpected emitting properties and led to publications in Nature and Science. Molecular recognition in medicinal chemistry binds strong collaborations towards medicine, as well as synthetic efforts towards cancer research of two groups. In the last category, a talented young researcher seems to have potential to become a future research leader. Research on polymer science shows excellent citation history and will enjoy strengthening by joining of a new PI with industrial background to the team. Work on supercritical fluid extraction technology on natural products has many new important collaboration initiatives. Yet the brake-through results are waiting. Via a recent recruitment, the combination of high-resolution electron microscopy and know-how in growth of semiconductor nano- pillars has brought results that convinced the University to invest in a state-of-the-art ETEM microscope. Strong collaboration with solid-state physicists, mainly with NanoLund, is producing research with high citations. This work, basically semiconductor physics or nanotechnology, has so far had little overlap with synthetic, polymer or analytical chemistry, but could open up new avenues by cross-fertilization within CAS.

#### **Societal Outreach**

The strong asset of the division, according to the report, is their production of PhDs who are welcomed as work force in Swedish chemically oriented industry, an excellent societal output from the University. An important reach in making chemistry known to public is undertaken by a CAS PI who is currently one of the most visible communicators of chemistry in Sweden, with an extremely important mission to change the thinking of 'sooty' chemistry towards useful chemistry. This work has had a nationwide impact. Activities of CAS in applied research and with industries are further encouraged from very good present-day level.

#### **Collegial culture**

During the discussions, it became clear that CAS has been successful in creating an internal atmosphere where issues are openly discussed and outcomes presented, as a common will towards decision-making. They have also created a very nice social environment (fikarummet) of the Centre by including all staff members and students in decision-making discussions as well as weekly meetings and seminar traditions in the common social area.

Internal collegial activities consume working time. The role of hard work in creating expertise and reach for excellent results, though, should be emphasized among coming chemist generations.

#### Infrastructure

Keeping up CAS infrastructure is one of the key requirements for high-class experimental research. The self-evaluation lists recent renewals of an NMR, two X- ray diffraction instruments and three mass spectrometers during the reporting period. None of the instruments, except the newly purchased ETEM, shows exceptional performance and are available in many laboratories. No strategic plans for future infrastructure investments were given.

It is fairly obvious that research at CAS, and also at CMPS, would highly benefit on the availability of a modern well-equipped 800 MHz (or even 1200 MHz) NMR spectrometer, including expertise to make best use of the instrument. Having a cryo- electron microscope to complement the TEM portfolio of the division would be a step forward. Medium expensive instrumentation such as high-resolution mass spectrometry is to some degree available within the division, but the collaboration with the local facility (BioMS) seems problematic. CAS has access to world-class X- ray (MAX IV) but use of this facility in their research has remained scant.

#### Scandinavian Science Village

Move of the whole CAS unit to totally new premises at Brunnshög (SVS) could offer the division exciting possibilities to make *in house* projects, where synthesis, extraction and characterization of new compounds and materials, making new material structures as well as testing their potential towards practical applications could become possible. The alternative, i.e. remaining at the Chemical Centre needs, however, to be carefully analyzed. If the move would became a reality students (including student laboratories) need to move in case research will move.

#### Recommendations

- *Merge the chemistry budgets of the Engineering and the Science* Faculties to reduce the administrative load on permanent professional staff and to allow for improved strategic planning.
- Join plans and initiatives towards the move to Brunnshög and SSV.
- Make a *strategic plan for future large and medium size infrastructure* investments, keeping in mind the needs of the entire department for shared and efficient use.
- Assume a more strategic recruitment strategy for renewal, emphasizing the need for external recruitments and tenure track positions to make undersized groups more competitive.
- Improve chances of getting larger long-term funding from domestic sources, as well as from the EC, including ERC, by forming large enough, interdisciplinary group consortia (within CAS as well as supplementing with groups from the department and outside) that have a common research goal. One option would be to synthetize functional organic molecules that bind to nanostructures with a designed task.
- In view of an emerging new research trend on light responding molecules, the possibility of doing basic optical spectroscopic analysis of freshly synthetized compounds in the Unit premises should be established.

#### Observations

CALS is composed of three divisions: Biotechnology, Applied Microbiology and Pure and Applied Biochemistry. The Division of Biotechnology is considerably larger than the other two and accounts for about half of the department staff. The research fields and topics are very broad, and, as may be expected, are mostly of the applied type. This applies both to the Centre, but also to the individual Divisions. A lack of integration and focus is of particular note.

The divisions have separate administrative structures and economies, only a chairperson is elected at Centre level "to lead the actions within the Department of Chemistry that are of common interest to the three divisions". There is little common research infrastructure and technical platforms. From their report it appears that common activities in terms of scientific animation, seminars etc. between divisions are scarce, although during the interview with the Panel it became clear that the three Division leaderships are at least aware of the current limitations and are willing to evolve in the right direction.

While most of the research activities are of good standard (publications in established peer-reviewed journals, with good citations) nothing is really outstanding. There is some overlap between the divisions concerning research topics. Nevertheless, CALS researchers are successful at an individual or research group level, are good in attracting external funding (several large SSF and Mistra-funded research projects, occasional EC funding), work in close collaboration with industrial partners, and have founded start-up companies.

The panel has the impression that more integration and concentration at Centre level could lead to even better success here. It appears that this integration as a Centre has been decided 'top down' and not developed naturally, and that CALS is still in the beginning of the road towards a common research environment and politics. Instead, they try to provide good conditions for individual research groups, and center their efforts mainly around funding opportunities. This is of course fuelled by the fact that part of the salaries of the permanent staff has to be covered from external funding, and that the OHs are relatively high.

CALS' self-evaluation is as one of the leading Centres of applied life sciences in Sweden and Scandinavia. This may be questionable and a real comparison with possible benchmarks (for example Chalmers, Copenhagen) was not provided. Comparison is done on a mere research topic level, which reflects the missing integration between the three divisions.

#### Leadership

For historic reasons there seems to be no natural common leader among personnel of the three divisions, because of limited collaboration among divisions, some overlap in topics, and the general character of the research which is mostly applied and oriented towards funding opportunities.

Gender balance is visible at the PhD and young PI levels, but less at senior PI level.

#### **Research strategy**

The self-evaluation formulates this overarching research strategy: "By creating and participating in networks in our core research areas, the overarching research strategy of CALS researchers is to visualize the potential of CALS and create fast routes to collaborations on larger applications, aiming to solve research questions that are important for the future". This is vague and the focus is clearly on large research collaborations, allowing for the individual research groups to continue to work merely independently. Little tendency is observed that the Centre would try to make use of the clearly present synergistic opportunities to reach a higher level of excellence at the level of the Centre as a whole.

#### **Publications**

The publication record is adequate, most articles being in peer-reviewed journals of good impact (79%). CALS researchers could aim for more publications in general journals with a higher impact.

#### The relationship between activities in research, education and external

There appears to be no general strategy or recommendations at Centre level how to balance research, education and external engagement. The general attitude seems to be that if sufficient external funding cannot be obtained, teaching activities will increase. This may lead into a vicious circle. External engagement of the personnel and outreach activities are not clear from the report, although during the interview, it became apparent that there is an increasing willingness and efforts at a Centre level.

The divisions all provide high-quality teaching. Collaboration between divisions seems much better here, and this could be a driving factor for research integration as well.

#### **Collegial culture**

The divisions seem to retain many of their staff after postdoc or even PhD employment. However, there is no mention of specific efforts to support or mentor junior scholars. As mentioned above, the lack of a strategy for hiring independent junior researchers is problematic.

There is no visible strategy concerning sustainability and renewal of research strengths, the divisions rely merely on initiatives at faculty level.

CALS researchers take part in several thematic research initiatives within Lund University as well as regionally and nationally, demonstrating good networking abilities.

There are no specific data on gender balance among researchers and students, although this balance seems to be more real at student and young researcher level than on senior PI level. There appears to be no special Centre initiatives for this but a mere adherence to university and governmental guidelines.

CALS researchers are in general successful in acquiring external funding (e.g. SSF and Mistra), reflecting a good quality of applications, although more prestigious grants (ERC, KAW) are missing. Drafts of applications are typically peer-reviewed by colleagues, which is very good as it suggests good relations between PIs and groups, at least at Division levels.

#### Quality ecosystems

There seems to be a good connection between research and education. Courses are constantly updated to include modern developments. Participation of PhD students in activities seems to be encouraged, and training for this is provided, which is very good. There is a better collaboration between divisions here with several courses given jointly. This could be the basis for a stronger Centre engagement in educational strategies, although these are often organized at the department level. It is mentioned that the lack of funding makes it difficult to introduce new courses.

CALS researchers are engaged in many national and international collaborations and also interact frequently with industrial partners. This is a strong point for CALS and should be further supported and developed.

In terms of outreach activities, CALS researchers are stated to "have a genuine interest in external contacts" including press releases, interactions with media and popular science activities, which is important to attract new students and interest from industry and the general society. Facilitated by the applied character of their research activities, this is one of the strengths of CALS and should be developed further.

#### Infrastructure

The CALS divisions have good laboratory facilities. They also maintain different types of support infrastructure platforms (cell culture, bioanalysis), which are critical for their activities. In addition, they have the ambition to further invest in infrastructure for R&D targeting biological production processes from microliter to bench and pilot-scale open to both internal (LU) and external users. For this, CALS will invite interested researchers with complementary expertise in automation, statistics, and big data processing and visualization.

It appears difficult to obtain adequate funding for the maintenance of these platforms, which will also depend on the, hitherto unclear, interest from outside users. Here, a suitable general model and support from the faculty and/or university might be needed, including for technical staff.

#### **Recommendations:**

- A real reflection on how to improve collaboration and integration between divisions is urgently needed, to make use of the synergistic potential and avoid too much overlap. A strong common research environment with a clear strategy needs to be established, mainly concerning research, but also including teaching and outreach. This in turn requires a stronger centre organization with a clear leadership. Implement a longer-term vision (10 years).
- The faculty should establish *efficient and clear principles for the distribution of the direct governmental funding* (DGF), to allow the Centre to have a strategy to use the DGF for example for strategic recruitment and development of joint technical platforms.
- A better *recruitment strategy* accompanied by attractive starting packages should allow to attract highpotential independent young PIs from outside. This will stop the historic tendency to 'inbreeding' and allow to bring in new competencies and develop new cutting-edge research themes.
- The divisions should build on their already good *collaboration in terms of teaching activities*, focusing on delivering high-quality education including modern and recent areas. Continue to offer PhD students and postdocs the opportunity to take pedagogical courses and to get training in teaching.
- Implementing *regular benchmarking of research organization, strategy and activities* is needed to strengthen the international position of the Centre.
- Intensify *collaborations* within LU.
- Develop the *international network* to increase the rate of EC funding. Develop a common EC project strategy at the Centre level.

## Centre for Molecular Protein Science (CMPS)

#### **Overall assessment**

Overall the CMPS is a healthy department with excellent researchers with strong publication records, significant external funding, rich international networks, highly complementary profiles, competences that provide an excellent basis for collaborations, good (but not outstanding) infrastructures, and a positive culture. The research output is overall impressive and outstanding.

There are nevertheless a few points that may need attention.

CMPS is a cross-faculty unit consisting of two divisions, Biochemistry and Structural Biology (BSB, Faculty of Science) and Biophysical Chemistry (BPC, Faculty of Engineering). The two divisions have 10 and 3 senior faculty members, respectively, showing a clear imbalance. This is a weakness in view of the importance of BPC contributing methodological and theoretical competence. Several successful recruitments have been made since 2008, but the generational shift is clearly still ongoing.

Although part of the same unit, the financial conditions offered to BSB and BPC PIs are different. BSB PIs have 100% of their own salaries covered by government funding (DGF), but this value may be lowered in order to free up DGF to cover missing overheads on external grants. BPC PIs have 50–70% of their salaries covered by DGF, while the rest is covered by external grants.

At BSB approximately 20% of the total DGF budget is allocated for education. At BPC, this number is approximately 40%. There is also a difference in overhead costs and the amount of overhead allowed by external funding bodies in the two units. LU should continue its work to harmonize the economic conditions between the two faculties, which otherwise create unnecessary inequalities between colleagues working in the same environment.

At present, CMPS has an imbalance with too few PhD students in some research groups, and an overall low number of PhD students per PI. In both divisions, PhD students are typically not covered by DGF but by external grants.

Currently, there is a gender balance at the Professor level with 4 male and 4 female professors, but not at the PI level (70% men and 30% women).

#### Leadership

Leadership appears soft (in a positive meaning) without articulated priority settings. Instead it appears that it is the scientific problems that define the guidance rather than any formal policy about choice of goals for research etc. Publication patterns seem prolific for many groups and several noticeable peaks of break-throughs. The self- evaluation, not separating the divisions or groups, also supports the impression of a coherent, well-functioning collaboration and 'team leadership'.

Despite the organisational challenge of being organized into two divisions belonging to two different faculties, CMPS has a clear strategy to integrate these two divisions into one centre. This is achieved by joint seminars, retreats and social activities, and encouragement to share methods and results. It also involves a sharing of administrative functions, infrastructure and collaborations on teaching. This is a wise strategy and appears to work very well, although also offering several challenges, as for instance in how the different faculties distribute direct governmental funding (DGF) and how teaching is organized. This ambition to create a coherent centre, both within and between divisions, is a real strength of CMPS and should be encouraged and further developed. The faculties should recognize this and do whatever they can to allow the two divisions to further harmonize their different organizational and administrative structures.

CMPS has gone through a generational shift, but has several strong group leaders that have been able to take over the leadership. They have seen this shift as an opportunity to discuss the direction of the Centre and the two divisions and how to organize in an optimal way. CMPS is therefore well prepared for future challenges and opportunities and can now also focus on how to promote the next younger generation of scientists.

#### Priority setting of direct government funding

Of particular concern is the difference in actual overhead costs and the amount of overhead allowed by external funding bodies, such as prestigious grants from KAW and ERC. While the Faculty of Engineering historically has covered about 15% of the overhead, the Faculty of Science has not done so, leaving it to the department/divisions to cover the missing overhead with their normal DFG. This means that each new prestigious grant leads to an overhead deficiency that has to be covered by DFG otherwise allocated to the division PIs. This creates strain on the organization and sets a "ceiling" on how many such grants a division can accept. This is a negative incentive that is suboptimal and detrimental on an overall division and faculty level. Instead, for prestigious grants the missing overhead should be filled at faculty level in order to create a positive incentive to attract as many such grants as possible (similar to the Engineering Faculty). Such a positive incentive should be in the best interest of all the different levels of organization, and will aid in the prioritization of successful research.

#### **Recruitment, promotion and succession**

CMPS has a good recruitment policy based on excellence and independence.

The Centre has a clearly articulated strategy to recruit junior faculty with excellent potential. This means already demonstrated independency and ability to compete for external funding. They should also have complementary expertise to existing CMPS faculty, meaning that they can effectively contribute to the Centre competence profile and have the potential to actively engage in collaborations within the Centre. This is an excellent strategy that should be further continued and emphasised. The Centre leadership is aware of a gender imbalance among the Centre PIs and is actively trying to search for and encourage female applicants to new positions.

CMPS is aware that their ability to recruit strong junior faculty will be dependent on their ability to provide good start-up packages. While BSB can partly do this using division DFG, this is almost impossible at BPC, given the way DFG is distributed at that faculty. This is a clear weakness of BPC and makes them completely dependent on new faculty support for new recruitments.

#### **Publication patterns**

CMPS researchers are generally publishing in high-quality peer-reviewed journals. The publications are well cited on average. Some research groups are publishing at a very high level, clearly being leaders in their respective fields. The Centre seems to have a well-developed and communicated publication strategy.

#### **Overarching research strategy**

The CMPS research strategy is well formulated being grounded in strong fundamental research but with clear ambitions to promote applications. Another central part is the idea of a highly collaborative environment in which different research groups contribute complementary competence within specialized areas so as to cover as broad a range of techniques and methods as possible for the benefit of all research groups.

#### **Collegial culture**

CMPS takes a very strong stand in emphasizing that junior faculty are fully expected to develop their own research programs from the very beginning of their careers as independent PIs. This means that although senior faculty serves as mentors and sometimes collaborators and providers of infrastructure, they will not demand senior authorships. This is an extremely important principle and should be strongly supported also in the future.

#### Infrastructures

CMPS researchers are critically dependent on access to large-scale national and international research facilities, including MAX IV, the Swedish NMR Center, and the SciLifeLab cryo-EM facilities. They are also responsible for running an up-to-date mass-spectrometry facility serving all research groups, as well as outside customers.

CMPS is responsible for the operation of several NMR spectrometers. The facility needs to be constantly developed and up-graded in order to stay internationally competitive and support the recruitment of new junior faculty.

The Centre also outlines the need for a cryo-EM instrumentation at LU to serve as a screening microscope to test samples prior to conducting experiments at the SciLifeLab cryo-EM platform.

CMPS researchers also need access to high-performance computing (HPC) provided by the Swedish National Infrastructure for Computing (SNIC), and point out the pressing need for infrastructure for data storage.

#### Recommendations

- Rectify the gender imbalance in future recruitments of junior faculty
- The ambition to create a coherent centre, both within and between divisions, is a real strength of CMPS and should be further developed. The faculties should recognize this and do whatever they can to allow the two divisions to further harmonize their different organizational and administrative structures, including a further *harmonization of the economic conditions* given by the two faculties.
- CMPS has come a long way towards creating one fully integrated centre. The logical next step is to *merge BSB and BPC into a single division,* as has been done by CAS.
- The burden of filling the missing overhead should be taken at faculty level to create a positive incentive to attract prestigious grants such as those from ERC and KAW. Such a positive incentive should be in the best interest of all the different levels of organization, and will aid in the prioritization of successful research.
- CMPS' ability to recruit strong junior faculty will be dependent on their ability to provide good *start-up packages.* While BSB can partly do this using division DFG, this is almost impossible at BPC, given the way DFG is distributed at that faculty. This is a very clear weakness for BPC and makes them completely dependent on new faculty support for new recruitments. *Differences in funding, as well as administration, between the Faculty of Science and the Faculty of Engineering should be harmonized for the two divisions to be given equal opportunities.*
- CMPS will be dependent on university and faculty support to keep their technical *platforms up-to-date and internationally competitive*. The panel strongly encourages the acquisition of new higher-field NMR spectrometers (currently the facilities are far from being state-of-the-art) and of a cryo-EM equipment.

## Centre for Physical and Theoretical Chemistry (CPTC)

#### Observations

The Division of Physical Chemistry at LU has a strong tradition in NMR and theory of aqueous solution surfactant, polyelectrolyte and colloidal systems. The strong experimental and theoretical focus is today maintained in more general soft-matter science. The spectroscopic expertise is expanded to include a battery of other experimental techniques: small-angle X-ray and small-angle neutron scattering (SAXS and SANS) and dynamic laser light scattering, but also rheological, atom- force and surface force techniques. Research problems include both soft matter systems of technical and industrial importance as well as problems from biochemistry and medicine. The Division represents clearly a unique Swedish strong-hold in theoretical as well as applied surface and colloid chemistry.

Theoretical chemistry has a long tradition in the development of computational methods in *ab initio* quantum chemistry. Today the research is including both statistical thermodynamics, statistical mechanics as well as quantum mechanics with density functional theory and multiconfigurational quantum theory, pursued in fruitful collaborations with experimentalists, for example at CMPS and CAS.

In the Chemical Physics Division, ultrafast laser studies of fast energy-transfer processes in photosynthetic systems have long dominated the research. Today focus has been shifted towards fundamental mechanisms of solar-energy harvesting processes, theoretical and experimental work on complex molecular and semiconductor systems, exciton and charge dynamics in organic and inorganic photovoltaic materials including perovskites and further developing advanced short- pulse laser technology (e.g. optical 2D spectroscopy) and single molecule spectroscopy and imaging. Together with collaborators from CAS and Theoretical Chemistry, photophysical processes in the new iron complexes with long-lived photoexited states have been studied.

The Centre is overall excellent and has outstanding scientists who produce very profusely and get good grants. All three divisions have been recipients of numerous prestigious research grants. The publication list is impressive.

The Centre for Physical and Theoretical Chemistry consists of three conceptually separate divisions: the Division for Physical Chemistry (10 PIs), the Division for Theoretical Chemistry (8 PIs), and the Division for Chemical Physics (8 PIs). All three divisions belong to the Faculty of Science at Lund University and are part of the Department of Chemistry. The three divisions have different aims and backgrounds that partially justify their individuality.

The Unit says in their self-evaluation that it is an 'amalgamation of three separate evaluations' – this view is also colouring the nature of leadership, research objectives and, to some extent, collaboration and common culture. We shall therefore treat them separately. All three divisions have recently undergone generational changes, successfully undergoing a significant rejuvenation.

#### Leadership

There appears no natural common leader among the researchers of the three divisions – possibly partly due to the presence of very strong characters among the older professors, and partly because the divisions' most important collaborations are outside the department shell. This problem might solve itself if retirements will make a reorganization motivated: clearly with the common physical chemical theoretical paradigm as basis, one fused common Centre would probably be good and encourage to collaborations in the same way as seen at CMPS. The ideal scenario would be one where the divisions together chose a leader with leadership talent and sufficiently broad competence to be widely accepted and who could advise, inspire and initiate new directions of research. Overall, however, the panel understands and accepts the separation for the moment, also in view of the problems that one big common Centre of 28 groups could pose at the administrative level.

#### **Overarching research strategy**

All three divisions mentioned their strong research profiles and broad range of competences – in physical chemistry mainly within soft matter science, and all strongly covering both experiment and theory – with theoretical chemistry, theoretically driven research which in several cases is complemented by experiment, either 'in-house' or through collaborations. Chemical physics specializing in fast processes provides links to quantum phenomena in, for example, solar energy contexts. This description of strengths the Panel fully agrees with. Each division seems to provide a good working climate/culture, and to realize the importance for continuity to support a broad age distribution.

#### Research strengths reflected in educational portfolio

All three divisions complained that the undergraduate education is suboptimal with (for chemical physics) poor links with local chemistry students, possibly (we surmise) an effect of little teaching load for chemical physics faculty. Theoretical chemistry complained that graduate students lack mathematical skills and experience of tackling theoretical problems, analytically as well as numerically. We believe this handicap be more pronounced for students from the classical university curricula than for those trained within the engineering faculty where problem solving is prioritized. This is clearly an important aspect that has to be addressed within a general perspective for the whole of the University.

#### **Problematic aspects**

All three divisions refer to the unpredictable nature of external funding as their main threats and a general tendency of decreasing budgets of the Swedish Research Council (VR) is seen as a major issue. Among serious consequences of long-term economical uncertainty, the negative psychological impact on well-being of staff and PhD students is mentioned.

There are problems with finances due to the instability of external sources and the system of overheads. That faculty senior salaries had to be funded by up to 60% by external grants was mentioned, as well as the problem of not being able to save money for the following financial year. This leads to a stressful work environment, and makes it very difficult to attract promising young researchers.

The three divisions see their potential relocations to Science Village Scandinavia as associated with threatening large costs.

The Physical Chemistry division also sees as a threat that the experienced users of neutron radiation and synchrotron light will soon be retiring within the coming five years. Chemical physics sees that parts of their division are at some risk of becoming a service-providing secondary (not leading) partner in collaborative projects.

Gender balance among PIs is an issue, e.g. with a female/male ratio of 1/7 at the Division of Theoretical Chemistry. At the PhD student and postdoc level, though, the balance is close to 50/50.

#### **Opportunities**

All three divisions mentioned the great opportunities that the MAX IV electron storage ring facility will offer as well as the ESS neutron source and the great environment that the interest-organization LINXS (The Lund Institute of Advanced Neutron and X-ray Science) may provide. We note from publications both in the Physical and Theoretical Chemistry fields as well as in the fields addressed by CMPS (in particular protein structure determination) that synchrotron X-ray radiation has wide and important applications, both for steady state and time-resolved studies. Earlier MAX versions have been much exploited for protein crystal determinations and are currently in use for Small-Angle X-ray Scattering (SAXS) applications, a technique that in many contexts is replacing neutron applications. The development of current international facilities (e.g. time-resolved short pulse X-ray diffraction by Free Electron Laser (FEL) and the ESRF facility) is promising and in our opinion will guarantee that many research groups both at LU and at other universities will benefit greatly from MAX IV. The Panel is more hesitant about the European Spallation Source (ESS): the number of current applications, both in physics and chemistry, is limited and the experiments made so far and interest shown by researchers from the Centre for Physical and Theoretical Chemistry do not indicate the need for a high- intensity neutron facility or any lurking novel, ground breaking application. That the few neutron users soon will reach retirement age is seen as a threat.

#### Recommendations

- Importance of *new recruitments of young talented scientists*, not necessarily in pre-determined areas or to replace retiring faculty.
- A stable financial situation with *fully covered faculty salaries* should be developed. If senior salary support only covers 40%, recruitment of excellence will be very hard.
- Problems with large grants requiring *co-financing of overhead* (OH) not compatible with the Swedish system should be resolved.
- The problem that *surplus finances cannot be saved for future use should be solved*, for example via a strategic banking mechanism at faculty level for new investments in personnel or equipment.

- Detailed analysis should be made of the consequences of moving to Science Village Scandinavia in Brunnshög. While Chemical Physics, as a part of the Lund Laser Centre, probably could benefit from a move, it is less obvious that Physical & Theoretical Chemistry would benefit from moving away from the Chemical Centre environment.
- The Panel encourages investigating the possibility of *merging Physical Chemistry with Chemical Engineering*, with potential great benefits of collaborations between theoretically advanced levels of physical chemistry with the applied challenges encountered in industrial contexts.
- A way to solve the educational problems would be *to change the curriculum to include courses in common with the physics curriculum*. This is already done in other universities in Europe (e.g. Scuola Normale Superiore, Pisa) and offers a tremendous asset for the students.
- A growing general problem of deficient knowledge in mathematics, physics and chemistry from high-school education has to be mitigated possibly by *offering summer courses* to support incoming students.

## **Department of Chemical Engineering**

#### Observations

The department has a small staff covering a broad field of research. The majority of the research appears focused on the development and design of sustainable processes of one sort or another, which is a highly important topic for the future and one in which the discipline of chemical engineering has a major role to play. Research on the use of renewable starting materials for (bio)fuel and chemical synthesis, improved energy efficiency, as well as carbon capture and storage (CCS) is essential now, and also in the years to come.

Many of the current fields are rather applied, which is, of course, to be expected in an engineering discipline. Furthermore, there are good industrial contacts and collaborations, also as expected for a chemical engineering department. The Panel's impression is that the research strategy revolves around funding opportunities, and this prevents a solid focus in one direction. As a result, the staff is involved in several different fields of research, as varied as biopharmaceuticals, carbon capture and storage, and bio-refineries. There is also expertise and research in membrane technology, as well as catalysis. It is, to some extent, understandable that there is not a specific unifying theme, given the financial pressures. Nevertheless, one way or another, the theme of 'separation processes' could link many of the projects. Additionally, it is currently hard to identify the academic core research of the department, which might be expected to be focused more on particular tools (such as process design tools or process systems engineering tools). These are of great value to industry and academia alike and can contribute as well to unifying the many product- specific or process-specific fields.

Aside from research, the department is a significant provider of high-quality teaching and is responsible for many courses. The department is justifiably proud of its efforts here.

#### Leadership

The department is well-organized with a clear structure, although it is small enough to essentially operate as a unified group. This brings the significant benefit of effortless interaction and strong collaboration within the department.

External national sources fund a large part of the research, while EC and other international funding is currently not a significant funding source. The ratio of external to internal funding is 3:1. The depart-

ment sees this as a threat, especially when combined with decreased funding for undergraduate teaching. More needs to be done to secure longer-term funding, which could also come from a wider variety of sources (such as international grants).

As frequently seen in chemical engineering departments, while the gender balance is good at the PhD level, this does not translate to more senior positions in the department (in particular at the professorial level). Much more needs to be done to encourage and support female applicants for such positions.

#### **Publication patterns**

The publication record is adequate. Nevertheless, there seems to be a more limited attendance at international conferences.<sup>61</sup>

#### The relationship between activities in research, education and external

Teaching by the department is conducted professionally and is appreciated tremendously by the students. This is important, we agree, since the Swedish chemical industry is very dependent on the provision of well-educated MSc engineers from the technical universities.

There is a decrease in funding for undergraduate education, which makes it increasingly challenging for the department to maintain this high-quality teaching for the future, with limited resources and time. The department clearly takes teaching seriously, and it is rightly proud of its work. It needs to be financially rewarded commensurate with this quality-led effort.

#### **Collegial culture**

The department seems a happy place to work with the retention of very many staff. The staff forms a multi-cultural group. It is clear that people enjoy working at the department and are comfortable with the existing structure. The department is proud of this. The positive environment this creates is excellent, resulting in collaborations both within the department as well as within chemistry as a whole (in particular food technology).

### **Quality ecosystems**

It seems that there are good practices to ensure that PhD students take some pedagogical courses. This is excellent, and the department should continue encouraging the PhD students and postdocs to participate.

The department was part of a major attempt to evaluate research quality around 10 years ago (RQ08). As a result of suggestions made then, several changes have occurred and today,

- the mean age of the senior staff is lower (51 years),
- the ratio between PhDs and senior staff is higher, and also with more postdoctoral fellows
- the department has closer collaborations with the Department of Chemistry, as encouraged by the evaluators of RQ08.

These are very positive developments. The department is still relatively young (16 years old) and strives for further development and improvement.

<sup>61</sup> Subsequent information received from the unit suggests that PhD students attend 2– 4 international conferences during their studies, both as a way to get acquainted with academic presentations and to be able to build an academic network, which appears adequate.

### Infrastructure

The department has extensive laboratory facilities, most notably the large apparatus hall (containing pilot-scale equipment and unit operations) for a whole range of processes. Despite the large size of the hall, there is so much equipment that space for new equipment is limited. Therefore, when funding allows, new equipment simply replaces old (which is stored or disposed of). There does not appear to be a strategic plan about how to exploit the pilot-scale facility. This is a particular concern, because while it is currently used for both teaching and research, many chemical engineering departments around the world look to scaled-down or miniaturized versions of such plants today. A suitable business model, including the cost of running the apparatus hall, the need for technical staff, as well as a budget for maintenance and utilities needs to be found.

#### **Recommendations:**

- *Continue to provide high-quality teaching.* The department should continue focusing on delivering high-quality education to provide well-educated chemical engineers to the industry. Also offering PhD students and postdocs the opportunity to take pedagogical courses is an integral part of high-quality teaching.
- *Nurture the excellent working environment.* The department has a good working environment, and the whole department operates as a unified group. This generates flexibility when it comes to the distribution of internal funding and allows continuity in the different research areas. Furthermore, it is clear that people enjoy working at the department and are comfortable with the existing structure. The department is doing an excellent job here.
- *Implement a longer-term strategic vision and plan.* The department could benefit from the implementation of a longer-term strategic plan. Questions, which might be addressed by such a plan, include: How can chemical engineering benefit from a closer collaboration with other departments at Lund University? What are the plans for the pilot hall in the medium and longer term? How to fund the laboratory activities? How to benchmark against the world-leading chemical engineering departments? How to focus research in such a way as to make the most of the small number of faculty? What could be the core academic and scientific research focus areas at the department in the medium and longer term?
- *Extending research collaboration with other departments.* The panel acknowledges that efforts have been considerable in the past decade to develop more collaboration, but this could go much further. For example, collaboration with physical chemistry on mass transfer, heat transfer, and microfluidics would be obvious topics. Joint research seminars could be one way to achieve this.
- *Develop a strategy for dissemination and communication.* Increased visibility through popular science activities and blogs is a strategy considered in many departments in Europe. Communication and outreach is a challenging task since there are several different target groups (potential new students, industrial partners, research partners), and many channels. EC-projects require dissemination and communication plans.
- Support for younger researchers. Provide guidance, especially for younger researchers, through peer review of applications, internally or externally. Additionally, it could be useful to establish an arena for young researchers to learn more about the application process, hear about success stories, and discuss the opportunities and limitations (this could also be done together with other departments).
- Implement a benchmarking exercise. Benchmarking the research and education activities is highly recommended. The idea could be to compare research and education (content and quality) in the department with others. Comparison with the leading chemical engineering departments such as

571

Berkeley (USA), ETH Zurich (CH), MIT (USA), Stanford (USA), Cambridge (UK), would be highly beneficial and inspire new initiatives.

- *Initiate the development of some newer research fields.* Commence the development of newer research fields in advanced chemical engineering such as microfluidics and catalysis, following international trends in this direction in other chemical engineering departments. The increased number of younger researchers (as a result of a generational shift in the faculty) could be a great opportunity to achieve this.
- *Develop an international network to build an EC-funding base.* A strategy to increase the funding from the EC (including ERC), should be established. It is essential to communicate the experiences and learnings already gained from others to help to get more EC-projects, together with others around Europe. Wider attendance at conferences would help build such an international network. The network is essential to participate in, as well as coordinate, future proposals.

# Department of Food Technology, Engineering and Nutrition

The self-assessment is well written and accurate information is provided.

### Research profile of the department

The research profile is quite broad. This is quite common to food science and nutrition departments at Universities. The merging in 2014 of the former Division Food Technology and Engineering with the former Division Applied Nutrition and Food Chemistry into the Department of Food Technology, Engineering and Nutrition was very appropriate. Also, the recent reconnection of the strong "Nutrition" group nicely completes the expertise of the department. However, that this department belongs to the Faculty of Engineering is a point of concern.

The activities were presented organized in three areas focused on products, processes and people.

In its focus on products, the department has a strong tradition in applied surface and colloidal chemistry. The research paper focus on starches and other carbohydrates, lipids, and proteins is very good. However, the activities seem to remain in the "comfort zone" of the researchers. Maybe they could dare to take more innovative approaches and especially try to leverage new collaborations within LTH and the Science Faculty.

Different processes are studied in detail. There is a focus on dairy technology and engineering, emulsification, the sustainable use of food side streams and different novel technologies. The expertise in field flow fractionation is world class and the connection with pharma formulation is of interest. What seems to be underdeveloped is a microbiological component. Indeed, most food technology departments have a strong food microbiology axis of research which is almost absent in Lund. Strong collaboration with other departments may help compensate this pitfall.

While the different research topics in the area of relation between food and health are very relevant and the department has a good track record in this area, the question can be raised whether the topics are not too broad to reach excellence. There are several international collaborations in this area. The embedment in the Engineering Faculty does not really facilitate collaboration within the University especially with the biomedical area. Such collaboration is in many instances crucial for the nutrition domain.

### **Overall assessment**

The strengths and weaknesses mentioned in the report seem appropriate and fair. The notion that there could be more collaboration internally is probably to be tied in with the lack of an overarching strategy.

This is especially relevant in the context of recruitment of new researchers: the critical mass of the department is at danger due to the retirement of several PIs, and the department does not have a clear strategy for the long-term future. Surely this is due to financial constraints but also to a lack of leadership and strategic vision on how to focus on excellence in the department. The strong connection with companies and the existing assets should allow to design a medium- and longer-term roadmap.

Most of the weaknesses mentioned (such as the limited long-term funding) are typical for many food science and technology departments. A threat is the potential loss of key competences. This is especially a high risk when very diverse activities are carried out by the PIs in isolation. It is suggested here to increase internal collaboration to reach commonly set goals. Of course, as mentioned in the self- assessment, there is also potential to exploit competences in collaboration with other fields.

## Bench marking

The report mentions Chalmers and Wageningen as two institutions for bench marking. As mentioned, Wageningen is much larger, however. In the future, benchmarking with excellent Food science centres in Denmark (Copenhagen and Aarhus) could serve as reference: their research environments have many similarities with that at the Department in Lund, and they have seen a rampant growth in the last decade.

## Important changes during 2008-2018

Several important external events have led to modifying the structure and orientation of the department. These were mainly positive but seem to have been rather passively received. Noteworthy is that the scientists of the Excellence Centre Antidiabetic Food Centre (2015–2017) at Lund University joined its Department of Food Technology, Engineering and Nutrition again when the project period ended.

It is to be applauded that two separate divisions were merged in 2014. While it is to be regretted that the total number of professors and different categories of lecturers has gone down, it is of note that their average age has gone down. A medium and long-term strategy about the future positioning of the department should be developed.

## Leadership, funding strategy and societal relevance

There are no formal divisions or groups within the department, which is not a bad thing *per se*. However, the impression exists that the department suffers from a lack of overall leadership. What is reported on the organization of the staff seems logical. However, there is a lack of long-term strategies for recruiting external scientists and, as observed in many other departments, there is a high rate of 'inbreeding'.

The department sets several funding priorities. Governmental funding is not the major income of the department. An excellent accomplishment of this department is that the external sources of funding are quite diverse and that there is ambition and the potential to further increase it.

Another laudable activity of this department is related to consumer information and education. As a leading player for food research in Sweden, the department could be even more relevant and visible in this domain.

### **Research strategy**

The focus on creating competences for developing foods with specific characteristics rather than on developing foods itself is to be applauded. However, the research strategy is described in quite general terms and a case could be made for the department to decide to concentrate its limited resources on the excellence already present. It is also good to read that as far as EIT Food is concerned, one is aware that many of its projects are short term efforts and that research efforts with partners are embedded in a significant number of long-term collaborations. The number of dissertations over the 2014–2018 period seems rather low given the size of the department and the vast diversity in research topics covered. The number of publications per PI is difficult to judge, as a definition of who is a PI is not given. Their impact factors are very typical for food technology environments.

A strength of the department lies in the collaboration with food industries. These support a diversity of projects. Several successful applications for EC-funded projects are of note. As for all food scientists, it is very challenging to obtain personal ERC grants.

#### **Collegial culture**

The report acknowledges that the atmosphere can be improved. The Panel had the impression that the integration of the different groups in the department is still ongoing and that a more intense team-build-ing activity would be desirable.

Numerous opportunities are offered to junior scholars to develop their skills. However, they seem limited to short term appointments to continue within the department after the MSc or PhD graduation. A faculty support program to keep talented students and attract gifted researchers should be set up.

There is a significant number of links with national and international organizations. The department is well known at national and international level.

The gender balance and the percentage of internationals are very good at the student/PhD level. Unfortunately, among the faculty the number of internationals is very limited.

The right attitude and procedures to act ethically and to avoid COIs are in place. This seems very professional.

#### **Quality ecosystem**

The undergraduate and graduate courses in food science & technology are well connected with the research. The rationale for starting up a program in pharmaceutical technology is not given. Indeed, while the department has decided to potentiate the area of formulation in close connection with the pharmacological sector, this is not yet well underpinned in the educational portfolio.

It is laudable that there is good staff exchange with industry on part time basis. Also noteworthy is that several spin-off companies found their origin in research at the department and that there is collaboration with partners in Mozambique and Bolivia.

#### Infrastructures

It is to be admired that the department has a well-equipped pilot plant, which can be a cornerstone for its future development in general and for increasing collaborations with external companies. However, it is good to remember that pilot plants in a University environment are an asset, but also that they also require a lot of staffing and resources and can easily incur significant financial losses.

The department feels it would benefit from better support by the University's Research Service and would welcome central support from the University for data handling and storage.

#### Recommendations

- *Consider changing the name of the department into "Department of Food Science*". This would be a clear sign of moving towards a more unified and coherent research strategy.
- Consider moving the department to the Faculty of Science.
- Fully integrate the applied nutrition activities.
- Elaborate a common overarching view on how the different focus points fit into an overall mission and strive for excellence.

- It is laudable that the department wants to have an agile structure to enhance collaborations. *Define the structure of the organization to clarify the internal tasks and to benefit interaction with external stakeholders.*
- Prioritize the research areas and develop a medium and long-term recruitment strategy.
- *Increase efforts towards internationalization and limit 'inbreeding'* (recruitment of scientists educated in Lund).
- Make the Department web page more attractive and informative.
- Strive to publish some papers in high impact factor generalist journals outside the food science comfort zone.

## Mathematics

## Panel overview

The Centre for Mathematical Sciences (CMS) is a joint department that belongs to both the engineering faculty (LTH) and the science faculty (NF). CMS was created in 1999 by joining the department of mathematics (LTH+NF), the department of mathematical statistics (LTH+NF) and the activities within numerical analysis at the computer science department (LTH) and the former department of theoretical computer science (NF).

Currently, CMS has around 130 employees: 18 professors, 40 senior lecturers, 11 post-docs, around 40 PhD-students (and 5 additional industrial PhD-students), around 12 technical/administrative staff and some guest professors, researchers etc. The internal organisation is based on historical reasons and the dominating activities within basic education (around 1200 FTE), that provides the major part of the funding for CMS. CMS currently contains three different divisions: Mathematics and Numerical Analysis LTH, Mathematics NF and Mathematical Statistics (LTH+NF), each led by a head of unit, responsible for economy and personnel.

The total turnover for CMS is around 160Mkr distributed as follows:

- LTH: basic education: 72Mkr, direct government funding for research 17Mkr, external funding 26Mkr
- NF: basic education: 20Mkr, direct government funding for research 20Mkr, external funding 10MkrResearch within CMS covers a broad spectrum of Mathematics, including Applied Mathematics, Numerical Analysis, Mathematical Statistics and Image Analysis/Computer Vision/ Machine Learning.



Figure: Illustration of funding sources for the Centre for Mathematical Sciences coming from the science faculty (NF) and the engineering faculty (LTH).
The units of assessment for RQ20 have been chosen independently of the current internal organisation. The evaluation unit *Mathematics* contains researchers working within theoretical mathematics (including probability theory) consisting of most researchers at the division Mathematics NF, some researchers at the division Mathematics (probability theory). The evaluation unit *Applied Mathematics* contains researchers working within applied mathematics (including numerical analysis) consisting of most researchers at the division Mathematics and Numerical Analysis LTH and a few researchers at the division Mathematics (including numerical analysis) consisting of most researchers at the division Mathematics and Numerical Analysis LTH and a few researchers at the division Mathematics and Numerical Analysis LTH and a few researchers at the division Mathematics and Numerical Analysis LTH and a few researchers at the division Mathematics and Numerical Analysis LTH and a few researchers at the division Mathematical Statistics contains researchers working within Mathematical Statistics and consists of most researchers at the division Mathematical Statistics. Finally, the evaluation unit *Image Imaging Group* consists of researchers within digital image analysis, computer vision and machine learning and consists of researchers within the division Mathematics and Numerical Analysis LTH.

The composition of the panel reflects the units of assessment, by including two members for each of the first three units of assessment and one member for the last, being the most homogeneous research group.

# External panel report

#### **Executive Summary:**

The Centre for Mathematical Sciences at Lund University is joint between the Faculty of Science and the Faculty of Engineering. It has active, high quality research groups in theoretical and applied mathematics, mathematical statistics, and computer vision/image analysis. The university as a whole benefits from having strong research in all areas of mathematics.

Belonging to two faculties, each having different financial models regarding the division between research and teaching, causes substantial difficulties. In particular, individuals belonging to the Faculty of Engineering (LTH) have limited faculty resources for research. There should not be this difference of employment conditions between members of the same department. In Uppsala the corresponding faculty is one of science and technology, while in Gothenburg all department members of the joint department have similar employment conditions. This situation at Lund University must be resolved. We give three possible solutions: merge the faculties, create a joint department, or move all of mathematics to the Faculty of Science. We also recommend a change in the LTH funding model for research, and that the department takes responsibility for strategic planning and growth university-wide in artificial intelligence, machine learning and data science.

#### Introduction:

The panel for mathematics in the RQ20 evaluation has consisted of

Bo Berndtsson (chair, professor of mathematics at Chalmers University of Technology),

Peter Guttorp (professor emeritus of statistics at the University of Washington),

Helge Holden (professor of mathematics at the Norwegian University of Science and Technology),

Gunilla Kreiss (professor of numerical analysis at Uppsala University),

Ari Laptev (professor of mathematics at Imperial College, London),

Rasmus Larsen (professor of image analysis and provost at the Danish Technical University),

*Olle Nerman* (professor emeritus of mathematical statistics at Chalmers university of Technology) and *Otmar Scherzer* (professor of computational science at the University of Vienna).

The panel has evaluated the Center for Mathematical Sciences (CMS) at Lund University. The center is shared between two faculties, the Faculty of Engineering (LTH) and the Faculty of Science (N) and is organized in three divisions: Mathematics LTH and Numerical Analysis, Mathematics N and Mathematical Statistics. However, for the purposes of the evaluation, the center has instead been divided into four units of assessment (UoAs):

Pure mathematics, Applied mathematics, Mathematical statistics, and Artificial intelligence, machine learning and computer vision.

There have been two main sources of information for the panel; the self-evaluation reports, one for each unit, and the site visit, which because of the present situation with the corona pandemic was replaced by zoom-meetings. In addition to these, there have also been one zoom-meeting with the leaders of the two faculties (jointly with physics and chemistry), and one zoom-meeting with the chair, vice chair and deputy chair of the department.

Although the necessity to replace the site visit by virtual meetings certainly has been a disadvantage, we think that the procedure in general has worked reasonably well and that we have been able to access most relevant information that we needed. The fact that the subdivision into units of assessment does not correspond to the administrative structure of the department has been the source of considerable confusion, especially when it comes to evaluation of the leadership of the units. It would have been advantageous if we had met the leadership of CMS before we met the units.

#### Observations:

We start by giving a short overview of each of the units.

The research in **pure mathematics** in Lund has undergone a great change in the last 20 to 30 years. Before that time, the department of mathematics at Lund University was dominated by a few extremely successful mathematicians, working in analysis and more specifically linear partial differential equations, making Lund a worldwide center in that area. It has not been possible to keep that tradition, but instead the department has become more diverse and now houses a variety of different research groups, including complex analysis and operator theory, harmonic analysis, dynamical systems and probability theory. There is still an important group in partial differential equations, where the research now also includes nonlinear equations, in addition to topics like microlocal analysis and spectral theory that can be considered as a continuation of the classical tradition. The number of senior researchers is approximately 25.

As is natural, none of these groups reach up to the earlier level, but each of them has become well established and internationally respected and has produced excellent results during the period of evaluation. This is witnessed by publications in top journals, a fair amount of VR grants, recurrent support from the Wallenberg foundation, a Wallenberg prize and one ERC grant (which is of course extremely difficult to obtain).

It should be noted, however, that the main orientation of the unit of pure mathematics is still in the direction of analysis. (Although, since quite some time there is one researcher in differential geometry, and there is also a smaller group in algebra.) The rebuilding of the department thus seems to have, to a large extent, followed the tracks of the earlier tradition, with complex analysis, operator theory and harmonic analysis being the part most closely aligned with the 'classical period', and dynamical systems and nonlinear PDEs representing the most novel additions.

The unit **applied mathematics** has grown out of the former division of numerical analysis. It has at the time of self-evaluation 11 senior researchers. Traditionally the research in the group has focused on

real-world problems, and the quality of the research is on a high level. The unit pursues interesting research topics related to PDEs and computational science, much of the research being driven by practical applications and industrial collaborations. This work is in perfect alignment with, and very useful for, research collaborations within a technical faculty. Several software components have been developed which can be used by applied scientists. The group is internationally recognized for instance for their work on numerical integrators.

Its research is focused on the following modeling activities:

*Biomathematics and life science* (including population dynamics, photobioreactors, cell-cycle modeling, intra-cellular pathways, neuronal outgrowth, protein simulations);

Material science (including boundary integral methods for Maxwell equations, corrosion cracks);

- *Societal science* (including traffic flow and machine learning, simulation in reflection seismology simulations, feedback loops between climate and vegetation, electromagnetic waves and medical imaging, quantification studies in the human left ventricle); and
- *Industrial problems* (turbulent flows for wind turbine and airplane, fluid structure interaction in rocket engines, turbulent flows in magnetized fusion plasmas, separation processes, including sedimentation and flotation, structural topology optimization of multibody systems).

In addition, the unit does research regarding numerical methods, focusing on:

- Time integrators for ordinary partial differential equations (ODEs) and differential-algebraic equations (DAEs).
- Highly efficient schemes for the numerical solution of Fredholm second kind boundary integral equations.
- Finite volume-based schemes for nonlinear hyperbolic partial differential equations (PDEs).
- Fast parallel iterative solvers for flow problems.
- Abstract convergence analysis of splitting time integrators applied to dissipative evolution equations.

The research strengths of the unit of **mathematical statistics** are in signal processing, theoretical statistics, spatial statistics, and financial mathematics. In general, the research is of very good quality. The unit has 10 senior faculty and two postdocs. The lack of junior faculty is alarming and discussed further below. The unit has also recently lost some senior faculty members to other universities.

The division of mathematical statistics, which is joint between the two faculties, has in addition to the unit two senior faculty in probability theory. It was created in 1959 by Gunnar Blom (who became professor in 1962). The group was part of the new LTH, and a key factor in their financial feasibility was that all engineering students were required to take mathematical statistics. Mathematical statistics in Lund has produced some 90 PhDs since 1970. Traditionally it focused on theoretical statistics, extreme value theory and stochastic models.

Current research is focused on stochastic processes in options and risk management in finance and inventory control. Spatial and spatio-temporal processes are used to study land use and greenhouse gas emissions. Novel methods for processing and time-frequency decomposition of nonstationary signals are being developed and applied, e.g., to brain signals. Solutions to a variety of order- and shape-restricted theoretical problems have found use in forensics and neutron detection. Multivariate extreme values in risk analysis are studied in particular using copulas, and theoretical nonparametric statistics, mainly in the context of survival analysis, is another active research area. Finally, there is pedagogical research concerning basic academic training in mathematical statistics. Members of the unit are currently involved with high quality cross- and multidisciplinary research in medicine, biology, ecology and renewable energy.

From the onset in the 1980's by professor Gunnar Sparr, the research philosophy of the unit artificial intelligence, machine learning and computer vision (AIMLCV) has been to excel in mathematical theory as well as in engineering, and industrial application. The AIMLCV has been very successful and is recognized as an international leader in its field. As a unit AIMLCV has been very good at recruiting projects at all levels, including an ERC consolidator grant. This also applies to industrial projects and collaborations with industry in general. AIMLCV researchers consistently over time win international awards and excellence grants. Moreover, an impressive series of successful companies have sprung from the AIMLCV activities or have been started by AIMLCV staff and alumni. Among the units, the AIMLCV is the one whose structure fits best with the present organization of academic research in Sweden – especially as it is interpreted at LTH – with its large dependence on external financing.

Research groups in computer vision typically have backgrounds in computer science, statistics, electrical engineering, and more rarely mathematics. The field of computer vision evolves and revolves with developments and breakthroughs in algorithms, but also with computational power, camera technology, applications, etc. The AIMLCV has in the past successfully developed its theoretical contributions, e.g. from studies of visual invariants to geometry, and recently to machine learning. There is no reason to believe that the AIMLCV will not be able to continue to excel based on contributions rooted in a solid mathematical background.

The continued work with industrial and academic applications is important since 1) it is what engineering is about; 2) it increases funding opportunities; 3) it is a sanity check on the theoretical contributions; 4) it is very motivating and stimulates innovation and entrepreneurship. However, if working predominantly with applications there is a risk to miss out on the long-term research sustainability, i.e. solving problems with yesterday's methods and isolating group members by spreading over too many application areas.

#### Leadership:

Since the actual organization of the Center for Mathematical Sciences does not correspond to the division into units, we will discuss the question of leadership at the departmental level.

The organization of the department into the present three divisions seems to be rather unnatural. Besides the integrated division of mathematical statistics, it reflects how the department is shared between two faculties and how resources arrive but is not practical from the point of view of organizing the research work at the department.

Several UoAs raised the issue of the base funding being "locked" in a 2x2 matrix on {engineering (LTH), science (N)}x{research, teaching} where the department is governed by individual man-hours allocated in each cell and where faculty are pre-assigned as belonging to either N or LTH.

To the outsider it appears that the merger of units from the two faculties has stopped midstream, where – as we all know – the risk of capsizing is the highest. It would be beneficial to the department if these constraints were lifted and the department instead of the inputs could focus on the outputs, i.e. delivering courses and student FTEs and good research in its fields. This way unproductive discussion and bookkeeping would be avoided.

Some decisions are taken at the level of the divisions, and more important decisions are made at the level of the department, that is, the Centre for Mathematical Sciences. However, all decisions including budget, hiring, teaching, and working conditions (incl. salaries) follow one of two independent paths –

one through the Faculty of Engineering (LTH) and another via the Faculty of Science (N). Considerably resources are spent on serving two rather than one faculty.

There is a different tradition regarding the importance of external **funding** between the two faculties. In the faculty of engineering, external funding is very intrinsic and indeed necessary for research in engineering. In the Faculty of Science the situation is quite different, and for most mathematicians, the sources for external funding is rather restricted. This is a source of concern and worry within the Centre for Mathematical Sciences.

**Recruitment** of new faculty is the single most important decision of any university department. The success or failure of the department is decided on the quality of its employees. There is considerable difference in the focus for recruitment funded by the Faculty of Engineering and the Faculty of Science. In coarse terms, teaching requirements are more central to the engineers, while research strength is more central to hiring funded by the Faculty of Science. This is detrimental to the development of the department and is considered a problem by all units of assessment. All mathematics departments worldwide have to balance the requirement regarding teaching ability with the quality in research, but it appears to be a problem that has not found a satisfactory solution here. In addition, one has to balance the above considerations with the research profile within the department and try to avoid a research profile that is too fragmented. Modern science, and also the ability to secure external research funding, require larger and sustainable research groups.

As we understand it, the main decisions on hiring are being taken by the division but have to be confirmed at the department level. The decisions of the divisions are in turn based on proposals from research groups, but there is no formalized hiring committee. With such a system there is a risk of conservatism, while there is less concern for an overarching strategy. One might see traces of such an effect in the present structure of the department, but the plans for new recruitments appear reasonable.

In particular, the efforts of the unit of pure mathematics to recruit within the areas of algebra or algebraic geometry and to further strengthen the very successful group in nonlinear PDEs are natural and important.

Stochastic modeling is mentioned as an area of growing importance, into which the unit of applied mathematics wants to move (here collaboration with the division of mathematical statistics is natural). Mathematical statistics are aiming at adding either someone in theoretical statistics or in data science. Our impression is that both are needed, as well as substantial growth at the junior level.

AIMLCV has a focus on future recruitment. There is a vigorous recruitment in both AI and CV from universities and industry on all career levels, and the unit should focus both on recruitments in geometry and machine learning.

The next crucial leadership issue is to ensure optimal working conditions for its faculty, in particular to work for the right **balance between activities in research and education**. Here we identify a big problem on the LTH side, where most of the research is supposed to be financed externally. This may be possible for some parts of very applied mathematics and statistics, but definitely not for pure mathematics, and not even for all of applied mathematics and theoretical statistics. The main source of external funding for pure mathematics is VR, and in exceptional cases an ERC grant, and it cannot be expected of a researcher to have an unbroken chain of external grants through his or her career. LTH therefore has to substantially increase its faculty support to pure mathematics or face a situation where only very applied mathematics can survive and the overwhelming part of its teachers in mathematics are not active in research. At least two things speak against the latter alternative. One is that new applications of mathematics very often originally come from the pure side, like e.g. the very successful group in imaging and artificial intelligence at the LTH. Without enough support for fundamental research there is therefore much less possibilities for fruitful applied research in the future. The other point is that the Centre for Mathematical Sciences

in Lund is joint between the Faculty of Engineering and the Faculty of Science, and a situation with such drastic differences in culture and conditions is untenable. We will come back to these two points in the section on recommendations.

The exception to this general picture is the unit AIMLCV, whose research orientation makes it easier to attract external funding. The AIMLCV has a good balance between research and teaching, participating in courses at the master- and PhD-level, as well as introductory math, e.g. linear algebra. However, a group of this size should be able to run their own regular seminars or colloquia, which is not the case presently. This is a big deficit in how they are advertising their research. Such seminars and colloquia need to be considered a high-level teaching and training, which every entity needs to perform. An important task is to train students in upcoming areas, such as machine learning, which the unit should give priority.

The division of Mathematical Statistics have expanded their teaching activities on the advanced levels and in particular they have been responsible for an impressive number of masters projects, and they have increased the number of PhD-students through external grants. However, they struggle to get enough research time for their seniors.

With regard to **publication** patterns, the unit of pure mathematics has an excellent record of publications producing between 20 and 30 articles per year that are published in mathematical journals of high quality. Among them are publications in such prominent journals as Invent. Math., Duke Math. J., IMRN, Ann. Henri Poincaré, Anal. PDE, and the J. Lond. Math.Soc.

The unit of applied mathematics has a good and steady publication pattern, and their results are published in journals of the highest quality in the field of numerics, like in several SIAM journals, J. Comput. Phys. and different Nature publications, as well as in a wide range of other journals spanning from Eng. Fail. Anal. to Ann. Henri Poincaré.

The mathematical statistics unit is publishing about 15 journal papers per year on average. The publications are in high quality journals, such as Annals of Statistics, Scandinavian Journal of Statistics, Electronic Journal of Statistics, Journal of Applied Probability, and Statistics and Probability Letters. In addition, there are publications in subject matter journals such as IEEE Transactions of Signal Processing, Journal of Geophysical Research, Quantitative Finance, and Remote Sensing of Environment as well as many publications in conference proceedings.

The AIMLCV unit publishes consistently at the top conferences in its field including CVPR, ICCV, ECCV, NeurIPS as well as in leading journals IEEE T-PAMI and IJCV. In the assessment period 35 publications out of a total of 160 are registered at these conferences/journals. In the AI, ML, CV fields the top conferences rank as high, or even higher, than the top journals.

The Centre for Mathematical Sciences has formulated a strategy, but only in general terms.

In particular, there is no department level strategy for how the department should handle the emerging opportunities in artificial intelligence, machine learning, and data science.

The strategies of the units consist mainly of the planned recruitments, which are intended to strengthen ongoing important activities and reduce the fragmentation mentioned above. It would probably be useful for the units, as well as for the department as a whole, to think about strategy in a more organized way.

#### Collegial structure:

The principal mechanism to **enhance research quality** at a department of mathematics is to create an atmosphere of openness and trust, hire as good and creative people as possible, and to give them enough time for research. The latter does not necessarily mean as much research time as possible. A reasonable amount of engagement in teaching is part of life in almost all universities and can have a positive effect on research at the same time as it enriches the undergraduate teaching.

It is however extremely important that most of the people in the department have enough time for research. This is particularly important for those that are early in their careers, and it has to be based upon a combination of external funding and faculty funding. As noted above, external funding cannot be expected to provide a very large part of research possibilities in pure mathematics. This makes it necessary for a good department to have a substantial amount of internal faculty funding, and also a good way to allocate it efficiently and transparently.

As we understand it, the allocation of research time in Lund is principally decided by quotas where professors get a certain percentage of time, associate professors another, etc. These percentages are determined centrally, but interpreted in different ways locally – in particular very differently on Faculty of Engineering (LTH) and the Faculty of Science side. Whatever resources that are left, may then be used for extra support, like bridging over a break in external funding, or extra support to more junior faculty. These latter decisions are in practice taken by the head of divisions.

We understand that there are strong reasons for this system, like local agreements with the trade unions. However, there is also a danger of too much rigidity. In particular, there seems to be no way to see if the available resources are used in the most efficient way. The divisions might consider a change here towards a system where research time is allocated to a larger extent by a committee with a responsibility to look at the global picture and the division and the department.

After these general comments we will briefly describe efforts to build up a collegial culture:

#### Opportunities for junior scholars to develop their originality and independence:

There are various seminars encouraging younger researchers to present their work. Dahlgren's and Lannér's scholarships allow young researchers to participate in conferences, workshops, summer schools, etc. In particular, such funding permits them to establish a strong international network. The LTH Career Academy offers support on the LTH side for associate senior lecturers.

#### Quality in applications and publications:

The centre has a research committee whose task is to inform researchers about available funding opportunities, help with applications and prioritize. The members of the centre are encouraged to apply for funding from such sources as VR, KAW, Crafoord foundation, ERC, etc.

#### Diversity, integrity and ethics:

No issues regarding ethics have been reported to us. The researchers in the units focus on ethical issues in connection with publishing, and the units strive to create an atmosphere of openness and trust. This is not uncommon in academia in the areas of mathematics and natural sciences.

Special attention is paid to gender problems that are very common at departments of mathematics in Nordic countries. The gender distribution is extremely skewed in AIMLCV and no faculty members of that unit are women. The AIMLCV must make a conscious effort in order to make a change in order to ensure that talents are not discouraged from pursuing an AIMLCV career because of under representation. The units of pure and applied mathematics have also a considerable gender imbalance among its senior researchers.

The unit of mathematical statistics has a good proportion of female senior faculty, and gender balance is not always a difficulty in statistics.

There are two programs for inviting guest professors of the underrepresented gender at the University level, the Hedda Andersson and Lise Meitner visiting scholar professorships for female researchers.

#### Sustainability and renewal of research strengths:

Sustainability and renewal of research strengths is achieved via active recruitments of new lecturers and inviting prominent guest professors with broad expertise in different areas. Such invitations are often funded by KAW.

#### Academic networks and collaboration outside your unit:

As a rule, the researchers in the units have strong academic networks both within the university, domestically, and internationally.

Alumni from AIMLCV, mathematical statistics and applied mathematics have successfully pursued careers both in academia at other universities and in industry.

The unit of mathematical statistics is providing a consulting service to the natural and technical sciences. It is essentially run by four faculty members This often leads to co-authorship on papers and to research funding proposals. There is a plan to involve PhD students more directly in the consulting program.

A 2-year master's program in machine learning, system, and control has been developed by the unit of mathematical statistics jointly with computer science, computer vision, automatic control and electrical and information technology. This development, together with machine learning activities in the two other applied math groups, could form the foundation of a data science group in the Centre for Mathematical Sciences. Multi-disciplinary master's exam projects in collaboration with disciplines all over university can be used to accelerate research build-up.

The unit of pure mathematics runs the bi-annual Öresund seminar jointly with the University of Copenhagen. This seminar was organized more than 40 years ago and is focused on a broad range of topics within Analysis and Mathematical Physics. It also organizes other joint activities, like the N3-days and an annual differential geometry day. Generally, this unit has a good network of international collaboration, but no contacts with industry.

# Quality Ecosystem:

This term is new to us, but we will try to answer the specific questions for each unit separately.

#### **Pure mathematics:**

#### Research strengths and how these are reflected in the educational portfolio:

The research strengths of the unit lie principally in mathematical analysis, dynamical systems and probability theory. This allows the unit to offer a broad variety of PhD courses, bachelor's and master's projects and undergraduate courses at advanced level. There are also courses offered in other topics like geometry and algebra, and on the whole the choice of courses offered seems well balanced.

#### External research collaborations:

The group does not have any external research collaborations with industry but its members have extensive collaborations with colleagues from many universities in Europe and US. This increases the quality of their research and gives international recognition and visibility to the unit's members.

#### How the unit deals with integrity and ethics:

The members of the unit thoroughly follow the standard requirements of integrity and ethics that are accepted by the university authorities.

#### External engagement and outreach:

The unit is actively participating in different outreach activities both in Lund and in the country being

involved in Kleindagarna, Sonja Kovalevsky-dagarna, Kulturnatten Lund, NMT-dagarna and the LMK day for upper secondary school teachers in Lund. T.Persson and F. Wikström are respectively the president and a member of the board of the Swedish Mathematical Society. N.Dencker and S.Pott are members of the Swedish National Committee for Mathematics. T.Persson and M.Persson Sundqvist are the members of the steering committee of Lunds Matematiska Sällskap, which dates back to 1923. V.Ufnarovski has been the deputy leader of the Swedish International Mathematical Olympiad team since 2006.

#### **Applied mathematics:**

#### Research strengths and how these are reflected in the educational portfolio:

Most of the teaching resources are spent on undergraduate teaching for engineers. More advanced courses are joint for students from the faculty of science and the faculty of engineering, and these courses are more closely linked with the ongoing research. This is the common way internationally, and the way it should be.

#### External research collaborations:

The unit of applied mathematics has a great potential for strong interaction with other groups in natural science and engineering in Lund. The engagement in the strategic research area (SFO) for e-science, essence, has resulted in such interaction, as well as interactions with the partner universities. Furthermore, the strong industry in Skåne, and the proximity to Copenhagen offer a multitude of opportunities. Finally, the local research infrastructures ESS and Max IV provide chances for further development that should not be missed.

#### External engagement and outreach:

The unit has activities aimed at students of local schools, and research collaboration with Trafikverket and Skånetrafiken. Courses in simulation techniques for newly employed engineers were held for Volvo Cars in 2018 and 2019. The unit has contributed to IT training activities for newly arrived academics from other countries, and to industrially oriented workshops in different parts of the world.

#### **Mathematical statistics:**

#### Research strengths and how these are reflected in the educational portfolio:

As mentioned earlier the research strengths of the unit are in signal processing, theoretical statistics, spatial statistics, and financial mathematics. This manifests in the second cycle courses, where master's level instruction is offered in most areas of strength of the department, and has been an area of continuing growth in terms of student FTEs.

#### External research collaborations:

A major approach to collaboration with industry is through joint student projects. Through joint grants and collaborative research there is networking across campus and across faculties. The unit has collaborations with ESS and expects to develop some with MAX IV. In addition, there have been conversations with the University hospital (SUS) about a possible joint position, with emphasis on teaching in the Centre for Mathematical Sciences and research in SUS. The plan may involve affiliating more than one statistician from the Medical Faculty to the unit to do both teaching and project supervision. This could regenerate some of the earlier biostatistical strength in the unit.

# AIMLCV:

Most of the questions for this unit have been answered under previous headlines.

#### External research collaborations:

The group should benefit more from the excellent high computing infrastructure at Lund. Similarly, there should be possibilities in pursuing partnerships in relation to the imaging experiments at the large-scale faculties at MAX IV and ESS.

#### **Recommendations:**

#### 1.

The major problem with the department as a whole as we see it comes from the fact that it is divided between the Faculty of Science and the Faculty of Engineering. There are similar issues at other Swedish universities and they have been addressed in different ways. In Uppsala, there is a joint faculty of engineering and science. This means that the mathematics department in Uppsala houses a rather wide spectrum of activities, which does not seem to lead to big problems. In Gothenburg, the mathematics department is joint between Chalmers and the University of Gothenburg, but the joint department is organized in a rather flexible way. This means, e.g., that teaching duties can be carried out at either school, regardless of where the teacher is employed. The distribution of research money is to some extent handled similarly, although some care has to be exercised because of limitations imposed by the different schools. In Stockholm, there have been attempts to create a mathematical center, joint between the KTH and Stockholm University, but these have failed, and there are still two separate departments there. This option seems less feasible for other Swedish universities where the respective departments are not big enough to have critical mass.

It seems that Lund has so far failed to create a stable solution to these problems. There is only one department of mathematics, but it is divided between two faculties in a rather drastic and probably detrimental way. Thus, with few exceptions, teaching duties are carried out at the same faculty as the teacher is employed. Moreover, the situation with respect to faculty funding of research is enormously different at the two sides. The salary levels at the two sides also differ considerably. This way, one suffers the disadvantages of belonging to two faculties, without enjoying the benefits.

There are different ways to resolve the problem and the resolution to the problem must be found by Lund University. **One** possibility would be to merge the faculties as has been done in Uppsala. The new faculty of science and engineering will become a very large unit within Lund University. Mitigating measures will have to be installed to counter that, however, as can be seen from Uppsala University, it can be done with success. The panel member from NTNU, Trondheim, reports that their department functions in a similar way, and that this works well. **Another** option is to create a really joint, as opposed to a divided, department, somewhat in line with what has been done in Gothenburg. **A third** option is to move the Centre for Mathematical Sciences to the Faculty of Science as it is done at Imperial College, London, where both pure and applied parts of mathematics are united in a single faculty. The considerable teaching services needed by the Faculty of Engineering will have to be purchased at rates decided by the central administration of Lund University. This will have to include the (currently modest) research funding that comes with the funding from the Faculty of Engineering. This option would have to be carried out with great caution to guarantee that all mathematics at Lund University, and, in particular, at LTH, continues to be taught by mathematicians from the Centre for Mathematical Sciences to the Faculty of Engineering (LTH).

#### 2.

Regardless of which route is chosen, it seems to be absolutely necessary that the faculty funding from the LTH side for research increases substantially. Without such an increase the recommendations under point 1 would create conflict between the groups and jeopardize the currently well-functioning groups at the Faculty of Science side. We are aware of the difficulties in making such a change, but perhaps the moment of an evaluation is an appropriate time to initiate it.

Probably, a real change will require an intervention of the central leadership of the university, and also involve increased funding to the Faculty of Engineering. At Lund University the volume of engineering education is much larger than that of science education, and funding for education is distributed in proportion to the educational volume. Research funding, measured in relation to the educational funding, is significantly lower for the Faculty of Engineering than for the Faculty of Science. Here, again, one can compare to the situation in Uppsala. At Uppsala University research funding is at least at the same level as the educational funding for all departments in the joint science and technology faculty. Some traditional science subjects have more research funding, but the difference is small compared to the situation in Lund. The imbalance in research funding is severely felt by the Centre for Mathematical Sciences in Lund. A goal for the university should be to lessen the imbalance of research funding. It is vital that the LTH recognizes the importance of research in mathematics in order to be able to offer the most up-to-date education in engineering. Since the government funding for the universities in Lund and Uppsala is based on the same principle, this is an internal problem at Lund University, and has to find its solution there.

#### 3.

There is a need for some group at the department level to take on the responsibility of planning for the future in areas where broad mathematics competences need to work together to make significant contributions. Examples are the areas of artificial intelligence, machine learning and data science. Regular strategic discussions at department level, as well as on the level of divisions, should be held. These need to consider how to support and strengthen ongoing activities but should also be forward looking and plan for new directions. However, modern quantitative interdisciplinary research requires larger group sizes and deep knowledge of the application sciences involved. Thus research team coordination and leadership activities increase and teaching capacities decrease for the seniors in the teams, while the junior team members are less generally trained in mathematics so that it may create cultural tensions between divisions and problems with teaching resources. If, as we advocate, the department should make a coordinated effort in e-science and machine learning, these consequences have to be discussed and recognized on all organizational levels in the department as well as in the faculties.

There are great advantages for education and training of graduate students with large departments in mathematical sciences. Similarly, there are great mutual advantages with mathematical departments hosting groups of applied quantitative scientists collaborating extensively in academia and with industry. However modern quantitative interdisciplinary research requires larger group sizes and deep knowledge of the application sciences involved.

Broad knowledge inside mathematics is a tradition in mathematics, and mathematical researchers are trained broadly, but their own early research is necessarily very specialized (a model that guarantees flexibility on teaching level). Mathematics is an essential basic training in engineering schools and more and more also in natural science faculties and will probably continue to be so in the future and thus teaching tends to dominate the funding of theoretical mathematics groups.

The department is in a good position to expand, support and lead university-wide initiatives in areas such as e-science and data science, so that competitive applied groups can be in the right disciplinary environments, simultaneously with securing more research money for mathematics. We encourage an interactive interplay between the theoretical mathematicians and the applications and initiation of new theoretical research directions relevant to the applied groups.

We end with a list of suggestions to the different units.

#### **Pure mathematics:**

The panel has the impression that the management of the pure mathematics unit is inappropriate due to its members being split between the divisions of Mathematics N, Mathematics LTH (including Numerical Analysis) and Mathematical Statistics. It might be useful to consolidate the group and to consider it as a separate division with a division leader under the head of the Department.

It might be profitable to think of a collaboration between Lund University and other Swedish universities in giving joint distance courses. For example, Imperial College London is a member of a group of UK universities (led by the University of Oxford) that gives distance courses using modern IT facilities.

At the moment the majority of the PhD students are primarily funded through external funding. It would be desirable for the faculties to provide the Centre for Mathematical Sciences with some faculty funding for financing PhD students.

#### **Applied mathematics:**

The recruitment of new faculty is considered a problem for the unit, and it is finding it difficult to balance the pedagogical and research requirements. The department has to take this problem seriously, and make sure that research quality is given first priority and that one focuses on larger and less fragmented research groups.

Stochastic models are of increasing importance, and the unit is recommended to have an increased activity in this area, as it is needed to keep education up to date and offers new research opportunities. Increased collaboration with mathematical statistics is recommended here.

The unit should organize regular strategic discussions that consider the future of applied mathematics. These discussions need to consider how to support and strengthen ongoing activities in the area, but also be forward looking and think about how applied mathematics can contribute in new directions. In particular the unit could consider opportunities in the emerging fields data science, machine learning and artificial intelligence.

It might be beneficial for Mathematics LTH to discuss a possibility of appointments of senior lecturers jointly with industrial partners.

#### Mathematical statistics:

The unit is at the moment in a critical situation as to sustainability, since it is fairly small and only has senior faculty. It needs more faculty, particularly at the junior level. The current hiring plan, looking for one senior, one junior, and one diversity hire, needs to be expanded strategically to place the unit at a strong place nationally.

It is important for the future both of e-science and the statistical discipline that skilled applied statisticians increase their engagement in the e-science field, and that some junior hires are made in this area. In particular this is important for e-science in connection to evaluations /virtual evaluations of black box trained algorithms used in safety-critical situations (autonomous vehicles, personalized treatments in medicine etc.).

There is since many years a close collaboration with DTU in Copenhagen on a graduate course in the time series field which could potentially be developed to an internet variant serving other Swedish universities. Joint internet based graduate courses in the e-science field are natural to develop with national and international partner universities.

#### AIMLCV:

The unit AIMLCV has a size and internal cohesion that would merit it being its own division.

It would be beneficial to the long-term planning of the unit to establish an alignment of academic and formal leadership. Hence the group should be raised at least one level in the university hierarchy, i. e. at least to the same level as the division of Mathematics LTH and Numerical analysis and should not be considered a part of it. This also would represent that the unit does the most applied research of all mathematics at the department and highlight the interdisciplinarity of the group. This seems also to be beneficial for international hiring of representatives of the groups, because researchers representing the research areas of the unit are often hired also in other disciplines such as Computer Science. For instance high level machine learning researchers with a background in computer vision can be more easily recruited in a separate unit.

The AIMLCV should take efforts to conduct processes, e.g., annually or biannually to make foresights on a unit level to make plans for the unit and what individual projects should be pursued.

The AIMLCV should continue its initial strategy of excelling in mathematical theory as well as in engineering, and industrial application.

The AIMLCV should make continued efforts to couple application projects (e.g., individual PhD projects) to fundamental research projects. This could be in the one-to-one model that the AIMLCV suggests or in organizing (sprints of) fundamental research work across application projects.

Presently, there are almost overwhelming application areas and funding opportunities for research in AI/ML/CV. The unit should take care to develop a research priority and a research funding strategy ensuring a sustainable portfolio of research projects including large and small, excellence and collaboration, fundamental and industrial, low risk and high risk.

# 9. Faculty of Social Sciences (S)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 3	TOTAL NO UoAs: 12	
SUBJECT PANEL NAME	UoA NAME	
Service Management and Service Studies, Psychology, and Social Work	Service Management and Service Studies	
	Psychology	
	School of Social Work	
Gender Studies, Strategic Communication, Communication and Media, Sociology of Law, and Sociology	Gender Studies	
	Strategic Communication	
	Media and Communication Studies	
	Sociology of Law	
	Sociology (incl. Social Anthropology)	
Middle Eastern Studies, Human Geography, Sustainability Studies, and Political Science	Middle Eastern Studies (incl. Swedish South Asian Studies Network)	
	Human Geography (incl. Human Ecology)	
	Sustainability Studies	
	Political Science	

# Foreword by the faculty leadership

The Faculty of Social Sciences consists of 12 departments and units; most are located in Lund but some at Campus Helsingborg. In terms of student enrolment at the BA and MA levels, it is one of the largest faculties at Lund University, second only to engineering.

For RQ20, we have divided the 12 units into three panels. One panel consists of departments with large student bodies and educational programs with a strong professional focus; another consists of small to mid-sized departments with reasonably budgetary balance between research and education; and the third panel consists of departments and centres with a strong emphasis on research.

Panel I consists of the Department of Psychology, the School of Social Work and the Department of Service Management and Service Studies. The Department of Psychology is located in Lund, while the Department of Service Management and Service Studies is located at the Helsingborg Campus. The School of Social Work operates in both places.

Panel II consists of five departments: Sociology, Sociology of Law, Gender Studies, Media and Communication Studies, and Strategic Communication. All but the relatively newly established Department of Strategic Communication at Campus Helsingborg are physically located in Lund. However, Media and Communication Studies is organizationally partly linked to the Faculty of Humanities and Theology.

Panel III includes the Department of Political Science and the Department of Human Geography, two well-established departments that have a significant research budget in relation to the educational budget. This panel also holds two trans-disciplinary research centres that have recently become part of the Faculty of Social Sciences: Lund University Center for Sustainable Studies and Center for Middle Eastern Studies.



# External panel reports

# Service Management and Service Studies, Psychology, and Social Work

# Panel overview

The Faculty of Social Sciences consists of 12 departments and units; most are located in Lund but some at Campus Helsingborg. In terms of student enrolment at the BA and MA levels, it is one of the largest faculties at Lund University, second only to engineering. With only one exception, our 15 BA-programs are taught in Swedish, while 18 out of 23 MA programs are taught in English. The overall share of international students at the MA level is constantly increasing, including tuition paying (non-EU) students. The faculty's doctoral programs represent a combination of classical disciplines and relatively new research subjects, and a growing proportion of the research conducted is multidisciplinary. For most researchers at the Faculty of Social Sciences, collaboration with various external stakeholders is a given part of the work.

However, the share of university funding allocated to the Faculty for research does not match the significant education assignment. This has several consequences. Firstly, it means that everyday life at all levels of the Faculty is dominated by issues related to education. Secondly, since a "normal" teacher position involves only 20 percent research time, it exerts a constant pressure on individual teachers to attract external research funding. The success rate in attracting external funds to compensate for the meagre university allotment varies considerably across units. Research management is heavily decentralized, but some Faculty- and University level coordination and support is in place. The Vice-Dean for Research chairs the Faculty research council, with one representative from each of our 12 units. The Faculty Library provides extensive support in information management.

For RQ20, we have divided the 12 units into three panels. One panel consists of departments with large student bodies and educational programs with a strong professional focus; another consists of small to mid-sized departments with reasonably budgetary balance between research and education; and the third panel consists of departments and centres with a strong emphasis on research.

**Panel I** consists of the Department of Psychology, the School of Social Work and the Department of Service Management and Service Studies. They all have large number of students and educational programs with a strong professional focus. They also have extensive collaboration with the surrounding community, but represent different research profiles and publication patterns. In budgetary terms, research has traditionally been significantly smaller than education. The Department of Psychology is located in Lund, while the Department of Service Management and Service Studies is located at the Helsingborg Campus. The School of Social Work operates in both places.

# External panel report

#### Executive Summary

The three Departments reviewed have all been successful in attracting external research funding from prestigious sources, form partnerships with relevant local, regional and national stakeholders, and they maintain a limited but firm number of international networks. Owing to the prioritising of research in science and technology in the major national funding programmes most of the relevant research topics of the Departments Social Work and Service Studies have limited access to them.

Research output in recognised forms of publications has increased and the spread is appropriate to the subject areas. Presence in prestigious international journals has been established but needs to be monitored and stimulated more strategically.

High teaching loads and student numbers prevail as apriority over the time available for research and determine the research subject orientation in the recruitment of new staff. This results in rather dispersed research profiles that grow "organically" rather than strategically. More leadership is required to balance those demands and to make "implicit profiles" more explicit. Overall, the ratio of teaching to research commitments needs to be reviewed at higher levels as present arrangements constitute an impediment to the full realisation of the Departments' potential.

Junior researchers do not easily find access to research clusters and their integration requires more attention, as does their participation in discussions aimed at the development of subject-specific research methods.

More technical and logistic support for project applications, management and budgeting at university level is required, particularly with regard to availability and mentoring of digital research aids whose importance increases for human sciences in the era where social distancing features.

The topics of Lund University's Strategic Research Areas bypass the research focal areas of all three Departments and it is strongly suggested that the definition of their scope and reach include more the research fields in the Humanities and Social Sciences to provide access to these resources for departments like these 3 social sciences.

## Introduction

After having been appointed the panel chair made first contact with the panel members by e-mail to confirm the evaluation mode and schedule.

Self-evaluation reports were received from each Unit of Assessment (UoA) or Department by the end of 2019 and distributed to the panel members for first reactions.

The panel chair then participated in the meeting of chairs at Lund University on 9/10 January 2020 at which details of the RQ20 procedures were presented and discussed. This helped greatly to specify the responsibilities of chair and panel members and the modus operandi of the three subject panel groups in relation to their UoAs.

The panel chair communicated the information and impressions from that meeting to the panel members in writing, and in a series of online meetings discussed and clarified points of procedures. He particularly emphasised the supporting sources of information which the RQ20 office had made available and which were accessible from online sources. Panel members then examined the internal assessment reports and other sources and formulated factual queries which were put to the Departments for clarification. Further exchanges between panel members and of the chair with panel members formed the preparation for the site visit in May which due to the Corona restrictions had to take place virtually. In view of this, the chair in consultation with panel members asked for a specific schedule of online meetings to be arranged so that departmental researchers at all levels had the opportunity to answer questions and give their views on research activities and arrangements. On the basis of this schedule pattern, the chair asked each subject group to prepare specific topics for discussion arising from the internal reports so as to round off the impressions concerning the research activities and profile of each Department.

The virtual site visit was organised very efficiently and technical support was excellent. This allowed for both meaningful discussions with departmental staff as well as "private" discussions among panel members. However, the time schedule was very restricted and the format did not facilitate spontaneous further formal and informal discussions as would have been the case with an on-site visit. The "visit" confirmed the panel's proposal to write the report as a collection of three reports, covering each Department separately in view of the specific characteristics of each unit. Despite the extended time schedule for completing the final report the individual reports were completed within a few weeks of the "visit". Various drafts were exchanged and augmented in exchanges between chair and panel members before the chair compiled the final report, having agreed it with members.

# 1.1 Panel Report Social Work

#### Leadership

#### Identity and visibility

As in most countries, social work in Sweden is still a relatively new discipline in universities and has not yet been given the status of an independent scientific sector. The Swedish Higher Education Authority (UKÄ) still lists social work under "sociology" and Lund University's own online Research Portal presents social work not on a level with for instance psychology, law or educational science, an aspect that requires instant remedy. Hence the discipline's full establishment and recognition depend on clear leadership in teaching and research at unit level.

The Department of Social Work at Lund University, having one of the highest student numbers in the Nordic countries, has achieved a high degree of internal and external recognition on the strength of a "distributed" leadership model (and a collegiate staff culture) which strikes a balance between allowing individual initiatives by staff members while also pursuing overall goals and presenting a recognisable profile. This is expressed in a broad orientation towards "social work and social policy" (without this having been adopted as a departmental title) which is appropriate for the nature of the discipline because it combines personal as well as structural aspects of intervention and hence of research.

The Department operates a principle of organic development emphasising continuity of existing research areas, led mainly by professors and senior staff and their research assistants. Among others, the topics "child welfare and protection", "poverty" and "care for the elderly" are examples of a perpetual focus. Changes in the actual research profile depend largely on success with funding applications by individuals or departmental consortia but in that way most "classical" social service areas get research attention (perhaps with the exception of disability). This means that practice issues and an implicit orientation on methods of social work are a central strength and link together teaching and research mostly efficiently in view of the very high teaching load of the Department. Links with regional and national stakeholders are emphasised as a priority which accounts for the as yet somewhat limited international visibility of the Department as a whole, whereas individual academics are well known in the international academic community.

#### Priority setting in research

The leadership encourages ambitious research funding applications and researchers have been successful in tapping into the most important national public programmes, the Swedish Research Council on Working Life Health and Welfare (FORTE), the Swedish Research Council (VR), the Swedish Foundation for Humanities and Social Sciences (RJ), and also Sweden's innovation agency VINNOVA and FORMAS, the Government Research Council for Sustainable Development. There are obstacles, however, in that the criteria applied by these large funding programmes favour increasingly applications that define measurable outcomes of social work narrowly, even though a leading member of the Department, Prof. Meeuwisse, is represented on one of these national bodies, FORTE, a fund with an explicit orientation to health and welfare projects. As extensively underpinned by international research profiles, social work research projects require a broader understanding of 'outcomes' than can be expressed in mere 'measurement'. The Department has also been looking for alternative sources of external funding with some notable success in order to maintain its orientation towards the requirements of social service contexts and especially the interests of marginalised groups in society. Funding has been obtained from governmental agencies such as the National Board of Institutional Care, the Swedish Agency for Youth and Society, the Crime Victim Fund and the Prison and Probation Service and from foundations such as the Children's Welfare Foundation Sweden, the Crafoord Foundation and the Kamprad Family Foundation for Entrepreneurship, Research and Charity as well as from regional and local organisations. It is one of the avowed strengths of the Department that it is well represented on decision-making bodies concerning research at faculty, university and national level.

Overall, there is a low level of leadership influence on research activities and priority setting detectable in the Department and there is no formally appointed research coordinator. This principle appears to be working well at present but needs to be reviewed in the light of impending challenges both in terms of trends in general funding strategies and with regard to changes in social service and welfare environments. It will be important that the leadership keeps the overall funding strategy of the Department under close observation in view of these external conditions so that this maintains and consolidates its research output demonstrably. Applying for small project funds is time-consuming and it is also symbolically important to compete with more "classical" academic disciplines for major national funds.

The relationship with the city of Helsingborg is however significant. Leading researchers of the Department, have managed to conduct several applied social research projects in such a way that the practice-oriented funding conditions were taken into consideration but by way of injecting into the goal-definition the central values of independent and transformative university level research. Against the background of these achievements and through its principle of devolved leadership in research which facilitates links with other departments that share this objective, the Department can be regarded as a driver of innovation by combining conventional welfare studies with an orientation towards ecology and sustainability studies. This approach is currently receiving explicit support at faculty level and it is hoped that social innovation of this kind will in future be included in the university's strategic research areas.

#### Recruitment and promotion strategies

Specifications in calls for academic staff are primarily oriented towards the teaching needs of the Department, which have a declared priority over research needs given the very high student numbers. Nevertheless, the connection between research and teaching is stressed throughout the whole Department and, given the nature of the discipline social work, the leadership constantly underlines that up-to-date research should enhance practice and hence influence the skills of students as future practitioners. This departmental orientation shapes the recruitment of new staff and of PhD students from outside the university who share the same understanding of social work and feel an affinity between their own and the Department's research priorities. Where appropriate for teaching topics with specific practice orientation, non-academic teachers from practice are contracted who do not usually form part of research activities.

Re-activating the promotions to full professor and external recruiting of senior lecturers is vital in view of the precarious balance between teaching and research responsibilities. It has been noted that recruiting and retaining young scholars can be difficult due to long-winded bureaucratic processes. While there is support for academics whom the Department wants to retain, there does not seem to be a clear policy on how to achieve this which requires attention (see below).

#### Balance between research, education and external engagement

In addition to the priority teaching commitments demand in view of the very high student numbers, national and university regulations limit the proportion of time devoted to research, depending on the career level reached. For most junior researchers 80% of time has to be devoted to teaching unless they

obtain extra funding for increased research time and this can only be re-balanced at full professor level. The exact regulations around this and the incentives associated with this do not appear to be very transparent. It was stated that staff have annual individual sessions with the Head of Department to discuss academic performance, but the overall coordinated strategic planning of research developments seems to be a matter of individual initiatives. This "culture", which has so far achieved respectable results, may however imply a lack of targeted support for junior researchers in terms of furthering skills in research programming and career development. This needs to be kept under constant review concerning its effects on research output and staff retention given current trends in national and international research funding.

#### Publications

With their papers, researchers of the Department have a good presence in leading national, Nordic and international scientific journals of their fields. In addition, they contributed to the launching of the *Nor-dic Journal of Social Work* and have also editorial responsibilities on several peer reviewed journals. As is appropriate for the dissemination of practice-relevant research, there is a preponderance of monographs and particularly of edited volumes and chapter contributions among the publications of departmental research results, although papers appear increasingly in relevant peer-reviewed international social work journals, with occasional papers also in sociology and social medicine. This indicates a consolidated, consistent pattern, and with growing success in obtaining external funding, more scientific journal publications and 88% of journal articles are in English, and some even in other languages than Swedish and English. The spread of publication outlets used and the concern for dissemination through a wide variety of outlets rather than a concentration on high-ranking journals is appreciated by the panel in view of the broad social relevance of social work research. This needs to be respected by the university bodies assessing the Department's research achievements.

#### Overarching research strategy

While research methods and other "technical" topics of research are being addressed in departmental seminars, participation is recommended but is not a formal requirement and staff can participate at their own initiative. This not only reflects a certain lack of explicit attention being given to the specificity of social work research methods, but makes also for a rather uneven process in the formation of research communities, since opportunities for debate and exchanges are not created systematically.

The Department opted not to design and implement a research strategy but to practise "an openly formulated strategy" which apparently relates to an annual rhythm of discussions. This has strengths and weaknesses in that it allows considerable individual freedom to pursue suitable research topics and priorities, but it also hinders the formation of a clearer research profile that would communicate and promote the Department's understanding of social work in academic contexts. Its absence also makes it hard for newly entering staff to find a thematic research "home" unless they are recruited through a research project or can easily relate to a research cluster. The "open" approach strategy gives the impression that more fundamental discussions are perhaps being avoided and an overall consensus is assumed rather than being tested in systematic and critical internal and external debate.

#### **Collegial culture**

#### Opportunities for early-career researchers to develop their originality and independence

Given the Department's declared 'open culture' and flat hierarchical structure, junior researchers, unless they are hired for particular research projects, have considerable freedom to identify and pursue their particular research interests and to move between research groups. This means, however, for "unattached" researchers with 'peripheral' research topics that they may not easily find the support of a research community with links to topics and methodology. Overall, researchers seem to come to terms with this openness and develop it to their benefit. Nevertheless, the level and intensity of internal debate about research priorities, specific social work research methods and strategic approaches to gaining access to external funds could be improved.

One of the crucial aspects that strengthens the contribution by emergent scholars in the Department which the consultations revealed is the supervision of PhD students for their research projects. Internationally, different systems and principles are in operation from PhD students being completely free to choose a "doctor father/mother" (as in Germany) to a top-down decision by the chair of the PhD programme (as in Italy). The Department appears to have given careful consideration to this process and strikes a balance between the student's research interests and a supervisor's experience and research orientation in a collaborative process between all persons concerned. While the Director of PhD studies has considerable influence in this process, this seems to be an occasion where the research profile of the Department is being implicitly monitored and defined and the Panel suggest that discussions on the profile and direction research is to take in the Department overall, should follow similar structured lines.

#### Sustainability and renewal of research strengths

The Department is aware of the need to "build a common ground for all research activities at the Department" beyond the open seminars already regularly held. The momentum for high quality publications appears to be 'self-generated' but the sustainability of this approach has to be monitored. The current array and variety of research areas has probably reached saturation point and the Department does rightly not envision an expansion into further areas although changes in the practice context, as exemplified by the sudden Covid-19 crisis, need to be observed and responded to flexibly.

#### Academic networks and collaborations outside the unit

The Department maintains numerous collaboration networks with external partners, nationally and internationally, focused on the Department's priority research topics. A good example is the project COPE (Combating Poverty in Europe) which brought together academic partners from 5 European countries, had a strong European Stakeholder Committee and held its final dissemination session in Brussels. Another project, REFUGIUM, co-funded by the ERASMUS+ Programme, was coordinated by the Spanish University of Murcia with 3 other international university partners. At university level, staff of the Department have links with researchers in disciplines like sociology, political sciences and medicine. It was not immediately clear to the Panel whether social work as a discipline is being treated as an equal status partner in these collaboration projects, but such partnerships would represent good opportunities for establishing the Department's full presence in the university.

#### Diversity, integrity and ethics

The Panel notes that ethics and gender issues are mainly treated through bodies and regulations at university and at national level. This may reflect a particular aspect of Swedish general culture which relies on formal procedures in equality matters and may account for the fact that a previous departmental ethics group that advised on research implications was superseded by university and national ethics vetting structures and agencies. The Panel suggests, however, that concern for ethics and diversity in matters of staffing and research cannot be reduced entirely to questions of formal correctness but require also ongoing debate among researchers so as to interpret regulations and if necessary advocate their modifications as an ongoing process that meshes with methodological considerations rather than this being treated separately. It is appreciated that the Faculty runs regular courses on research ethics for doctoral candidates which form an obligatory element in PhD training, but this again points at a reliance on formal structures rather than the promotion of a corresponding comprehensive research culture.

#### Quality ecosystem

#### Research strengths in relation to education

As mentioned above, social work requires a particularly close association between research and teaching in order to inform professional competences with relevant research findings.

The Department identified the following research areas, reflected in groups with flexible and overlapping boundaries:

- Care for the Elderly conditions and everyday realities
- Child and Family Welfare Research
- Children's Rights (as an explicit Institute at Lund University)
- Civil Society and social work
- Housing First
- Migration, Sustainability and social work
- Social Work, Power and Intersectionality

These topics correspond broadly but also imaginatively in their grouping to key areas of research that influence practice-oriented social work teaching at most universities, with the topics of migration and sustainability being recent and innovative responses to themes of heightened actuality in social work. The research area of disability is not listed, but this does not suggest that the range of research topics should be expanded as this would exceed current capacities.

The teaching programme benefits greatly from the intense research activities by teaching staff and this is reflected in the high number of applications for places on departmental undergraduate social work courses. Innovative is the inclusion of service users in teaching in correspondence with the emphasis on participative research methods. It is intended to involve Master's students directly in research projects which would be a further progressive step for the Department and probably also attract more students to that level of studies.

#### External research collaborations

The Department prides itself in maintaining close contacts with stakeholders in all aspects of teaching and research and this constitutes its core strength. Student placements form a 'natural' link to practice agencies and function also as a 'monitor' for ongoing developments and perceived research needs in the field which is of great importance. Apart from regular collaboration with the City of Lund, the strong engagement with the City of Helsingborg is exemplary. The Department makes a central contribution to furthering the city's declared aims of achieving a sustainable urban environment under the programme of Urban Social Innovation and with funding from other prestigious national agencies. Other collaboration projects with municipalities are more dispersed, often facilitated by PhD students who are employed there and pick up on themes of actuality. The Department has focused its overall initiatives in this direction by launching the "National Research Programme on Social Work" (FYS) which is leading for the entire country.

A further initiative that demonstrates the Department's leadership in promoting high standards in social work research is its active participation in the joint national Research School in Social Work that runs two to three national courses for PhDs annually. It is clear from the Panel's observations that the Department successfully aims at influencing not only quality social work practice but also policy developments which is a particularly valuable orientation given current international trends to restrict the impact of critical research on public policies. There is also a growing level of international collaboration, which promises further development on the strength of the high academic visibility of senior departmental academics and their active involvement in leading international associations and networks in social work, but also in sociology. Other external Nordic and wider international partnerships in research and action programmes concern specific topics arising from the declared research areas like elderly, homeless or migrant people as well as children.

#### Lund University Research Infrastructure

Most of the research projects are meaningfully presented on the Department's very informative and well organised research website. This contains links to results and publications, so that deeper insights are facilitated to all interested observers and possible collaborators.

While support for vetting research application drafts is available from Lund University, the Department feels that these formal research support services are not fully oriented towards the needs of the Department. Given the high teaching demands on staff, it would be vital that the university give more administrative support regarding application writing, budgeting and administrative management of research projects, tasks which otherwise command an inordinate amount of time of academic staff. Access to and training in digital research and teaching facilities are key to future developments, particularly in view of the Covid-19 crisis.

#### Links to the University's strategic research areas (SFOs)

The university's identification of strategic research areas appears to be mainly the product of national funding structures and strategies which hence do not lend themselves to the requirements and the potential of the discipline of social work, which the Panel very much regrets. The Department appears to take this as a given reality, but in view of the strong motivation and expertise by academic staff to become politically engaged in advocating change and especially in the light of the weaknesses in this national (and international) research orientation exposed so vividly by the "unanticipated" impact of the current pandemic, a strong case can and should be made for a thorough revision of these priorities, if not achievable at national so at least at university level. Social work seems uniquely suited and positioned to spearhead such changes on behalf of other human and social sciences which are equally disadvantaged under current arrangements.

#### Recommendations

- The wide range of research areas covered by departmental research projects shows how closely staff members are in touch with the requirements of the different areas of social services, but the coverage and direction of research at the Department could benefit from more explicit procedures and discussions of profile-building concerning research.
- Access to funding sources at university and national level has been achieved through strenuous efforts by staff members to tap into the laid-down conditions of funders. It might be the right moment now to question these priorities from a social work point of view and to make the voice of the discipline better heard so that conditions and priorities get changed in the direction of favouring more socially relevant research topics. As an immediate step, the university should revise its strategic research priority areas in this direction. The Department is in a good position to combine the principle of independence of academic research with that of the ethical and social commitment and value of research.
- Given the heavy teaching commitment by staff, more technical and administrative assistance needs to be forthcoming at faculty and university level to ease the administrative burden on researchers so as to allow them to make more efficient use of their actual academic capacities rather than having to spend them on administrative duties.
- Staff recruitment and retention appears to be over-complex from a procedural point of view. More flexibility in this regard is imperative and would need to be matched by more support and

transparency in relation to career planning across the spectrum of academic levels, but particularly at junior researcher level.

• It is further recommended to formalise research meetings in terms of their contents, on specific social work research methods and in relation to formal exchanges over research priorities. This would benefit younger researchers primarily but would also be of value to senior staff in terms of the synergies the meetings could provide.

#### Panel Report Psychology Department

#### Information Sources and Diagnostic Procedures

The Panel's major source of diagnostic information was the Department's Self-Report and a series of online video conferences conducted on May 7, 2020, involving the reports authors (Magnus Lindgren, Robert Holmberg), the department leadership, senior researchers, postdoctoral researchers, and students. An informal but highly informative Skype discussion between Magnus Lindgren (Department) and Klaus Fiedler (Panel member) had been already conducted the week before.

The Self-Report was structured under the same topics and sub-topics as the present Panel Report. The Department Leaders provided their own appraisal of the strengths, weaknesses, opportunities, threats and of the Departments' responses and attempts to deal with the evaluation and recommendation received six years ago during RQ14. The main sections of the remaining self-report were devoted to Leadership, Collegial Culture, Quality Ecosystem, and Transversal Themes. Last but not least, the Department responded to a number of open questions drafted by the Panel after the video-conference.

The materials provided through these various encounters were generally quite informative, although a number of queries were never answered in all detail (e.g., the exact budgeting algorithms, a comprehensive overview of teaching load, and a synopsis of all externally funded grants).

#### Observations

One central observation with implications for many sections of the Panel report refers to the lack of a synergetic conception that integrates teaching and research goals. The self-report states under "weaknesses" that "the department is organizationally defined by teaching, rather than research …" The Panel's own interpretation is that this failure to coordinate teaching and research goals is a primary problem. This was most manifest in one senior faculty member expressing that the amount of research-related external funding is deducted from internal funding (i.e. from those who are deserving best opportunities to concentrate on their research) so much that it would risk senior researchers not reaching the top international level. Our interpretation is that an insufficient regulation of the trade-off between teaching and research, and the failure to understand teaching and research as mutually supporting facets of academic work rather than as mutually interfering tasks, force members of the department to accept teaching contents that are largely disconnected from teachers' genuine research interests. Such obligations may tend to disturb optimal proceedings in one's work due to the reasons given below.

We believe that it is unrealistic to cover all relevant areas of psychological knowledge in a comprehensive teaching program that is applicable to all students. This is not possible even in very big departments where the distribution of areas of expertise of professors (and younger teachers) is wide. To support students optimally it is essential to train them to acquire meta-skills on the basis of which they can learn to adapt later to different environment where psychological knowledge is needed in areas which are beyond those explicitly taught to them in the university. Such training in psychology requires at least three facets:

- 1. orientation and ability to search, find and follow knowledge which has an empirically proven basis
  - in all required areas of psychology;aptitude to be able to critically evaluate whatever knowledge is available and adapt and translate it to the constantly changing needs one may face in one's profession later; and
  - 3. the kind of interest in science which only experts who are deeply interested in their research sphere can mediate (including the emotional expressions of engagement).

If students can be "conditioned" to follow these three ways to strengthen their skills and their professional attitudes they will give the best service to society in their later professional life.

This all means that teachers have to be able to structure their teaching duty from such a starting point that their teaching mediates these three features of approaching reality in an optimal way. Committed researchers are able and willing to do so. But this follows naturally and most optimally only if they can do it by concentrating on teaching contents which are as close as possible to their best research interests which guarantees that their engagement in research can be "mediated" to students who are able to follow the research on which their instruction is based.

On top of these aspects, teaching in well-equipped departments of psychology includes training skills to use the most important methodologies. These can be acquired effectively with sufficient practice only via a close integration of research and teaching. In psychology these comprise at least experimental study (designs and their applications), basic and multivariate statistics and also so-called qualitative methodology to such an extent that one can build useful assessment tools applicable for many practical purposes.

The very same weakness in integrating teaching and research goals appeared and was reinforced by our observation that relatively little information was given about shared research projects, collective working in research groups covering all age groups and in collaboration between senior and younger members of the department. Deep engagement and commitment are necessary for organizing successful activities in order to reach ambitious goals. This means that a successful department does its best to guarantee the creation and maintenance of such a willingness to fully engage in research. This in turn means that everyone of the research/teaching faculty and staff has to have a wide say in choosing both the research and teaching activity whose integration then mediates the engagement-related feelings to students.

#### Leadership

Based on the information sources listed above, the Panel arrived at the conclusion that addressing leadership and governance issues is indeed crucial for our evaluation and our recommendations for quality control and future development. There is a conspicuous discrepancy between appreciation and actual admiration for the self-organizing power and the positive corporate identity of psychologists working in Lund on the one hand and the continued neglect of several vital governance goals on the other hand.

Thus, the leading senior scientists of the Department have successfully managed to establish the infrastructure necessary for research in their preferred areas, they can proudly refer to a reasonable record of partly very prominent publications, and they have attracted junior scientists to carry on their research centres. They are full of respect for each other, and the general level of work satisfaction strikes us as considerable. The high priority that is commonly assigned to quality in teaching as a most prominent obligation serves to establish tranquillity and continuity, and the resulting stability and satisfaction seems to carry over to post-docs and younger scientists.

Yet, while all university professors and principal investigators appear to be content with their own work conditions and the condition of their personal team, it is our impression that several governance issues that are of central importance at the departmental level are not being attended to equally. Most urgent are the long-term vacancies in professorial positions that call for replacement. According to the Department's self-report, until now only one of seven (!) professors who retired between 2014 and 2018 was replaced through external recruitment. It did not become clear in the exchanges whether this was the result of external constraints or of departmental decisions. The Panel notes only that there are no full professors currently in such essential areas as developmental psychology or work and organization. The failure to fill these vacancies corresponds to a self-reported paucity of external funding and a shrinking number of PhD candidates. Even when vacant capacities can be compensated by transitory teaching contracts, it seems obvious that such surrogates cannot be as efficient and of the same academic quality as established professorships. Moreover, the continued state of multiple non-replacements conveys the impression of self-satisfaction of a Department that suffers from serious financial scarcity highlighted in the Department's self-evaluation.

Another major problem that has to be settled at the leadership level are decisions concerning research funding which amount to a curious negative incentive for external fund raising. The self-report states: "When a researcher received external grants, the amount of government funding allocated to that researcher was reduced. The rationale behind this was to save government funding and increase the department's opportunities to support PhD students, new professors". However, the fact is that under this arrangement no new professors were recruited. Although the precise budgeting rules underlying these allocation decisions were never clarified despite an extensive list of questions concerning the origins and the handling of these constraints having been put to the Department by the Panel. The authors of the self-report concede that the reduction of government funding for successful fund raisers "… is regarded by many as an extremely negative incentive".

The Panel regrets that in the exchanges with the Department it was not able to clarify the precise budgeting rules, including the crucial question of who receives what part of the overhead gained from a research grant. It does not interpret this so much as a lack of openness on the Department's side, but wonders whether this reflects a lack of transparent procedural rules at faculty or university level generally. The compensatory motive to re-allocate successful fund-raisers' government funding for other purposes and to support other colleagues who do not invest time and effort in fund-raising strikes us as hard to understand. Following the unwarranted presupposition that "teaching interferes with research", which the report writers attribute to RQ08, the department leadership discourages research initiatives and funding success as contra-productive and incompatible with teaching, which has been declared to represent the highest priority goal. At the same time, the self-report complains that defining the department by teaching rather than research and basing personnel decisions on teaching needs in the first place constitutes a major weakness.

Such inconsistencies and signs of collective inattention and procrastination in the face of an obvious state of under-funding seem to reflect a general lack of attention to consistent strategic planning. A personalized interpretation of this state of affairs has pointed the Panel to the fact that few senior scientists in the Department put themselves forward to fill the sorely needed role of a designated science manager. A less personalized account relates the governance problems to existing procedural conventions. Even if no senior scientist devotes his or her academic life to administration and management, it is essential to institutionalize a hierarchy of most important governance activities and goals in a democratically established structural development plan. Despite the details given in the self-report concerning developmental planning activities, in the Panel's view these do not amount to a codified structural development plan, to which the department policy could be firmly committed. This ought to include a clearly stated hierarchy of goals and procedural means to accomplish goals related to the curricular program, the major research topics, the personnel structure and the mapping of the personnel structure according to a research profile, the Department's involvement in and commitment to the University's strategic research areas, and ways to realize career-planning, ethical, and gender policy goals.

#### **Collegial Culture**

The Panel formed a clear impression of the prevailing collegial culture but failed to learn enough about how the younger members of staff – from the PhD-studies level to professor level – are led through different steps to the senior level. What was clearly observable was that young scientists at post-doc level were well supported. However, young scientists noted critically the lack of permeable connections and established collaboration between work groups.

In today's more and more demanding research culture, it has become increasingly common that younger research-oriented students are motivated to jump on 'moving trains' (of senior members' research), allowing young scientists and even students to participate in established research projects. In the ideal case, young members of the Department are given the opportunity to take part in the research process from the early planning phase to the final documentation. The resulting publications help them to start collecting merits and motivates them to engage in self-determined research and other academic activities. This is most likely in a department where teaching and research are very well integrated. In a department where such an integration functions well, teachers are interested in seeing during their lectures who among the audience would likely be interested in joining them in taking steps towards a PhD degree.

A crucial aspect in such an approach is to be sensitive enough to perceive the stage when senior teachers have to start motivating their younger colleagues to jump off the train and start their own train. Senior members tend to keep young colleagues as long as possible under their "command" by defending themselves (possibly too much) with the possible fact the group is thus helped to reach more ambitious goals in research from the point of view of the research achievements of the department.

Apparently, the preferred way to go is to take into account the individual orientations of the younger people. Some are happy to stay in the seniors' train longer and some may have courage to take the risk and jump off relatively early – and we consider it to be early if it happens immediately when they start their post-doc career. This naturally requires that they have to be able to obtain funding independently. Success in earning external funding requires substantial maturity from the applicant. The solution followed in Lund – as we understood it - is interesting and may be defendable. It would be interesting to see how often Lund's post-docs start being successful also when they soon after need to rely on external funders.

Even though Lund university does not seem to make research funding available to post-docs immediately after they have defended their theses funding from the Swedish Research Council has been obtained for some of them. Thus, for them an independent career can start relatively easily. If the requirements to defend one's thesis are not high (at least several international papers with first authorship) this may be too early. This is often not yet a stage when competitive money from external sources is available. Thus, the collegial culture might benefit from the above considerations.

In all, we did not notice any negative opinions among younger students concerning their having been treated in any non-optimal way. They appeared to be happy. But without being able to meet them face-to-face one cannot be absolutely sure whether this is really the case.

#### Quality Ecosystem

Many points raised under the leadership heading are of primary relevance for the creation of an encouraging and fertile ecosystem or scientific environment. Most important from the Panel's point of view is a revised synergetic conception of the relationship between teaching and research. The Panel is convinced that a major developmental goal for the Psychology Department is to combine teaching and research in a way that no longer considers teaching and research as rivals and incompatible. We believe that sources of weakness, conflict, and dissatisfaction are essentially linked to the failure to implement an academic climate in which research grants can be used to enrich teaching and learning, in which students and junior researchers can profit from the available profile of research grants, in which doctoral students and postdocs are supported and considered future researchers that carry on the Department goals, as outlined in a structural development plan.

Given that not only young scientists and advanced students comment, and even principle investigators admit, that the exchange between departmental subgroups, labs and branches is suboptimal, another major goal for future development is boosting richer collaboration between research units and teaching sub-disciplines.

With regard to novel developments in the research landscape (e.g., digitalization, big data, data management etc.) and societal changes (e.g., Corona challenges, remote teaching, fake news, scientific consultation of politics and organizations etc.), it is also important to cultivate and extend further elaborate collaboration with external organizations and to optimize and modernize the infrastructure for research and education goals (lab rooms; software training; methods courses; participant pool; scientific writing; peer reviewing). The challenging questions raised by the Corona pandemic can be considered catalysts for the creation of novel ideas and scientific activities that call for renewal of the academic infrastructures.

# Recommendations

The Panel Report leads to three clear-cut recommendations for the Psychology Department.

- Of primary importance is a structural development plan that gives guidance regarding the present and future research and teaching policy in the Department.
- One high-priority part of this structural development plan should be personnel decisions and replacements of vacant professorships in particular.
- The most important overarching task of the Psychology Department consists in the development of an academic conception within which teaching and research can be understood as synergetic and mutually reinforcing aspects of academic life, rather than mutually inhibiting goals.

# Panel Report Department of Service Management and Service Studies (Institutionen för service management och tjänstevetenskap), ISM.

#### Leadership

#### Recruitment, promotion and succession

While the situation among academic staff looks generally fine, the department lacks a strategy for recruitment, promotion and succession, to ensure the development of the department's future capacity. The self-evaluation report raises a number of open questions concerning the direction the department should follow in terms of recruitment of staff (p. 14). In the Zoom interview, we observed that the department did not provide such answers. For example, it is not clear what the desired field of expertise of a potential new professorship under discussion should be. More generally, the department and its management did not identify specific areas of research and teaching that needed to be strengthened so that the department would achieve its (strategic) goals.

#### Priority setting, including goals for external research funding

Since the department does not have a clear research strategy, it is understandable that no clear priorities are set at the departmental level in relation to which profiles to promote, apart from the founding objectives of the department: to establish a social science transdisciplinary platform for critical and applied knowledge development for the various service industries. However, it is clear from the self-evaluation report, that the department does have one main priority: to attract more external funding. Teaching loads are high and therefore it is crucial that the department protects and supports already existing research hours, while simultaneously applying for external funding. In order to secure more high-level and excellence-oriented funding, it is crucial that researchers continue to take part in cooperation with other universities and research institutions, since funding bodies are often keener to support consortia than give high-level funding to single departments.

We observed that the department is well integrated into a number of cross-departmental and cross-faculty Lund University research centres, that have received external funding. However, such research cooperation across and beyond Lund University will often tend to weaken senior researchers' and professors' orientation to supporting and facilitating the internal research culture of the department, since funding conditions simply draw their attention away from the department's internal research culture. Here clever compromises and combinations are needed that allow strong and leading researchers to continue crucial and rich external relations, while also sharing these relations with department colleagues, including PhD students.

#### Publication patterns

As an education-led department, ISM has a broad, generally good average but not entirely focused publication profile. It follows from the department's interdisciplinary nature that a great variety of publication channels are relevant. But this means seizing the opportunity for being more ambitious concerning the amount and rankings of publications. This could perhaps be supported by strengthening the internal collegial support for and mentoring of the publication work. Although there are already practices in place, more systematic processes of supporting research-writing would be possible.

Only a few Department members seem to publish their work in top-tier journals. It is worth considering for the department to decide standards for level and number of publications as *minimum for individual* researchers and of the level of *ambition for groups* of researchers related to the level of research time. Expectations are generally lower for faculty members with only 20% research time. Managerial and collegial thinking about expectations should aim to ensure a robust research infrastructure where everybody contributes, rather than only going for excellence projects.

#### Balance between activities in research, education and external engagement

ISM is clearly an education-led department founded in order to provide higher level qualified human resources for many important service industries, like tourism, health, retail and logistics. Teaching thus takes a dominant position, and much research is also developed alongside teaching, establishing the classical university education-research nexus with success. This is especially the case in master but also to some extent in bachelor programmes. Research-based teaching allows students to develop strong skills in analysis and strategic thinking, alongside their specialisations. ISM has strong external engagements with companies and public sector actors in different service sectors, in synergy with teaching and educational profiling for the labour market. However, with such a large number of students, there is a lack of research time for most researchers in the department. The upgrading of research time for associate professors (docents) from 20% to 30% was helpful, although this is still low by international comparison. Measures to protect and increase research time are important in future.

ISM has a strong outreach performance, which is not always easy to measure and document. It would be recommended that Lund University as such put more emphasis on recognizing the important contribution ISM gives to Lund University's profile. It is also central to acknowledge that the outreach performance is grounded in the department's interdisciplinary approach, which could be an inspiration to other departments.

#### The overarching research strategy

The fact that the research strategy created in 2011 "has not been recently updated" since suggests that ISM lacks enabling leadership. In meetings with Department members on May 6, 2020, they repeatedly emphasized the valued their "freedom" in that management refrained from articulating a set of obligatory common goals for the department. While this might demonstrate collegial culture, it may also be experienced, particularly by the junior scholars, as a lack of shared organizational purpose and orientation - because well-integrated, purposeful collective behaviour usually requires a strategic framework of some sort.

It was pointed out by several members that the department would benefit from a collective reflection on and further development of its research strategy. It seems that there is no shared agreement on what actually constitutes "Service Studies" as a broad field of scholarly research and what the *mission* or purpose of the department is, which particularly junior scholars found would be desirable. While this might look quite normal for interdisciplinary university departments, it seems that ISM has the distinct potential to apply to itself the kind of strategic thinking which is being taught to students for business leadership. The panel got the impression that there is a basic common orientation across all disciplines, on 'better understanding the customer'. This hints at the department's potential to strengthen its brand by making its existing strengths, e.g. in teaching, more visible.

The management of the Department explained that as a higher education organization, the department was teaching-oriented and originally established to meet the continuously growing needs of the (Swedish) service industry and service society. But in the discussions with Department members, it was somewhat unclear how the research carried out in the Department today contributes to achieving this purpose.

It transpired, however, that members of the Department have now started to discuss this issue. The PhD students, for example, reported having initiated workshops in which the different dimensions, theories, and questions associated with "Service Studies" were discussed.

#### Collegial culture

#### Opportunities for early-career researchers to develop their originality and independence

While we get the impression of a generally good and supportive collegial culture, there is also a question about how the collegial culture can develop with the weak strategic orientation described above. Furthermore, the fact that many researchers for rational reasons give priority to external cooperation in order to raise funds, contributes to a situation where some of the most important issues in research development become detached from rather than being embedded in the collegial culture.

The lack of shared identity and strategic direction might be problematic for the junior scholars working in the Department because today junior scholars benefit more than ever from some sort of 'strategic mentoring' and from being intentionally integrated into the international, scholarly networks of the senior professors in the department.

For the junior scholars of the Department, the lack of a clear collective academic identity as a "service studies community" was clearly a major problem – to the extent that the PhD students that we talked to had started to engage actively with some other departments of Lund University in the hope of finding and "belonging to" a scholarly community in which they could get peer-support in developing their

expertise and 'professional identity' as scholars. However, we must also acknowledge that this may result from the funding conditions where much external funding sources for early-career researchers target cross-departmental projects.

Finally, it seems that the doctoral students would seem to benefit from a more systematic, standardized approach to student training, coaching, and mentoring.

#### Sustainability and renewal of research strengths

With around 40 researchers employed, ISM has the staff contingent for acting as a strong department both internally and externally. It has the capacity to run programmes with the diversity of competences needed, while still being a collegial unit where people know each other personally. Like in many other departments, it could be worth discussing whether the introduction of research groups or clusters within the Department would create a stronger profile and collegial culture. At the time of writing, the website mentioned six research themes while the self-evaluation report mentions efforts to form and communicate four interesting research themes, based on 2018 publications (p. 3).

Although these themes may be overlapping, with the sustainability theme a likely link for all, externals approaching the department might also expect to find a distinct group of (maybe overlapping) researchers representing each research theme. Research groups can be a source of renewal and consolidation of research strengths, but there is no guarantee that this will happen, especially if groups get too large, or if they overlap too much with competing stronger groups, such as funded research centres across departments.

The self-evaluation report mentions that there is a risk of the Department "withdrawing into small groups" not feasible for newly arrived researchers and PhD students, and it is mentioned that "there is a potential for the development of new strong research groups" (p. 9). Newly arrived research and PhD students need to find groups which they can belong to, but at the same time young researchers need to have several groups and networks to relate to in order to further their career.

#### Academic networks and collaborations outside the unit

Many researchers in ISM are involved in networks and collaborations across departments, faculties and centres with specific research priorities of Lund University and this seems to be a very important tier of research work in ISM, thus supported by and contributing to the rich diversity and high capacity of research at Lund University in general. Working in different research constellations is a crucial source of inspiration and satisfaction for both well-established researchers and PhD students.

Overall, the department's research profile is lacking in visibility and needs to do more to communicate already existing practices formed from below.

#### Diversity, integrity and ethics

Since the panel did not observe problems in this field in the self-evaluation report and the Zoom meetings, further information was requested which pointed out the existence of systematic procedures with regard to Equality and Diversity, as well as other issues concerning the working environment. The Department also fosters an organizational culture within which people appreciate and can capitalize on individual differences through a number of measures, some of which depending on faculty funding. For example, postdocs and doctoral students play an important role in organising a variety of seminars and staff conferences.

#### **Quality ecosystem**

#### Quality in applications and publications

The ambition to increase publication activities could be improved. Department members tend to publish their work as reports and book chapters with only a few select individuals publishing in top-tier journals (e.g. AJG 3 or 4 or FT50 ranked journals) of their field.

The department is active in applying – and has been successful in securing – external funding from various sources. While we do not have insight in the general quality of applications from the department, it seems that there could be a more systematic (obligatory) use of internal review of draft applications, in order to develop applications and increase their success rates.

#### Research strengths and how these are reflected in the educational portfolio

In several fields, research and teaching are integrated and work in synergy. This is a strength and advantage for students and academic staff, much in line with the general idea of universities.

In terms of potential areas of research excellence, it seems that 'sustainability studies' is a particularly strong research area - particularly when measured in publication activity and the output of high-quality publications. Sustainability studies also appear to be logically and systematically connected to teaching activities and intended learning outcomes of the master's and bachelor's programs of the Department.

Sustainability would also seem to be a dimension of 'Service Studies' that could potentially be defined as the common denominator of all the different research groups of the Department. Inter-disciplinary research projects on 'sustainable service society' might also have significant potential for winning competitive research funding in the future.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

ISM is strongly oriented towards contemporary and future societal challenges, including UN Sustainable Development Goals. ISM has strong connections to industries, and the self-evaluation report (p. 10) suggests that this should also become a more direct advantage for the post-grad carrier of PhDs in service industries. Meanwhile the department also hints at a 'lack of understanding on the part of the faculty of much of the close-to-practice research being conducted' (p. 11). As stated above, outreach and research close to practice is a departmental strength in need of acknowledgement by Lund University.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

Besides the dilemmas associated with close-to-practice research, the panel did not observe problems with integrity and ethics. A department in contact with service industries with an interest in improving understanding of consumers needs to include a business angle in its work. However, these projects are based on cooperation. Commissioned projects, where ethical issues could be expected, are not common in the Department.

# How the unit uses and capitalizes on the available research infrastructure in Lund University and elsewhere

From the Zoom meetings and the responses to further questions raised, it is the Panel's impression that the Department does not draw much advantage from broader research infrastructures at Lund University, apart from occasional support for considering larger interdisciplinary grants.

The panel also noticed that the Department mentioned only a few transversal issues (p. 18), all of which we found important.

ISM's location in Helsingborg has advantages in terms of making ISM visible to the environment, including industries and public authorities - but this also produces a situation where ISM does not get the same support as other departments in this faculty.

#### Alignment with the University's strategic research areas (SFOs)

It is surprising that Lund University's 11 strategic research areas ('Strategiska forskningsområden') hardly include any social sciences, and therefore no surprise that ISM is not aligned. It is remarked that there is one

on sustainable industrial production (led by Chalmers), but ISM is oriented on services. Since all the diverse kinds of service production and consumption areas ISM is researching have severe environmental impacts, a future focus of ISM - and Lund University - on sustainable services, is much recommended. ISM seems ready to play a leading role in such an initiative, and we got the impression that this is on its way.

#### Recommendations

The panel finds the issues below most central, none of them are urgent, but they need to be dealt with in the short (1-2 years) rather than the longer term.

#### 1. Recruitment

The permanent staff of the department is under the leadership of a generation born in the 1960s and 1970s, while there has not been any permanent staff recruitment since 2017. To ensure the future capacity of the department, it is crucial to find ways to attract new and younger researchers into junior and permanent positions. Meanwhile, since promotion to professor positions have not been possible in later years, and the faculty generally tends to have fewer staff in professor than in other positions, it is important to ensure the possibility both to promote internal and recruit external candidates for professorships, within areas defined in the department's strategy. Professorships are important means to both stabilize and develop a department.

#### 2. Strategy

As observed, the department lacks strategic orientation, which should also support recruitment. ISM has potential to strengthen its identity and research profile, building on its orientation to understanding consumers and developing this into a stronger profile in sustainable development in services and consumption or what was called 'sustainable service society'. Another area of interest developed in cooperation with other departments of Lund University is culture and creativity. Both are areas with a potential for excellence, where ISM needs to clarify what is the specific and unique ISM take on these fields. Focusing on consumer and user needs in services requires the complex interdisciplinary effort characteristic of ISMs profile.

It would seem to be in the long-term interests of the department to better define its raison d'être and to collectively - through a bottom-up process - elucidate the strategic strengths of its multi-disciplinary profile, particularly as regards creating value for the Swedish service society and, perhaps, also for serving the 'human capital' needs of the global service industry.

#### 3. Research organisation

As observed, the organisation of research is diverse and includes strong groups and networks across Lund University. But there is a need to find ways to deal with the dilemma between inter- and intradepartmental projects, groups and networks. The main purpose of this will be to make groups more inclusive and help junior scholars in developing their scholarly identity and networks as academics. Today, it is often in thematically coherent, mutually supporting research groups that scholars feel energized by and able to achieve excellence, but there is not one best solution to research organisation. Early-career researchers' voices are central to the discussion and development of the research organisation.

# 4. Communication

Web-site communication of the department's research profile needs to be improved urgently. But while there is room for improvements of this, further public communication of research activities will have to be oriented towards developments in the department's strategy and research organisation.

# 5. University- and faculty-level acknowledgement

ISM does not gain much support from present university- and faculty-level infrastructure and strategic research areas. Furthermore, Lund University needs to recognize more fully the contribution to the uni-

versity's profile from ISM's orientation to sustainable services. ISM and other social science departments should play a greater role in Lund University's strategic research areas.

# Gender Studies, Strategic Communication, Communication and Media, Sociology of Law, and Sociology

# Panel overview

The Faculty of Social Sciences consists of 12 departments and units; most are located in Lund but some at Campus Helsingborg. In terms of student enrolment at the BA and MA levels, it is one of the largest faculties at Lund University, second only to engineering. With only one exception, our 15 BA-programs are taught in Swedish, while 18 out of 23 MA programs are taught in English. The overall share of international students at the MA level is constantly increasing, including tuition paying (non-EU) students. The faculty's doctoral programs represent a combination of classical disciplines and relatively new research subjects, and a growing proportion of the research conducted is multidisciplinary. For most researchers at the Faculty of Social Sciences, collaboration with various external stakeholders is a given part of the work.

However, the share of university funding allocated to the Faculty for research does not match the significant education assignment. This has several consequences. Firstly, it means that everyday life at all levels of the Faculty is dominated by issues related to education. Secondly, since a "normal" teacher position involves only 20 percent research time, it exerts a constant pressure on individual teachers to attract external research funding. The success rate in attracting external funds to compensate for the meagre university allotment varies considerably across units. Research management is heavily decentralized, but some Faculty- and University level coordination and support is in place. The Vice-Dean for Research chairs the Faculty research council, with one representative from each of our 12 units. The Faculty Library provides extensive support in information management.

For RQ20, we have divided the 12 units into three panels. One panel consists of departments with large student bodies and educational programs with a strong professional focus; another consists of small to mid-sized departments with reasonably budgetary balance between research and education; and the third panel consists of departments and centres with a strong emphasis on research.

**Panel II** consists of five departments: Sociology, Sociology of Law, Gender Studies, Media and Communication Studies, and Strategic Communication. They are small to mid-sized departments, mostly with reasonably budgetary balance between research and education. Some of these have previously belonged to the Department of Sociology, and all but the relatively newly established Department of Strategic Communication at Campus Helsingborg are physically located in Lund. However, Media and Communication Studies is organizationally partly linked to the Faculty of Humanities and Theology.

# External panel report

#### Panel II The RQ20 Assessment report

The Panel II evaluation includes the five following departments: Sociology (sections 3.1 and 4.1), Sociology of Law (3.2 and 4.2), Gender Studies (3.3. and 4.3), Media and Communication Studies (3.4 and 4.4), Strategic Communication (3.5 and 4.5). The report follows the same order.

# **Executive Summary**

According to the Dean's document (19.12.19), the panel's five departments are small and medium-sized, and "with a reasonable budgetary balance between research and education".

The LU overarching strategy on international research competitiveness and quality makes research and external funding major and linked issues. The imperative question is: how do we get there? Departments vary in terms of discipline, history, demographic transformations, geographic location etc which in their own interconnected ways facilitate as well as complicate their strategic work (section 3.0). This calls for department specific responses (section 4) to enhance the LU overarching strategy. We underline the fact that departments themselves must prioritise and transform our recommendations (both in 3.0 and 4.0) into workable practices based on local knowledges if RQ20 is to succeed.

In general, the panel has identified certain issues as cross-cutting challenges such as the teaching/research relationship at times intensified by specific department circumstances such as staff composition (demography: retirement/young staff), and the resources provided by LU. Rather than perceive requests for more resources as a classic demand for more money, the panel suggests that LU should consider how better to protect "research time" from any undue bureaucratic demands. Further, though the departments work well and have clear foci regarding their everyday practices, they vary in the framing and following up of strategies. Strategies and activites need to be coordinated with activites understood as ways to follow up a strategy in practice. The panel reminds all departments of the need to coordinate with LU's overarching strategic vision for a successful future as an international university.

# The Panel members and evaluation approach

RW20 Panel II has consisted of five professors from the relevant disciplines. Table 1: Brief overview over Panel II, panel division of work according to members` special competence, and collaboration:

Panel members	Special focus on the following departments	Reading across, writing, and commenting on drafts and final report
Mathieu Deflem, University of South Carolina, USA	Communication and Media, Sociology of Law	
Winni Johansen, Aarhus University, Denmark	Strategic Communication, Communication and Media	
David Nelken62, King's College London, UK	Cross-cutting issues, Sociology	All nonel II members
Ann Phoenix, University College London, UK	Gender Studies, Sociology	All paner il members
Terje Rasmussen, University of Oslo, Norway	Sociology of Law, Strategic Communication	
Anne Ryen, Agder University, Norway	Sociology, Gender Studies, Panel II leader	

Our process involved an informed and critical reading of the self-assessment reports, and because of the corona pandemic, informative zoom-meetings with the departments in which our report is grounded. The panel were, therefore, unexpectedly dispersed across time zones.

#### **Evaluation approach**

The RQ20 assessment actively involved department members by requiring self-assessment reports and meetings with Panel II as an outside evaluator and additional facilitator. Both self-critical assessment

<sup>62</sup> Thanks to Professor Nelken and Professor Phoenix for language editing the final report.

reports on activities, merits, plans and hurdles plus our zoom meetings fostered further self-evaluation for improvement. This evaluation exercise draws on elements from participatory evaluation with internal and external panels to produce data for practical problem solving within the contemporary organisational context (LU and Swedish HE-policy making in the face of international competition). Panel II members recognize alternative epistemological approaches to evaluations, to interviews - and to document analyses. This makes the classic truth complex, interview responses as outcomes of the interactional and procedural interview talk, and documents into textual achievements where the local contexts shape how we write and read them. To illustrate further, this assessment is based on disciplines being transformed into a 'unit of assessment' based on a limited list of categories predicated on a classificatory system. Panel II members have adhered to all LU-keywords under 3.0 Observation, however, sorted into more elastic sub-titles. The appearance of uniformity is a textual achievement and reflects both members' everyday work and the organisational formats through which it is reported. This is a common feature of bureaucratic texts as reflected in the tidy formal report structure and genre of the RQ20 reports. Hence "Document practices" refers to an interest in what people do with documents and what documents do with people. We salute a RQ20 evaluation process that builds on active organisational involvement and dialogues, and in its own ways, makes space for alternative approaches to the data produced. This was central to making this evaluation a fruitful enterprise.

#### Observations

"Observations" (3.0) and "Recommendations" (4.0) are closely linked. We recommend reading per department (colour coded and the same colour in both sections).

#### **Department of Sociology**

This assessment is based on the department's self-assessment report, input from zoom meetings, and other data made available. Our recommendations are interconnected, not separate.

The Department of sociology is ranked as one of the 100 best sociology departments in the world (QS ranking). In their 2018-2021 research strategy they accentuate a continuous proactive effort to strengthen their research activities and maintain quality consistent with the general university strategy of enhancing qualities and ambitions in an increasingly competitive international environment. The department has produced a most informative, detailed, and critical self-assessment document and avoided the trap of self-indulgence. This evaluation includes sociology (with colleagues from Education) and social anthropology.

#### Leadership

This is a medium-sized department with two disciplines of very unequal size. The department has taken successful steps to overcome tensions by having shared staff positions, the Criminology program, methods, reading applications and announcing a professorship in social anthropology to revitalise the discipline and to increase external funding etc. This shows a department capable of dealing with complex internal issues that are the product of organisational structures. They also show clarity in how they corrected the unsuccessful RQ08 organisational recommendation and transformed the environment from tense to vibrant. We recommend following up such policies in search of enriching opportunities both within- and across the two disciplines.

The department leadership consists of full and part time positions. In the long run, we wonder if a 75% HOD is adequate not only to administer, but also to lead such a big Department, - a highly intensive and demanding endeavour though reported to work well. Admittedly, a part- time role may help a (generic) HOD to stay connected to everyday practice and to avoid a devastating alternative career pattern suited only for academically less successful scholars. Despite being in short supply, it appears strategic to use full
professors in alternative (part time) positions. The department handles this "combined leadership" issue very well, but there is an urgent need to increase the number of full professors.

# Priority setting, goals for external research funding, overarching research strategy, research and teaching

The main goal for external research funding is explicit and clear: to increase external funding in the next five years into 50-55% of their total research total budget. This includes making social anthropology as successful as sociology in its funding and to provide external funding for all research staff. The period 2014-2018 shows that they won several large international and national highly ranked grants with an increase in sociology grants, but a decrease in social anthropology. With their many (six) research environments and collaborations between them, and interest in quantitative and in innovative qualitative methods, we recommended that the department continues to maintain variety in external funding sources. Beginning with small-scale funding offers potential later to pursue larger funding. It also offers some flexibility in the research/teaching issue.

The department has been particularly proactive and innovative in seeking to combine research and teaching in both formal and less formal ways. This is seen in the creation of positions and activities such as a Research Coordinator (10%) working on writing, coordinating, and supporting research grant application etc., an International Coordinator (10% = half a day weekly) working with internationalisation, guests, students and teachers in/out, and a Director of Cooperation (since 2018, 20%) on external collaboration involving a "cooperative council" so as to facilitate collaboration with regional, national and international actors. Other useful ideas include a Reader's Panel with retired professors, Writers' Surgery, Writers' Day, inviting experienced writers to talk about the art of writing, and the annual collegial research application days. This is an excellent, future-oriented way to follow up priority setting, build a collegial culture and to stimulate members' efforts to pursue and implement the department's goals and strategy. It is strongly recommended that all these be continued. However, in the case of both research groups, research environments and a wish to grow from below, the need for flexibility has to be balanced against the risks of fragmentation.

We also find the many other research-related activities (networks, hosting conferences, community engagement etc) that likewise engage PhD students, strategic and excellent investments. The list of single- and co-authored publications is impressive and includes articles in international journals with high-impact factor, book chapters and books (monographs and edited volumes), and with great variety in topics, methods, genres, recognised publishers, disciplinary and cross-disciplinary publications etc. Publications are frequently cited especially "among the top 10 % cited" and placed in the "knowledge frontier", a position of which Lund University should be proud. One might consider a legitimate remuneration system with explicit criteria to celebrate successful scholars, feed into sabbaticals, and to motivate less research active scholars.

The department also offers an extensive teaching portfolio of courses and programs including joint degree programs linked to all research environments, and all teaching is research-led (discussions, writing textbooks etc). This adds to the heavy workload, especially for younger scholars with most teaching obligations. Open invitations to a rich institutional menu of activities combined with a public research-oriented discourse bring the latent message of "all at once" and the risk of stressful informal ranking despite a young vigorous generation trained in multi-tasking and grant seeking. We recommend putting this on the agenda jointly with staff, and along with "calendar-issues" and "time thieves" to protect precious research time. To illustrate, digitalisation often means individualisation, and the numerous digital platforms and growth in bureaucratic forms imposes a division of work presumably without prior user consent. Despite the supposed emphasis on research, time for research has in practice become a scarce resource (ending up as being performed in "residual time"). Academic staff alone cannot solve this work-

load dilemma which demands an increase in administrative support. Beyond the positive description of faculty support and central management as acceptably invisible there are few references to these levels. We strongly recommend the faculty and central level to protect time allocated for research.

# Recruitment, promotion and succession, collegial culture, and quality ecosystem

There is a well-functioning recruitment policy for research oriented young scholars, and early-career researchers are encouraged in numerous ways. But the department needs more professors. A moderate remedy could be even more collaboration within, across and beyond departments and the social sciences - also good for seeking external funding. In general, we recommend a policy actively to engage with the impressive overview of academic networks, and to reconsider the time issue in terms of career building to facilitate for junior and other scholars without sufficient funding better to balance teaching and research (the department already has specialists in research on meetings, organisations and methods). There seems to be insufficient flexibility in joint responsibilities for teaching/courses unless external funding. The department scores well on gender equality and is increasingly international. We are pleased to see that discrimination, gender issues and ethics are already on the agenda.

# Sociology of Law

Lund's Sociology of Law department has a noble and high goal set for itself, to be among the leading players in socio-legal research in Sweden as well as internationally. Major funding efforts are undertaken, for research as well as related educational objectives. The department prides itself on its unique designation as the only Sociology of Law department in the world.

With a relatively small number of professors and lecturers, the department is able to attract a great number of students every year, offering all levels of education, from BA to PhD. The department is well-positioned in the international community. The focus on the study of norms is not as central as it used to be but functions to produce the coherence of various research projects.

Funding applications have been successful, but new research opportunities remain a challenge. The department recognizes that it is not sufficiently balanced in terms of gender and position.

# Leadership

In terms of research funding, the Sociology of Law department has seen a shift in its reliance on direct government funding. Increasingly, co-funding is an unfortunate necessity as it uses up internal money. Funding needs for PhD students fluctuate as students are accepted in 'batches', rather than steadily. More research funding is needed if the department is to grow in size.

It is clear that research productivity and the international appeal of the Sociology of Law department are very high, as evidenced from publications, doctoral dissertations, and the well-recognized status of the department at home and abroad. The explicitly stated efforts to link research with educational goals are very much to the department's credit.

With respect to recruitment, promotion, and succession, challenges include generational shifts in the staff, internationalization, and gender balance. The department is very aware of continuing challenges, although the self-assessment provides little practical information on these matters other than stating them and emphasizing the resulting needs. The department is small and wants to retain some of the associated advantages. This will be difficult, especially if diversity needs are to be meaningfully addressed and, additionally, if funding needs are to be met with increased productivity and grants activities. This is an issue for which the department shows great awareness. The department must grow, but also become more diverse in terms of rank and gender. Recruiting from the bottom up should alleviate these concerns in the near future. The department's extremely productive doctoral program might play a useful role here.

Publication patterns in the department show generally high productivity as demonstrated by its various kinds of publications.

In terms of the balance between activities in research, education, and external outreach, the department prides itself on having a long history of producing work that reaches many publics. The topical nature of many of the department's themes of (legal) research relates well to this expectation. Online opportunities to connect beyond academia are taken up enthusiastically.

The overarching research strategy, within the framework of Lund University's highest-quality imperative, has traditionally centred on the study of norms. The concept of norms has in the department evolved from a central theme to a general perspective. The department's focus on the study of norms goes back to one of its leading architects, who is now emeritus. In view of changes in the constitution of personnel and the bottom-up approach to growth, the department will need to consider that the focus on norms is no longer as relevant. Of course, if norms will no longer constitute the anchor of the department, something else might take its place or it may be that the focus on law itself, which is of course enshrined in the department, can be accepted as sufficient.

#### Collegial culture

The Sociology of Law department has created a creative scholarly environment that encourages publishing and independent thinking. The emphasis on academic independence is important, especially because a substantial share of research is externally funded, including commissioned research and small-scale public evaluation assignments. The department is aware of the potential risks in this respect.

The foundation for an independent research profile lies in the department's tradition of individual researcher-initiated projects and the absence of a strongly directed research strategy. With respect to integrity, the document mentions that researchers are allowed to work independently, from the bottom up.

We agree that the department should build further on its legacy of independence in research and teaching. A good foundation lies in the PhD process where high quality research is conducted by individual doctoral students and where projections for future research are formed. The suggested expansion of workshops to stimulate research and funding applications is a very good idea. The loneliness and pressure experienced by up-and-coming scholars can be mitigated by organizing such workshops in which all participate and can share and learn from one another.

The department displays self-confidence and ambition to continue in its uniqueness and attract ample research funding. It wishes to be broad in its orientation, both with respect to scope (international) and approach (interdisciplinary). For the next few years, this would point toward being involved in national, Nordic as well as internationally funded research in collaboration with other institutions and research networks in Sweden and abroad.

The panel recognizes that the department prefers a relatively loosely structured organization of funding application processes in terms of topics and project structure. The department is thereby perceived as flexible and encouraging, capable of picking up and adapting to new research ideas.

#### Quality Ecosystem

The department's contributions to teaching are substantial. It seems to have strengthened its three teaching levels (cycles) with its ongoing research activity. The Bachelors program in Criminology enjoys popularity among students and benefits from previous and ongoing research.

The department produces its own textbooks, which no doubt function as a means to attract students. At the master's level, however, care should be taken that heavy emphasis on in-house literature should not limit students' knowledge of the diversity of perspectives on the international scene. A balance needs to be found. It is a good idea to integrate master's students more into ongoing research projects, provided that the students can actively take part in the research.

The panel appreciates the effort of the department to ensure quality and progression in the doctoral work done at the department. The number of dissertations in the last few years (at more than one a year) is very high, and the trend seems set to continue at least for the next three or four years. The PhD projects normally begin with one year of course-work, and there are presentation seminars at the beginning, middle and towards the end of the period. Three supervisors are appointed to each student. The department may wish to evaluate these arrangements. For instance, PhD students may need to be confronted with the 'lonely' research situation early on, so they know what to expect later in their career. Also, two secondary supervisors may cost more in terms of researchers' time than the additional benefit received by the student. If existing arrangements are to be successful, their significance needs to be discussed. There seems to be an increasing trend for PhD theses to be by publication, as opposed to the conventional genre of a unified monograph. The department needs to reflect on what this entails in terms of PhD competence and research structure.

Based on their self-assessment, it is clear that the Sociology of Law department's research projects reflect a diverse and interdisciplinary research profile, consisting of both current research problems of high social relevance and a few long-term and in part more theoretical themes. It is also satisfying to register that people in the department are engaged in projects, centres, and institutions elsewhere. The department is quite successful in acquiring research funding through various networks and other forms of collaboration at Lund University, and beyond, in spite of its considerable teaching responsibilities.

Finally, the review panel wishes to comment explicitly that the Sociology of Law department is to be commended for having undertaken its preparations for RQ20 so thoroughly. The self-assessment document is informative, detailed, honest, and extremely well structured. It is commendable that the department has utilised the RQ20 opportunity to conduct a thorough self-evaluation during 2019, now giving the department the opportunity to compare the comments of this RQ20 panel with the department's own findings.

# **Department of Gender Studies**

Our comments are based on the department's self-assessment and meetings with the department's management, staff and students. Our recommendations follow the RQ20 criteria.

# Leadership

Gender Studies practices a democratic and distributed style of leadership. A major strength of this is that it is in keeping with feminist principles befitting a department of gender studies and is successful in promoting a collegial culture in the department. The professors provide leadership in research and have gained large grants that help to sustain early career researchers. Their four major grants consolidate the research strands in the department and sustain the research strength of the department. The professors are also central to departmental priority setting and devised the department's self-evaluation, although the rest of the department was involved in discussion of this at their two-day annual Awayday. The leadership sets clear priorities for future development that engage with the strengths and weaknesses of the department.

The main departmental priorities are interlinked: broadening and diversifying research funding, increasing the number and capacity of mid and early career scholars, and recruiting another professor. These priorities are strategic given that the success of the department in student recruitment makes it important to retain staff and to support their progression. This is crucial since succession planning for the highly successful senior professors is now urgent if the outstanding research standing of the department is to be maintained. Successful implementation of the priorities of succession planning for the two leading professors who will retire in 2021 and increasing the number of PhD students is likely to enhance the department's strengths and achievements.

#### Collegial culture

The department is exemplary in relation to collegial culture in that it has a clear theoretical perspective informing collegial working, which comes from innovative understandings underpinned by feminist scholarship. In particular, the department is informed by intersectional social justice perspectives and aims not only to be collaborative, but to take an epistemological view of knowledge as co-produced and to encourage a plurality of knowledge frames as productive of originality. A shared culture is produced through a collaborative tradition of commitment to the field. The members of staff come from a range of national and ethnic backgrounds and different genders, although senior staff are predominantly women.

A further strength of the department is that they have managed to pursue a successful research strategy of engaging early career scholars in the professors' large-scale research programmes while encouraging them to devise their own research projects. This is a laudable and convincing aim but runs the risk of losing the coherence of the programmes for which the department is known or losing grant capture if mid-career staff leave or fail to build research programmes. The diversity of approaches and knowledge frames has produced many scholars with strong international profiles. However, a potential weakness of this is that it may hinder continued and future development of a shared research agenda to strengthen the international profile and the public-facing research agenda.

#### Opportunities for early-career researchers to develop their originality and independence

The PhD programme is central to the dynamic intellectual environment that constitutes the department and to capacity building. The aim of increasing the number of funded PhD students to complement the seven currently in post, together with fostering mid-career progression through the docent is strategically important for making the department sustainable. This aim both builds on and enables a major strength of the department, which is to allow the development of originality to develop organically from researchers' own interests in six thematic research strands supported by the research leaders. These have successfully attracted research funding. The concomitant weakness is that this success carries the risk of attrition in some research areas. A department of 24 scholars is necessarily limited in the range of relevant topics it can cover and so allowing the bottom-up emergence of research agenda can potentially make for fragmentation.

#### Sustainability and renewal of research strengths

The senior scholars have worked with early-career scholars to develop research grants and jointly author publications as well as encouraging them to pursue their own interests. In addition, the department views teaching as enhancing research strengths through teaching-research synergies. All members of staff do undergraduate teaching. This is highly commendable. However, the early career members of staff have relatively heavy teaching loads and the leadership faces the challenge of both retaining early and mid-career scholars and keeping them enthusiastic. This difficulty arises particularly from the fact that it is time consuming to apply for funded research and the department has few resources for helping with research applications despite the ambition that early career scholars should apply.

Given that they have high teaching loads, the small number of PhD students do not currently constitute a critical mass. This is undoubtedly a weakness of the department in that it reduces opportunities for peer support, casual discussion of research and the sense of belonging for PhD students. Their links with other departments appear to be limited.

The employment of further early-career scholars may well help to produce sustainability. However, the retirement of two of the professors next year constitutes a potential threat to the research direction and funding success of the department, despite the intended appointment of a high-status professor (which is now in progress).

# Academic networks and collaborations outside the unit

The department is internationally recognised as a leading gender studies department. It is clearly very well networked, both inside the university and at national and international levels. Their excellent film showing the multidisciplinarity of gender research at the university persuasively indicates that they encourage the interlinking of gender studies throughout the university, something that appears to be lacking for other disciplines. At the national and Nordic levels, members of the department are networked with an impressive range of networks. At the international level, the department attracts an impressive range of international visitors and has succeeded in conferring honorary doctorates on world-leading scholars. Individual members of the department also make international visits.

The extent to which individual links benefit the whole department is not clear. However, the senior scholars include early-career colleagues in their international networks and international publishing projects.

#### Diversity, integrity, and ethics

The department demonstrates an outstanding commitment to diversity, integrity, and ethics. Its teaching and research show that it is committed theoretically, and in practice, to intersectional diversity in terms of addressing issues of inclusion and exclusion. The conception of the *Moments of Discomfort* text on research ethics and integrity prepared by early-career scholars is highly to be praised and, although the panel have not had the opportunity to see it, may well attract an international audience.

#### Quality in applications and publications

The department produces cutting edge scholarship in both Swedish and English. It is known for its work, for example, on intersectionality, racism, gender theory, sexuality and gender in Asia and climate change. Its upward publishing trajectory is exemplified by the highly impressive launch of six books in late 2019. However, the department recognises that it needs to publish more in high-status international journals.

The trajectory in terms of grant applications is also encouraging in that there are currently three major grants held in the department and an ERC starting grant and programme grants in preparation at the time of writing. It is praiseworthy that there is peer review of applications and application seminars as well as that established scholars working with less experienced scholars on proposals. However, an area of weakness that comes from university processes is the time-consuming nature of administrative tasks around funding applications. This poses a potential threat to continued success for scholars with full teaching loads.

#### Quality ecosystem

The department capitalises on its small size in implementing research-teaching synergy by, for example, extending the research Awaydays to students on their courses. This is praiseworthy, as is the foregrounding of interdisciplinary feminist methodology in teaching and research so that students from BA level onwards are research literate and the teaching sharpens the students to methodological issues. This is one way in which the research strengths in the department are central to the educational portfolio. It is particularly helpful that the department sees teaching as a site for 'dynamic exchange' between research and teaching for academics. The development of training for the public sector on diversity and gender and the outreach work for social inclusion and social justice contribute to the university's mission of situating itself within wider society. The department raised one worrying issue, which is the threats made to gender scholars from outside the university. One recommendation in 4.3 addresses this issue.

#### **Media and Communication Studies**

On the basis of the self-assessment prepared by Lund's Media and Communication Studies department, and after the meeting with management, staff and PhD students, we provide a summary of the department's relevant activities, followed by a commentary on the basis of the RQ20 criteria.

#### Introduction

According to its own self-assessment, the department of Media and Communication Studies (MKV) engages in "world class" research on media, culture, and democracy. The department undertakes this activity by conducting research on media in the following four areas: media engagement, democracy, and cultural citizenship; media industries and creativity; gender, health, and society; audiences, popular culture, and everyday life. Although the department is relatively small, the staff of nineteen includes a fairly high number of professors and lecturers with a good international representation and outreach. Research and publication productivity are very diverse and fairly high.

The department has a focus that links its (intellectual) research and teaching activities to (practical) issues of media engagement, culture, and democracy. Following the department's structure of four areas in which it concentrates, this mission is accomplished in various ways. Research on media engagement focuses on how citizens relate to, and participate in, cultural and political debates by means of various media and means of communication. Research on media industries involves various creative forms of art and expression. The area of gender and health engages with the important role the media play in questions surrounding aspects of gender (in)equality and health-related (mis)information. A fourth area engages with research on various aspects of popular culture and everyday life, including digital media and media audiences.

Department productivity includes the publication of books, edited volumes, book chapters, and journal articles, several of them in international outlets. Funding has been received from various agencies in Sweden and the EU, sometimes in collaboration with other institutes.

Teaching activities are conducted at all levels, from BA to PhD, in Swedish and English. At the graduate level, international representation by students from different parts of the world is notable. The department's international series of international symposia also reflects its international focus. Further, the department is active in the Pufendorf Institute for Advanced Studies.

Acknowledged limitations of the department include a relatively limited number of doctoral students due to a lack of funding, occasionally limited grant success, and failure to cooperate with similar institutes at other universities. Such limitations are offset, according to the self-assessment, by opportunities to grow from below, continuance of the department's interdisciplinary focus, and participation in new collaborations.

The staff profile needs to be replenished in view of retirements and the lack of an internal sabbatical system. Funding challenges are important as well. A grow from below strategy is suggested to increase personnel, with a focus on innovative research. New recruitment is proposed to fill expected vacancies. It is also proposed that strategic partnerships should be strengthened, while funding opportunities should be enhanced, in part by hiring funding support personnel.

Among its highlights, the department mentions various publications, funded projects, collaborations, international conferences, and graduate programs, including a popular Master's program. Collaborating partners include departments at Copenhagen University and King's College London. In response to the review of 2008, various beneficial changes have been made. Gender balance and equality in media studies have moved center stage. Also, of note, a new Master's program has been created, which has contributed positively to international recruitment.

#### Leadership

The MKV department is housed in two faculties: the social sciences and the humanities, reflecting its dual focus. Staff support is considerable. Research productivity is noted, and a strategy is suggested to seek small and medium as well as larger grants.

Recruitment issues are discussed with reference to specific appointments of individual scholars. Open calls are suggested to help the department grow from below.

Publication patterns are varied, including a reasonable proportion of peer-reviewed contributions. Books are an understandably important part of these publications.

A balance between research, education, and external engagement is achieved in several ways. Teaching duties are based on staff members' research projects. External engagements are manifold and include projects with both industry and civil organizations.

The department's overarching research strategy, as explained in the self-assessment, arose from an international collaboration with a noted scholar in the area.

#### **Collegial Culture**

Junior scholars are especially encouraged in their efforts. A series of dedicated postgraduate symposia is organized where junior scholars can share their research ideas and learn from one another. MKV also participates in a European doctoral summer school.

The advances made by the MKV department in terms of internationalization have paid off as the program is now ranked higher than previously (top 100). International publications and the attractiveness of the Master's program for foreign students have aided in this positive development. The work environment is described as collegial and interdisciplinary.

Diversity and ethics are taken up in the department's research agenda, and conviviality is adopted as a strategy in the department's internal communications.

The quality of research and funding strategies is facilitated by means of workshops and active mentoring. Guest speakers with substantial experience and expertise further expose the department's members to the rigors of high-quality research. The quality of contributions is recognized in a supportive environment.

## **Quality Ecosystem**

The department's research emphasis on media, culture, and democracy are directly reflected in the curriculum. The four areas of research are likewise represented in the department's teaching. The department has been able to place its students at other highly ranked institutes for doctoral work. As noted, conviviality is a central guiding principle of MKV's culture. Regular meetings attended by the members of the department gel internal relationships as do co-authored publication practices to draw in junior scholars.

# **Department of Strategic Communication**

On the basis of the self-assessment prepared by Lund's Department of Strategic Communication (ISK), and after the meetings with management, staff, and students, we provide a summary of the department's relevant activities, and add comments on the basis of the RQ20 criteria.

#### Introduction

According to its own self-assessment, the department of Strategic Communication has achieved its goals: to become the number one department of strategic communication in Sweden (in terms of research and education) and to place ISK on the international map and become renowned for its strategic communication research and research-based education programs. The department undertakes this activity by conducting research on strategic communication, from an organizational perspective, applying different approaches and a variety of methods within various fields such as political communication, risk and crisis communication, environmental and sustainable communication, visual communication, public diplomacy and internal communication.

The field of strategic communication is rather new, and the department is young. It established its first educational (Masters) programs in 2008, and after having been part of a merger of five departments into the department of Communication and Media, the department was established as a department of strategic communication on its own in 2012 in the Faculty of Social Sciences. This meant that the department started receiving faculty funding for research. Since 2012, the number of staff has increased and includes two professors (including one on leave of absence), a fairly high number of lecturers (and docents) with a good international outreach, and an increasing number of PhD students. The department is the largest department for strategic communication education and research in Europe.

Research activities and productivity are fairly high. But the department lacks staff for teaching, and external research funding has increased considerably during the last 3-4 years. The department states that it is in a positive development process. Department productivity includes the publication of books, edited volumes, book chapters and international journal articles. Small and medium scale funding has been received from municipal government levels as well as from Swedish companies and non-municipal state authorities. Teaching activities are conducted at BA and MA levels in Swedish and English and include three educational programs.

Although strategic communication is an attractive field of study among students, and the department has a strong reputation and good relationships with industry, government and politics, strategic communication as a research field is rather new and struggles with a lack of understanding of the field and lack of recognition in the academic world. Furthermore, the profession of communication is witnessing a weakened legitimacy due to criticism of communication professionals and negative media portrayal. All these factors may lead to difficulties when trying to attract external funding. However, as strategic communication is an emerging and important field of study and the department has a unique position in Sweden, the department rightly mentions that it has a window of opportunity to become thought leaders within the field.

Among its highlights, the department mentions that it has attracted leading international guest professors and researchers, established the large research project NEMO (SEK 9 million) as well as a newly commissioned research project on *Countering disinformation and protecting elections*, and published the first international textbook on strategic communication. Furthermore, the department hosts two editors in chief of two journals within the field and is starting a new open-access strategic communication journal. The planning for an OA journal at the department may consider giving the journal a Swedish or even better, a Nordic profile to attract interest and ensure quality.

#### Leadership

The Department of Strategic Communication is housed in the Faculty of Social Sciences. The department has found a suitable size for its management group, divided among several persons on a part-time basis as is usual among small departments. ISK does not, however, have full responsibility for its PhD students, as this responsibility is located at the Board of Media and Communication Studies department in Lund. What this implies in practice, for instance with regard to supervision, is not stated in the self-assessment. The absence of control over the PhD level has in part historical, in part practical explanations. It makes sense to provide the PhD students a minimum size of environment for its courses. The department had seven PhD students in May 2020 from a total number of academic staff of 25. However, although desire for an autonomous PhD program was not clearly expressed by the PhD students, for reasons of openness and interdisciplinarity, and it has little or no implications for the supervision, it seems to be reasonable that the department should have influence on the education of its PhD students. The department suggests that this is about to be sorted out.

The panel has respect for the events and circumstances predating the establishment of the department in 2012 that may explain the situation of the department today. Strategic communication is often seen as having another research approach than just media studies (which is informed by British cultural studies, and critical sociology). In other words, it is also informed by organization studies, management, and organizational communication. The distinction between academic research and professional communication work often seems less distinct than for instance between media studies and journalists. These facts concerning the status of knowledge may inhibit collaboration. It is however our impression that both departments (ISC and IKM) are relatively happy with the current arrangement – being two departments on their own - and that the future solution is to increase the degree of cooperation incrementally, particularly concerning the PhD program. The panel acknowledges that the department has succeeded in making the emerging field of strategic communication a renowned field of study and research in Sweden as well as at an international level in just a decade, and that the department has the potential to grow even more.

#### Research funding and strategy

The department is funded adequately to support the production of applications to acquire funding for new research projects, and to support employees without external funding to present papers at conferences. The department only received faculty research funding after the foundation of the department in 2012. This has forced the staff of the department to actively seek external funding. The degree of external funding has increased every year since 2012, and the department is very productive in relation to funding applications. To illustrate: The number of applications of all sizes submitted in 2018 was 29, which is a relatively high number.

The share of external funding tends to exceed university funding, and the largest share of external funding comes from government sources. The clearly largest funder is the municipal government which clearly indicates that research directed at organisational and management development in the municipal and regional level is quite successful. In this sense the department seems to have found a productive path, possibly a niche, for its funding strategies. Other kinds of funders are Swedish companies and non-municipal state authorities. It is notable that the department seems to have specialised in smaller applied projects concerning problem-solving and evaluation connected to specific public organisational change. This, and given the relatively small share of research time at the department, has left limited research time and resources for the staff to develop larger and more theoretically challenging projects.

Another occasional problem related to this kind of research time and research funding profile is that it might constitute a challenge to secure the integrity of the research and make sure that it is not going to be too fragmented. The department mentions the problem and notes that it needs to be further addressed.

In 2018, the department received funding for several projects of some length 2 - 4 years, which may indicate that more basic and long-term oriented research could be developed. The department has also developed a research strategy on how to improve the quality of applications. The elements of the strategy are quite common in larger departments and should be implemented immediately. The department also ought to think about research in its recruitment plan and would profit from being able to be less focused on teaching as it has been since 2016 due to lack of teaching manpower. This also seems to be the intention. Nevertheless, the funding situation may still cause particular challenges for those who are obliged to produce theoretically and empirically ground-breaking research, namely the PhD students. This is thus another reason for discussing how to include the PhD students and manage a PhD program within a larger cross-disciplinary or multi-disciplinary environment.

#### **Publication profile**

The academic staff mainly publish in four genres: Books, peer-reviewed book chapters, (international) journal articles and conference proceedings. This indicates that the staff are able to publish in established academic genres. Both the number of publications and share of peer-reviewed articles are steadily increasing, and PhD theses are turning towards the article-based kind. The lion share of the articles is submitted to international journals dedicated to strategic communication. Open Access (OA) articles are generally

encouraged, and a dedicated funding arrangement for OA articles in high quality OA journals could be considered. Generally, however, due to its importance for the career of the individual researcher, academic publishing needs little further monetary encouragement.

The department will focus on research and publications, which is a reasonable and necessary priority. As stated in the self-assessment, other efforts are made within other fields such as another master's degree and forms of external engagement. For these reasons it is necessary to develop a research plan with clear priorities. The department has established an ambitious plan. It could however be more focused given that not everything can be done.

## Teaching

A clearer plan for teaching is required, particularly since teaching still amounts to a considerable part of the department's time and other resources. Generally, the department seems to battle with a not uncommon discrepancy between present and future; what it is good at historically (small and medium-sized applied research projects and teaching), and what it *wants* to be good at (larger-scale research projects of international quality, executive Master's program). Handling the dilemma is not easy, but the department seems to have a plan for a gradual turn towards more extensive quality research. The development of teaching increasingly follows the norm of research-based education, at least on master's level. The idea of longer, and more theme-based courses is mentioned by the department and makes good sense.

## Collegial culture & quality ecosystem

In relation to the workload of the academic (and administrative?) staff and concerning the department culture, there are signs that efforts need to be invested in improving working conditions. Academic departments will always experience long days and a certain competitiveness that may be stressful. As the department notes, measures should be taken to keep the departmental culture constructive and not overly competitive. Several initiatives can and should be initiated to counter dysfunctional and negative experiences among the staff. The department management appears to be reflective about these questions. Several elements are listed that are intended to improve the working conditions particularly for junior staff, and to encourage research originality and creativity. Such elements include research networks, seminars, a supervisor network, international exchange, and interdepartmental research collaboration. There is a gender imbalance in management and research recruitment that the department is actively seeking to reduce.

# Recommendations

# **Department of Sociology**

In general, we recommend a flexible and forward-looking approach to continue the many excellent activities that already promote a conducive environment for research and quality at international level:

- The strategic use of professors in leadership positions.
- Active and strategic recruitment policies.
- Faculty funding and writing time for staff without external funding.
- Efforts to increase research, external funding, and variety in funders. This includes motivating young scholars to present at conferences in order to build up their research networks for collaboration on seeking funding, co-publishing, focus on research quality and an international outlook, continue the collective endeavours and creative activities in writing applications, and variety in type of publications/genres.
- Seeking more innovative collaboration across sociology and social anthropology, and with other departments and faculties in Sweden and abroad (as with gender).

- . . . .
- Continuing successful collaborations with PhD students. They appreciate the supportive department, the many colleagues who attend and comment when they present, a department with "open doors", that supervisors encourage them to present at conferences, the opportunity to publish with and without supervisors, and to teach.
- Training scholars to co-supervise Ph.D. students with a full professor.

Short term recommendations:

- An urgent need to recruit full professors to keep up quality to pursue the LU strategy.
- To accentuate efforts to protect research time in practice and to make time for writing continuous and non-interrupted rather than brief bits and pieces incompatible with analytic thinking, and to develop a concrete plan for sabbaticals to build and consolidate research networks.
- Assist PhD students further to balance freedom and structure, to present preliminary drafts for comments and to be helped to learn more about pathways into academia.

Long term recommendations:

- Changes in Swedish higher education and the LU strategy inevitably brings to centre stage the division of work and finances across all LU organisational levels, not at department level only: We recommend continuing this university perspective.
- Ask Faculty and Central Leadership to initiate a plan to deal with the calendar/time issues to enhance LU international standing in economic terms "to make more out of a krone" (SEK).
- To consider a workable system with remuneration that can be converted into research time without leading to unhealthy competitiveness.
- To consider making good teaching both visible and appreciated and maybe release extra time for grant seeking.

# Sociology of Law Department

The observation section (3.2) offers short - and long-term concrete recommendations explicitly linked to specific department issues. We refer the reader to this section whereas we here point to some more overarching issues.

In sum, the department has made some remarkable achievements and there is no doubt that the department's research and education profile ought to be continued and strengthened. A few final reflections may be helpful.

- One, while it is true that Lund's Department of Sociology of Law is unique in the world in its designation, it must be noted that its approach actually represents a broader (interdisciplinary) Law and Society perspective. The department, however, probably wishes to retain its current name (sociology of law) because it is unique and well-known, while still being clear about its interdisciplinary focus and openness to other fields, including criminology in which area the department is popular and fulfils meets its teaching objectives. As such, the department can also grow in size and become more diverse in all relevant respects.
- Two, with regard to research profile, the department should seek to maintain its international standing while also keeping an emphasis on the study of relevant Nordic realities of law, such as the (dwindling) welfare state. This orientation needs considerable discussion concerning funding, international relevance, and theoretical attractiveness.

# **Gender Studies**

The Gender Studies department undoubtably has many strengths but, as a small and successful department, scholars are also stretched to maintain the high quality for which the departments is nationally and internationally known. The following recommendations are therefore, designed to help future proof the department's excellence in teaching and research.

- Documenting of what has made the department so successful in research grant capture and theoretical development so those factors can be maintained as senior professors retire.
- Building of a critical mass of early career scholars to reduce teaching loads and extend the peer group.
- The development and implementation of a stronger succession planning, and capacity building, strategies (a professor is currently being appointed) for the appointment and retention of early career and senior staff.
- A forum for thinking through how to maintain the coherence of the department's research areas through strategic decisions about filling posts.
- More clear connections with the faculty and the rest of the university need to be developed to extend the PhD students' networks.
- LU needs to work with the department on security issues for gender researchers since these are currently acute, require university support and are part of the university responsibility to ensure safety of staff.

#### Longer term

- Developing strategies to facilitate publishing in high-status journals, including possibly encouraging doctorates by publication.
- Increased central research support and faculty support to allow non-tenured and senior scholars more time, and to give them support, to apply for research grants. This should include a sabbatical system to allow scholars to complete research tasks or devise grant proposals.
- Further central support with identifying potential grants and preparing proposals.
- Infrastructural support with communication with stakeholders.

# **Media and Communication Studies**

Several strengths of Lund's Media and Communication Studies department must be noted.

- The department admirably includes both social-science and humanities perspectives, and the department seems to be happy with being connected to two faculties. Such an intertwined approach is indeed useful for the study of media and communications as the theme invokes both study and research as well as interpretation and evaluation.
- The department's academic research is also explicitly connected with important cultural and political questions, which are all the more important in view of the current communications revolution and evolution and the centrality of the media in contemporary society.
- The department engages its junior scholars very concretely by organizing dedicated workshops.
- Research and teaching are linked, and research productivity is varied in nature and reasonably high in achievement and output. Interdisciplinarity and internationality are substantially achieved at MKV. In relation to research publications, the department has published many books, edited volumes, book chapters, and journal articles; several of them in international outlets.

Among the limitations and challenges the MKV department may still be confronted with, we note

- That the self-assessment may appear to place relatively more emphasis on what is already done in the department compared to what is still to be done or how identified objectives (and opportunities) are to be achieved. We strongly recommend looking that this be closely examined.
- The self-assessment could be more explicit on specific methods and strategies to enable the department to accomplish what it has set out to do. We trust that the department will reflect on the concrete steps and decisions that need to be taken to achieve its aims.

Media are an increasingly important force in contemporary society.

- The department admirably addresses all relevant academic and public issues by linking academic and practical questions. The question of how such aspirations are to be attained or measured, could be more explicitly explained to facilitate the link between the aim of reaching a wider public and strategies for actually reaching this goal.
- Addressing political and cultural issues might gain the department attention and recognition by focusing on issues widely recognized as relevant. However, it runs the risk of the department being driven by political and normative viewpoints rather than by academic perspectives and intellectual standards.

Moreover,

- The department currently specializes in four areas of research which invite reflections on: Is the department split along these lines of research? Why are these areas specified, why not others? Will continued existence of the differentiation of these areas be threatened by developments in recruitment if new staff are not evenly distributed across the four domains?
- The self-assessment refers to several members of the department. The overall focus on media, culture and democracy has proven successful for the integration and coordination of teaching and research at the department. It is recommended that the department continues its internal discussions regarding its overall conceptual framework.

# **Strategic Communication**

Lund's Department of Strategic Communication have several strengths to be noted.

- Although strategic communication is a new and emerging field, the scholars have succeeded in making the department internationally renowned for its research and teaching. During the last 3-4 years they have succeeded in consolidating their field, and to have more focus on research and publications. But, they still lack teaching resources as the field is rather popular among students and business.
- The department is located in Helsingborg, and for that reason has succeeded in developing strong relations to the municipality, and to receive local funding from the municipality of Helsingborg. The location issue remains, though less prominent now.

Despite these assets, the department urgently needs to sort out the teaching resources issue.

- Contemporary society has an urgent need for education and research on strategic communication in order for private and public organizations to live up to the expectations of consumers and citizens and to contribute to societal challenges. Thus, there is a need for high quality research and education within this field.

Among the limitation and challenges ISK may still be confronted with we find

- That the department experiences its position as weaker compared to older and more developed disciplines such as Media and Communication. As its SWOT analysis indicates, strategic communication is difficult to grasp for some stakeholders, and may appear somewhat diffuse. The academic recognition and status are reportedly low, and this may to some extent be due to the environment: the department is located in an old high-quality university, and not in a business school.
- Furthermore, the department diagnoses itself as vulnerable as it depends on certain key individuals.

These potential weaknesses can of course only be handled with quality research, publications in high-status journals, success in acquiring funding, but also higher visibility in relation to the international recognition of the department would be beneficial. Internally, it needs to work on fostering good-will by cooperating further with other departments and research environments at the university.

# Conclusions

The panel appreciates the good communication with the RQ20 leadership, and all departments and their many comments. Despite this, there may be matters that did not find their ways into our report. This is an issue raised in our introduction where we stress the importance of the departments` own work and dialogues within and across organisational borders at all levels, to anchor them in the local environment. Our assessment does not include the institutional consequences of the covid-19 epidemic which we could see was beginning to add to departmental workload and consume research time. This calls for exceptional solutions from LU as well as the departments over the next few years.

# Middle Eastern Studies, Human Geography, Sustainability Studies, and Political Science

# Panel overview

The Faculty of Social Sciences consists of 12 departments and units; most are located in Lund but some at Campus Helsingborg. In terms of student enrolment at the BA and MA levels, it is one of the largest faculties at Lund University, second only to engineering. With only one exception, our 15 BA-programs are taught in Swedish, while 18 out of 23 MA programs are taught in English. The overall share of international students at the MA level is constantly increasing, including tuition paying (non-EU) students. The faculty's doctoral programs represent a combination of classical disciplines and relatively new research subjects, and a growing proportion of the research conducted is multidisciplinary. For most researchers at the Faculty of Social Sciences, collaboration with various external stakeholders is a given part of the work.

However, the share of university funding allocated to the Faculty for research does not match the significant education assignment. This has several consequences. Firstly, it means that everyday life at all levels of the Faculty is dominated by issues related to education. Secondly, since a "normal" teacher position involves only 20 percent research time, it exerts a constant pressure on individual teachers to attract external research funding. The success rate in attracting external funds to compensate for the meagre university allotment varies considerably across units. Research management is heavily decentralized, but some Faculty- and University level coordination and support is in place. The Vice-Dean for Research chairs the Faculty research council, with one representative from each of our 12 units. The Faculty Library provides extensive support in information management.

For RQ20, we have divided the 12 units into three panels. One panel consists of departments with large student bodies and educational programs with a strong professional focus; another consists of small to mid-sized departments with reasonably budgetary balance between research and education; and the third panel consists of departments and centres with a strong emphasis on research.

**Panel III** includes the Department of Political Science and the Department of Human Geography, two well-established departments that have a significant research budget in relation to the educational budget. This panel also holds two trans-disciplinary research centres that have recently become part of the Faculty of Social Sciences: Lund University Center for Sustainable Studies and Center for Middle Eastern Studies. Both are dominated by research but each has its own MA program. Overall, this panel is characterized by dynamic research environments with extensive collaboration within and outside academia.

# External panel report

This report was prepared by the Panel consisting of:

Professor Katrina Brown (Chair),

Professor Peter Munk Christiansen,

Professor Sune Haugbølle,

Professor Lise Rakner,

Professor Richard Shearmur and

Professor Kristian Stokke.

# **Executive Summary**

This assessment was undertaken by a Panel of six international experts. It covers four very different Units of Assessment at Lund University: Two interdisciplinary research centres, the Lund University Centre for Sustainability Studies and the Centre for Middle East Studies; and two departments, Human Geography and Political Science. These are quite distinct; in size, structure, composition and types of research. The Panel finds high quality research in each of the Units, and many examples of excellent working practices and procedures that provide the underlying structures and environment to support it and nurture researchers. They share some common attributes and face some common challenges.

First amongst these is the *increased pressure to generate external funding*. This is a feature common to all Units, but it manifests slightly differently in each Unit, and is experienced differently by individuals at different stages of their career. Furthermore, employment insecurity is a challenge for many early career researchers, especially in the interdisciplinary research centres which have recently been, or are in process of being restructured and fully integrated into the Faculty of Social Sciences. This process has been extremely disruptive. The University and Faculty must ensure that these Units have the autonomy to flourish and continue to produce high quality interdisciplinary and collaborative research, to be outward-facing and engaged with society.

These diverse Units are also each grappling with issues of *interdisciplinarity and pluralism*. These are detailed below for each Unit, but the Panel also considers that there is action for the Faculty of Social Sciences and for the University overall to better support interdisciplinary research. Some of this relates to the university structures, and some to how research quality is understood.

A further challenge concerns the *demographic characteristics of the University's staff*. This was felt especially acutely in one of the Units assessed, but is a feature of all. The age, gender and diversity of the Units, and the desirability of a career as an active researcher in the University are affected by a range of issues,

including employment regulations, collegial culture and leadership styles. Staff in all Units feel under pressure to raise funds, produce quality outputs and teach their subject, but it is important that these pressures are not felt disproportionately and do not undermine individual wellbeing.

Overall, the term 'balance' was a feature of discussions with staff. *Managing and negotiating trade-offs and finding synergies* between teaching and research; applying for external funding and writing up papers; and different funding sources, are a major preoccupation, underpinning individual choices and collective strategies. These issues need to be addressed in each Unit through a well-developed deliberated strategy, backed-up and supported by Faculty and University policies and structures. This is on-going and iterative work, and it needs to start now.

#### Introduction

The Panel consisted of six international experts, each a senior academic and researcher in the social sciences. Panellists' specialisms include political science, geography, sociology, international development, and urban planning. Each has diverse experience of research assessments and review processes in different countries and for a wide range of different funders internationally. Panel members are based at universities in Norway, Denmark, Canada and UK.

The Panel was tasked with assessing and advising on the *preconditions* for high quality research in terms of procedures, strategies, resource allocation, balance between education and research, and networks and outreach, in order to help the University to develop procedures to support Units and to realise their potential. The Panel used self-assessment reports from each Unit, bibliometric data, and a series of meetings and interviews with Unit and Faculty representatives to do this.

The Panel met early in March to agree the overall process and to familiarise themselves with the RQ20, its key aims and approach, and timeline. The overall approach of the Panel was characterised by inclusivity. All Panel members attended all meetings and read every self-assessment report. The exception was one Panel member who, due to time differences and the pandemic crisis, was unable to attend the virtual meetings in Lund. The Panel requested to meet with senior management, senior researchers and early career researchers in each unit. This was to ensure that a variety of voices and perspectives were heard, and that groups were small enough for everyone to take an active role.

An individual Panellist was allocated to lead for each Unit of Assessment. This Lead has specialist knowledge of the discipline or field. Panellists all read each report, discussed the main issues in meetings and via email exchanges, and sent questions arising from the reports and considered important to be followed up, to the Lead. The Lead took responsibility for compiling these and for leading the discussion and questions during our virtual visit to Lund. The Panel Chair chaired each of the meetings. Each Panellist took notes, and after each meeting a de-briefing discussion was held. The notes were written up and circulated to the Panel. The Lead wrote a first draft of observations for each unit. The report was compiled by the Chair, but the whole process was undertaken as a collective and shared endeavour.

The process was highly collegiate and the Panel worked very well together. It was given helpful and timely information from the support team at the University. The virtual visit was managed superbly with no technical hitches. Although it was no substitute for an in-person visit, the four days were extremely effective and a very intense gathering of information. The Panel is very grateful to everyone who took part in the meetings for their participation and patience.

The report uses the structure and section headings suggested by the University. The next section sets out observations on each Unit, based on the Panel's assessment of the self-assessment reports, the bibliometric data and the interviews and discussions. In this section, *Leadership* includes assessment of the overall research strategy, the ways in which decisions are taken and priorities decided and by whom, the procedures for recruitment, and balance between research and other activities. *Collegial culture* concerns the ways in which relations are managed and supported within the Unit to enable high quality research, diversity and ethics, and particularly support for early career researchers. *Quality ecosystem* refers to the linkages and connections, support structures, enabling and constraining forces external to the Unit, and how it develops collaborations and partnerships.

A recommendations section presents specific advice for each Unit, for the Faculty of Social Sciences and more broadly for the University. The Panel appreciate the intentions of the review not to focus on individual performance but on the environment and ecosystem created to enable and support excellent research. Many of the conditions are outside the jurisdiction or control of an individual Unit, or even the University itself. Whilst the report concentrates its recommendations on those aspects which are amenable to change by the University and the Unit, it also comments on some of the broader contextual issues where appropriate, or where the Panel considers they are especially significant.

# Observations

The four Units examined by the Panel present four very different entities within the Faculty of Social Sciences. They differ in size – in terms of staff, compare Departments of Human Geography and Political Science – and corresponding levels of funding. Importantly, they differ in the extent to which they are more conventionally discipline-focused, or more interdisciplinary. This distinction is especially acute between interdisciplinary research centres (CMES and LUCSUS) and the two departments (Human Geography and Political Science). This is turn influences the extent to which they are primarily structured and organised around teaching, delivering an undergraduate teaching programme, versus research. However, all are striving to generate a greater sharing of revenue from external research funding, although the proportions of external:internal funding differs across the Units. These distinctions are very important, and gave the Panel some valuable insights into how the Faculty and the University operates. In particular, the significant institutional re-structuring – only recently completed in case of LUCSUS and on-going for CMES – point to some emerging challenges, and perhaps identify different ways of dealing with them.

#### Lund University Centre for Sustainability Studies – LUCSUS

#### Leadership

LUCSUS was established in 2005. It comprises approximately 45 staff of whom 30 are core teachers and researchers. The Centre founder describes LUCSUS as a success as it has managed to establish a new field of interdisciplinary research within a traditional university. This has been achieved through team-work, institutionalization of an interdisciplinary centre, serious attention to theory and "lots of disagreements" and "sharpening of our arguments".

The Centre is a sizeable and visible interdisciplinary and internationally-oriented research unit, with five core research areas; climate change, land use, urban governance, energy justice, and biodiversity.

LUCSUS presents itself as a dynamic research centre with motivated and enthusiastic researchers, a strong sense of vibrancy and shared purpose. The recent transition from being an independent centre to part of the Faculty of Social Sciences has been a significant shift, and has prompted much reflection on, and analysis of, the identity of the Centre and its relations to the rest of the University. In the interviews, the LUCSUS representatives claimed to identify more with the social sciences now, but, in the opinion of the Panel, the integration into the Faculty is still unfinished. The two – the Centre and the Faculty – still miss some alignment, in terms of expectations and aspirations, roles and responsibilities.

Funding is a major challenge for the Centre. Around 60% of the budget comes from external sources which leaves the Centre in a somewhat vulnerable position, given uncertainty about the external funding landscape. The Centre management team is very well aware that this brings significant risks and can be detrimental to long term planning. It also brings uncertainty, and the economic insecurity associated with dependence on external funds has a price. Staff members report that the Centre is "losing good people" because many people have "unsafe contracts". Of course, staff turnover is not necessarily a bad thing, and brings the opportunity for new alliances and collaborations, and demonstrates career progression and capacity building. In fact, a number of the Centre's PhD candidates have had the opportunity to stay at LUCSUS. Nevertheless, the high dependence on external funding makes the working conditions less attractive compared to departments with a less vulnerable economy.

To some extent this could be eased through more strategic collaborative work with other centers and departments, at Lund or elsewhere. Although there is active encouragement of such arrangements, and there are already many collaborative projects – for example with the Political Science Department – these possibilities could be expanded and utilized better in order to create a stronger financial buffer for the Centre. Such collaborative ambitions should also be supported and aided by the Dean and the Faculty.

At present, external funding is applied for from many sources, but the interviews revealed that not all faculty members are aware of the Centre's strategy on external funding. The Panel recommend that external funding becomes a more integrated part of the Centre's strategy and that it is communicated clearly to the staff. The Panel finds is that in order to counter the uncertainty associated with reliance on external funding, a more strategic approach in addition to collaboration and research alliances, would put in place safeguards and analyse risks associated with different funders and for different individuals.

In terms of research output, the overall number of publications shows a strong upward trajectory; 2018 is the most prolific year with 59 journal articles out of 91 publications altogether (79 if non-peer-reviewed publications are subtracted). The years just before produced significantly fewer journal articles. Whether the high level is sustainable or desirable remains to be seen, although it does not appear to the Panel as an over-ambitious target. Favoured journals include *Sustainability Science, Sustainability, Ecology and Society,* with papers also published in excellent outlets such as *Ecological Economics, Global Environmental Change, Environmental Research Letters* and *Current Opinion in Environment and Sustainability.* These are all well regarded and generally highly cited international and interdisciplinary journals. There is a good range of journals, with some publications in lower cited journals, but also some in *Nature Climate Change* and *PNAS* which are considered high quality mainstream science journals, and *World Development* a leading social science journal. Over the last five years 5% of LUCSUS articles belong to the top 1% in sustainability science and 25% to the top 10%. But this field is quite fluid – highly interdisciplinary but also expanding rapidly. Furthermore, the Panel acknowledges the usefulness of non-peer reviewed publications for purposes of wider communication and research dissemination, particularly newspaper articles, editorials and specialist publications. All in all, the Centre is doing very well in terms of research output.

Strategy processes are reported to be bottom-up and inclusive, with "lots of workshops" and discussions on how to identify strengths and develop them. There is a focus on consensus, but the Director is active "behind-the-scenes" to make it work. There are also disagreements and conflicts, but a healthy culture of continuing to discuss and listen to arguments.

The Centre's strategic focus is to cultivate the research environment from the bottom up, and openness to emerging areas; advancing mechanisms for funding; strengthening outreach and impact/relevance. Internally this means working to create a functional organizational structure; to secure institutional coherence; to gain clarity in research foci. But only so much certainty for early career researchers can be created in a Centre so heavily dependent on external funding. Nevertheless, the Panel finds the strategy somewhat unclear. From the reading of the self-assessment report and from the interviews the strategy appears "loose" and still evolving. Making strategic decisions means that some actions have to be selected and others rejected. As the Panel sees it, it is not clear that this is happening across all aspects of LUCSUS. Whilst the Panel acknowledges the very positive efforts made recently, there could still be a greater focus on targeting specific funders and supporting scholars – particularly early career researchers - in advancing their careers.

#### **Collegial Culture**

The overall impression is that there is a strong collegial culture at LUCSUS. The early career researchers in particular experience a strong sense of community and collegiality and feel well supported. The more experienced researchers also find the centre a very social and collegial place. The current Director plays an important and very positive role in shaping this collegial environment.

The recently completed LUCID programme for PhDs (2009-2018) enabled a very strong PhD community and a commitment to interdisciplinary research training – and although the LUCID programme has stopped, the strong PhD community is still there. The PhDs were generally positive about the support structure at the Centre, both financially – for example for conferences, fieldwork and literature – and in terms of supervision. They also feel included and that they are part of a broader community and research strategy.

In general, LUCSUS also provides a strong focus on research and organizational support for researchers to develop individual projects, both from LUCSUS and Lund University more widely. Applicants are provided support funding for quality grant applications, for example to the European Research Council (ERC), and the University offers courses on grant writing. As there are relatively few tenured positions and employment is insecure, all researchers in general and the young researchers in particular, must seek out external funding to be able to stay at LUCSUS. There is, for some at least, a feeling of job insecurity because of the funding structure.

LUCSUS has a different recruitment strategy than that of the departments; because of lighter teaching loads, the Centre can better focus on international recruitment while at the same time not being able to offer very many tenured positions.

As regards the collegial culture, there is one aspect that the Panel would like to emphasize: Some of the young researchers are not sufficiently aware of the demands that they must comply with. This particularly relates to the publication strategies. Some were very well aware of these demands and expectations because they were communicated by e.g. advisors or mentors, while others were less sure. The Panel recommends that the Centre starts, encourages, and clearly communicates deliberation on the expectations for teaching and research output for researchers who want to pursue a career in academia. This is important for researchers who want to stay at LUCSUS as well as those who will apply, at some point, for positions elsewhere.

#### Quality ecosystem

LUCSUS reports to have more than 50 partners from 25 countries. It is strongly outward-facing and actively seeks external and international partnerships and collaborations.

LUCSUS presently has 100 master's students and runs a 2-year master's programme in Environmental Studies and Sustainability Science. All core staff members take part in teaching activities. Teaching demands also affect appointment decisions at LUCSUS, but since tenured positions are primarily allocated according to teaching needs and as LUCSUS does not run an undergraduate programme, LUCSUS has a disadvantaged position in the Faculty and University. The third semester of the Master's programme runs a number of electives. This makes it possible for LUCSUS to create a strong connection between research and teaching, generally seen as beneficial for both staff and students.

LUCSUS invests resources in communication with partners both inside and outside academia which is a significant strength. The Centre engages with policy makers at multiple levels ranging from the United Nations to Swedish local municipalities. The Panel notes this as a strength of the Centre; it motivates the research and makes it relevant and impactful to society. The staff also contribute to research outreach through newspaper articles and other popular outlets. The Centre is well-known, with a high profile internationally in field of sustainability science and a reputation for interdisciplinary and critical social science analysis.

#### **Centre for Middle Eastern Studies - CMES**

#### Leadership

The self-assessment report and the discussions with the Panel were dominated by the restructuring and the uncertainties arising from it. Since its inception in 2007, CMES has supported, coordinated and expanded research on the Middle East at Lund University. It has built a strong international brand attracting international students, academic staff and visitors, won grants and funds, and formed international partnerships. Until recently CMES was a vibrant hub for conferences, workshops and meetings resulting in collaborations around book series, special issues of area studies journals, as well as significant participation in Swedish public debate about the Middle East. It housed a Master's degree which thrived.

Since January 2017, coinciding with the departure of the former director, the Faculty has taken a decision to change the Centre's structure and gradually transition to a cross-faculty programme ('Middle East in the Contemporary World'), supported by a substantial grant from the Swedish Research Council. CMES transferred into the Faculty of Social Sciences in January 2018. From the Faculty's perspective, for some time CMES had not been able to realize its full potential as a strategic research area (SRA). Hence, a working group tasked to formulate a vision for the Centre was formed in early 2019, consisting amongst others, of the acting CMES director. The aim of the transition is twofold:

- 1. To secure the Faculty's control over Swedish Research Council funds, which hitherto went straight to CMES. The Faculty's concern is that if the grant is not renewed, permanent staff placement has to be maintained.
- 2. To create a new structure for development of Area Studies based on more solid foundations in (various) social science disciplines.

From our discussions with staff, it became clear that they do not feel they have been involved in this process or sufficiently informed about it. They are generally unhappy about the situation, which they described as "being in limbo". This is because the transition has left staff uncertain about their own positions and about the future of the Centre. For those who have already moved to another department – for example, Sociology – their job is secure, but their current and future role as part of the Centre is not. For several, job insecurity is clearly a real and pressing issue.

This begs the question of whether the current process is meant to be a demolition of the current structure, or a transition. If it is a transition, elements of the old, successful model, and indeed spirit, of the Centre, should be preserved in order to create continuity. If it is a demolition – and this is how most staff seem to be experiencing it – it is difficult to see how the new structure is going to involve participation and buy-in from any of them. Starting from a clean slate may require significant new appointments, including at the level of Full Professor, and of a Director.

The Panel observes that the brand of CMES has been compromised by this process of restructuring. CMES no longer attracts the same number and quality of international scholars and students, and is not generating research income from external sources. Morale is very low. All this severely impacts on its ability to execute world class research and to maintain an international and national profile.

The re-organisation has meant there have been a number of changes in leadership and currently there is an acting director. The current director is one of several who have served as caretakers during the reconstruction process. They seem to have been badly informed by the Faculty and are in a weak position to manage effectively. However, the uncertainty and protracted period of insecurity has de-motivated and undermined any strategy and direction in the Centre. In the interviews conducted for this assessment, there was a sense of powerlessness and hopelessness expressed, summed up by one member of staff saying they had "lost hope for the Centre". The Steering Group described how they were waiting for a new board to be established and for a new director to be appointed next year, with current lack of clarity on who could make decisions and about what, and when.

#### **Collegial culture**

On the positive side, researchers do still feel strongly attached to CMES, even if they are uncertain about what it will be after the transition period. Early career researchers described it as a lively, collaborative and active setting *before* the re-organisation was initiated. It was a warm and welcoming 'home' for researchers, who felt a shared identity and purpose and who commented on the importance of diversity, in terms of ethnicity and disciplinary backgrounds of the researchers.

The CMES publication strategy is underdeveloped. Currently, it appears that publication decisions are left to individual researchers, resulting in a scattered and perhaps under-ambitious research output in past years. Nevertheless, the Centre produced a decent, but slightly sub-par, level and volume of peer-reviewed publication, which has however markedly increased in 2018. There is also a high volume of non-peer reviewed publications in newspapers and specialist publications, with four or five researchers contributing actively to public debate since 2017.

#### Quality ecosystem

It is clear to the Panel that, at present, the research environment is not conducive for meeting the stated goals of producing international excellence. The internal support structure for junior scholars is unclear at best. PhDs were unhappy about the lack of research groups, seminars, and general research environment. When asked if the Faculty had helped them, PhD students replied with an emphatic "no!". They explained that they had found it difficult to get funds – for example for travel or conferences – and had been "kicked between CMES and Faculty" and often ended up having to apply for external funding, commenting that it was really hard to get money from the Faculty, because there were so many "hoops to jump through".

The physical location of the CMES was an important reason for its dynamism and shared purpose before 2017. In the last few years, a number of staff have moved their offices out of the building, coinciding with a drop in student numbers. If "CMES 2.0" is to get off to a good start, it must include a physical space with buy-in from associated members.

A particular concern is that the interdisciplinary capacity of the Centre could be compromised by the restructuring. A clear strategy for how to facilitate interdisciplinary Area Studies research should take heed of the lessons and the successes of 2012-2017. One issue highlighted to the Panel, is that researchers complain that they are unable to submit applications for external grants without approval from the Faculty. They experience this as highly paternalistic and demotivating. They are unable to apply for funding through CMES and now have to go through individual departments. This severely undermines their capacity to do high quality interdisciplinary research. The ability to work across Faculties is also important, as collaboration around broader themes, particularly water management in the region, show the potential for a well-integrated CMES that benefits from the Faculty and vice-versa.

Ι

The Panel notes that CMES researchers publish substantively in Swedish and play an important role for society by participating in public debate that helps to shape policies regarding the region and immigration. The ability to engage with this public and political discourse effectively is related to the success of the CMES brand as a cross-University research centre.

#### Department of Human Geography

#### Leadership

The Department of Human Geography is a broad unit that includes an old subject (Human Geography) and two newer study areas (Human Ecology and Development Studies). It is an active and productive department with high ambitions in both teaching and research. The Department shows a strong publication record, success in getting external funding, high productivity in teaching, and active research collaboration and outreach. At the same time, the Department has potential for further improvement. It is especially facing challenges of maintaining and renewing study areas, balancing teaching and research, ensuring recruitment and career development for young scholars, and addressing gender imbalance and diversity. While these pose strategic dilemmas, the quality of leadership, the competence and productivity of the staff and the collegial culture are key assets that make the Department capable of handling them, especially if adequately supported by the Faculty and University.

The ambition of the Department is "to provide high quality research, education and administration, supported by a working environment that encourages the personal as well as collective development of its staff". The overall strategy for achieving this is to create a "balanced academic milieu", which means to pursue both excellence and relevance, tradition and renewal, and internationalization and contextual embeddedness in research and teaching. Leadership in the Department is described as enabling, with a focus on creating a conducive environment for research and teaching staff.

The high ambition and the 'both-and' strategy mean that the Department is grappling with various questions of balance and capacity. The self-assessment report and interviews point to a set of key challenges facing the Department. Maintaining capacity in research and teaching and balancing teaching and research are foremost concerns. The Department is relatively small in size but offers large and broad teaching programmes, while also being an active and broad-based research department. This breadth of scope raises critical questions about prioritization, especially as the Department is also wrestling with the challenge of renewing traditional research and teaching areas. These are potentially contentious issues. In this situation, the leadership style of the current Head of Department is characterized by inclusivity and dialogue. The Department has a strong commitment to bottom-up processes for formulating research agendas, and the leadership is described as "supportive of new projects" and "open".

The Department's capacity for research and teaching is dependent on external research funding, and it has been increasingly successful in acquiring grants. This raises questions about the risks and the long-term sustainability of this model, and about its impact on the balance between teaching and research among the staff. Dependence on external grants means that much time is spent on writing proposals, while successful bids result in volatility in teaching. The Department reports that there are some problems of understaffing in teaching, caused by success in winning external research grants taking staff out of teaching. This is exacerbated by time-consuming appointments processes. It seems that a large part of the teaching is offered by lecturers, who often have very heavy teaching loads and little time to develop projects and conduct research. This situation risks forging a divide between researchers and teachers, with entrenched constraints on career development from being a teaching-track early-career scholar to qualifying for professorship based on research merits. In this situation, securing more research time for <u>all</u> is a high priority for the Department.

In addition to these challenges of renewal and capacity in teaching and research, the Department is also facing demands for improved gender balance, increased diversity and internationalization of the staff. Successful recruitments are thus of vital importance for the further development of the Department. The self-assessment report and interviews point to certain constraints that originate both within and outside the Department. Position announcements are primarily defined by teaching needs and the balance between different research groups. Announcements for lectureship positions create openings for early career scholars and increase the teaching capacity in the Department. However, it offers fewer possibilities for strategic appointments to strengthen research or to address problems of gender imbalance and diversity among the staff. It is also noted that appointments processes are time-consuming, and it is difficult to successfully recruit strong international candidates. It is also a problem that the Department is not able to promote senior lecturers to professorial level. These challenges in recruitment and promotion mean that the renewal and diversification of the staff, especially at the professorial level, seem to be progressing relatively slowly. The self-assessment report and the interviews show that the Department and its leadership are well aware of these dilemmas, but more attention could be given to identifying openings and developing strategies for recruitment.

#### **Collegial culture**

The Department is characterized by a collegial atmosphere and a strong focus on "developing a collective idea of what we can do as a department". Interviewees describe a department with dynamic interaction and much collaboration in teaching and research, a culture of collegiality and leadership that put strong emphasis on enabling individual staff members. The Department's SWOT analysis highlights that "we have worked hard to improve the social norms around research, encouraging and highlighting research achievements through collective feedback". Senior staff members describe a situation where "you are on your own", but the Department has become "more and more enabling" and there are more discussions and collaborations among the staff in the Department than there used to be. Likewise, doctoral students report that the PhD programme has been much improved. The programme is more formalized, the expectations are clearer, the community of doctoral candidates has grown, and many are included in active research groups. Researchers in temporary positions observe that there are good opportunities for collaboration and engagement with research groups in the Department.

The research culture and vibrant community are seen as key factors behind the success of the Department. The Department reports that "all our staff are research active and want to be research active". There is a strong culture of applying for external funding and the Department has a high success rate in obtaining grants. Building support mechanisms for attracting external grants is a priority, and the Department provides co-funding to cover overhead costs. Most of the funding is for basic research and is aiming to contribute to international research frontiers. The publication record for the Department shows high and growing productivity. There is a number of articles in leading international journals, notably *Antipode*, *Economic Geography, Environment and Planning A, Geoforum, Political Geography, Progress in Human Geography*, but also a balanced diversity of publication types and channels, including contributions to policy-making and the Swedish public sphere, although overall fewer publications appear in newspapers, opinion pieces and 'grey' literature. The Department encourages publications in international journals, individual publication plans are discussed during annual staff appraisals and within research groups.

Beyond these achievements at the aggregate level, it can be noted that different groups within the Department face differentiated challenges as researchers and teachers. Most strikingly, early career scholars in lectureship positions have heavy teaching obligations and little time for research, compared to professors and those with externally funded projects. While the teaching needs create openings for teaching positions, there seems to be few career paths and promotion possibilities within the Department. Given the heavy teaching obligations it is also difficult for some early career scholars – specifically recent PhD graduates - to achieve sufficient research publications to be competitive beyond the Swedish context. These problems seem to be systemic rather than specific to the Department. The Department is, however, recognized for creating arenas for support and informal mentoring, which are highly appreciated initiatives among the interviewed early career researchers.

The Department also faces the risk of opening up a division among the permanent staff, between successful researchers with externally funded projects and those that do not have their own project. This also overlaps with gender and age divisions in the Department. The leadership recognizes this problem and seeks to support individuals in developing project proposal, seeing this as a stepping stone for individual career development as well as a strategy that benefits the Department. However, this strategy does not apply to researchers in temporary positions (post-doctoral fellows) who are often barred from applying due to funder's rules. These regulations are beyond the control of the Department, but the Department could consider ways of improving the infrastructure for helping young researchers to develop their research and career path.

#### Quality ecosystem

Researchers in the Department are well-connected and participate actively in research networks, projects and publications within Lund University, nationally and internationally. Researchers also engage in academic collaboration as editors, PhD opponents, members of evaluation panels etc. Much of the Department's research is also connected to public sector authorities, non-governmental organizations and civil society, in Sweden and internationally. The Department encourages national and international collaboration, for example by supporting conference participation and visiting scholars to the Department. Within the Department, there is active collaboration within research groups and project teams, as well as strong links between the education programmes and research.

#### **Department of Political Sciences**

#### Leadership

Political Science is a diverse and well-organized department with high activity and attainment levels in both research and teaching. An interdisciplinary multifaceted approach to research and methodology is a strong identity marker throughout the Department. In the view of the Panel, it has a fairly centralised system of decision-making. It has had some very successful large externally funded projects in the past which enabled active research groups, but these are coming to an end. Strategic discussions should address external funding and publication profile to meet the Department's stated ambition of becoming one of Europe's leading Political Science departments. The Panel concludes that there is room for improvements when it comes to top-level publishing (i.e. in top ranked journals and university presses), prioritizing more prestigious external funding and striking a balance in new recruitment between the need to maintain high level senior staff with the Department's teaching needs. An open dialogue involving the entire Department is recommended as there may be a potential conflict between the pluralistic narrative that everyone embraces and identifies with, and the ambition of more publishing in high ranked journals and a more targeted external funding strategy.

The new research committee is regarded as a step in the right direction, with an emphasis on supporting retreats, seminars, and reading grant applications to enhance the research culture. Also, the new recruitment committee is seen as positive. Recently, the Department has created a new position, responsible for research strategy and part of the leadership group, tasked to balance and prioritize, so the Department leadership will include a research leader. A clear strategy on publication ambition that involves clearer signals about targets and expectations throughout the Department, top-down as well as bottom-up, should be encouraged.

Similarly, a Department-wide strategy for a more prioritized model for generating external research funding is recommended. A debate recurring in our meetings revolved around whether to say no to some external funding in order to focus on more long term, prestigious European grants (which are important for the overall goal of becoming a leading European department). Again, a dialogue is encouraged around pluralism (i.e. aiming at almost any kind of external funding) or whether the Department's overall ambition to be a top ranked department in Europe would require a more targeted focus involving a shift to high quality external funding- for instance through encouraging research groups to pull together around ERC applications. There is no definitive model but the Panel suggests that the Department leadership instigate a debate on whether there should be a slight change of direction i.e. more critical of small external grants and more priority to prestigious European grants? But this will potentially expose other dilemmas, because prioritizing a large EU grant may exclude some individuals, meaning that the collective, pluralist model may be threatened by targeted strategizing.

Active recruitment at senior level is mentioned as one possible initiative, and the Department may have to consider being more strategic in prioritizing specific areas. The Department's fast growth (now over 100 staff) and rapid increase in external funding raise some concerns and potential tensions. Certainly, this means that more effort should be going to consolidation and maintaining internal dialogue.

The self-assessment report raised another concern regarding the need to hire faculty that could teach in Swedish (large entry level courses), with public administration a key concern.

#### **Collegial culture**

There seems to be a very good collegial culture in the Department. It has a clear sense of its own identity – reflected both in the self-assessment report and the discussions. It is confident of its strengths and weaknesses. The Panel is concerned that teaching in the self-assessment report is presented as a burden: phrases such as "Urgent teaching and administrative tasks often take precedence over research" (p3, para 2) suggest a mindset in which teaching is a chore that prevents research from occurring. Synergies between teaching and research are mentioned (on page 11), but seem incompatible with the attitude evinced from the first pages. In light of the challenges and potential tension between external funding and teaching, a debate on teaching and research synergies should be prioritized. Internationalization is a preference, but also a challenge in relation to teaching in Swedish which is necessary for some courses.

The Department has a systematic peer-review of applications, as well as seminars/discussions on applications in research groups. The opportunities for collaboration or synergy could also be built between the individual projects which would have benefits for research groups and research culture, including the integration of early career researchers.

#### Quality ecosystem

Overall, there is a good supporting environment in the Department, where everybody is – or feels – included. PhDs and post-docs report a culture of inclusion, especially in research groups, although their experiences vary between individuals and areas. There is also interdisciplinary collaboration, including with the Faculty research centres. Young researchers stress that there are no ivory towers and that senior staff are willing to share, to read, comment, attend seminars. Young researchers can have their ideas, notes, half-finished papers and papers discussed in informal fora in the Department and also in the research groups.

However, early career researchers also point to a vagueness about the rules and expectations. For example, they are unsure whether they should ask professors or supervisors to be part of their applications, and there is a sense that there were differences between supervisors regarding the propensity to advise on publication and funding strategies. The Department does not have a recruitment plan as such, there is a certain vagueness as to whether and how early career researchers can join research applications. The

is a certain vagueness as to whether and how early career researchers can join research applications. The Department would benefit from setting clearer guidelines on expectations for publications etc. and making special efforts to integrate junior scholars into funding applications where possible, but the Panel acknowledges that some of the constraints are externally created and structural. Young researchers are dependent on their advisers for career counselling, apparently nothing is done centrally to set up standards for what is needed to further pursue an academic career. Overall early career researchers value the Department, for example one young researcher commented, "the pluralism is why I came here, there are a lot of different people who really appear interested in your research".

# Recommendations

This section outlines specific advice for Units building on the Panel's observations. It makes some recommendations to Faculty of Social Sciences and the University more generally on the structures, procedures and practices that can best support and enhance high quality research in the Units.

# **Recommendations for the Units**

## LUCSUS

LUCSUS is a vibrant interdisciplinary research centre with motivated and enthusiastic personnel. Whilst it has a pluralistic culture and an inclusive, bottom-up approach to defining research directions, it would benefit from a more focused and explicit discussion on the Centre's future strategy as regards research areas, research quality and quality outlets, external funding strategy, cooperation with other centres and departments, and alignment with the Faculty. This should aim to make external funding a more integrated part of the Centre's strategy in order to decrease budgetary vulnerability. A strategy could be to point out that the Centre welcomes many and different sponsors but that that the Swedish state foundations and Horizon Europe are given special priority.

The Centre should continue its policy of methodological and theoretical pluralism, which is important to maintain an open and competitive research environment, but at the same time should produce some shared narratives around research themes, such as biodiversity.

The Centre should make efforts to develop a shared sense of which are 'best' journals and to encourage its most senior researchers to target top journals, whilst also supporting more specialist disciplinary publications where appropriate. This is especially important for early career researchers, so they can identify their research niche in a wide interdisciplinary field.

In addition, further support for early career researchers is necessary to develop shared understandings of what it takes to pursue an academic career at LUCSUS or elsewhere, in particular in relation to teaching and research strategy, including criteria for quality scientific outlets.

LUCSUS' profile and recognition within the Faculty should be strengthened in a dialogue with the Faculty. Both parties should be active in this process.

The researchers at LUCSUS should also consider more collaborative work with other centres and departments at the University. The Faculty should provide support for such collaborations.

# CMES

The Panel were very concerned to hear about the anxiety voiced by members of the Centre. Their experiences of the re-structuring appear to have been unnecessarily conflictual and painful. In the short term there is an urgent need for clarity for those individuals still "in limbo" about whether they will be allocated to departments within Social Sciences or other faculties at the University. Uncertainty and insecurity have had a very negative impact on some individuals, and more generally on the morale and productivity of the Centre.

In the *medium term*, as the new cross-department centre evolves it will be critically important to identify how it can build on the positive aspects of CMES, such as the diversity of its members, its interdisciplinary ethos, and its active engagement with political and policy debates. For example, if "CMES 2.0" is to get off to a good start, it must include a shared physical space, and have buy-in from associated members and their host departments.

There is a danger that the interdisciplinary capacity of the Centre could be compromised as individual researchers are assimilated into more disciplinary departments, and have pressures to develop teaching and research with colleagues there. A clear strategy of how to facilitate interdisciplinary Area Studies research could build on the successes of 2012-2017, but also has to be actively supported by Faculty and University level procedures and mechanisms. These might include spaces to meet, investment in shared projects, seed-funding for small projects or pilot research, joint supervision arrangement, team teaching and support for international research collaboration. Cross-departmental collaboration around broader themes, particularly water management, show the potential for a well-integrated CMES that benefits from the Faculty and vice-versa.

Clear and transparent decision-making processes need to be in place for the new cross-department centre, including procedures for resource allocation both within the centre itself and also in the Faculty.

In the *longer term*, the new Middle East in the Contemporary World initiative could build on CMES international and national work and forge a core identity and reputation in Area Studies, but it will need support and backing from the Faculty and the University to do this. This will involve giving the new Director some autonomy over spending; investing in new appointments; support (resources and professional services) for communications and applications for external funding.

#### Human Geography

The Department is aware of the challenges it faces, has an informed and reflexive approach and has developed procedures and commitment to provide an enabling environment for quality research. It recognizes some of the current tensions and constraints and is making progress in addressing these. The leadership is resourceful and responsive to the needs of the staff.

In the *short term*, priorities are to find ways to improve the infrastructure for helping young researchers to develop their research and career path, and providing support for them to apply for external research funding. In the *medium term*, more formalized research groups might help collaborative applications and research projects.

Challenges in recruitment and promotion mean that the renewal and diversification of the staff, especially at the professorial level, seem to be progressing relatively slowly. But this issue must be addressed in order to achieve a more diverse and balanced department. The gender imbalances are acute and were highlighted in the Panel's meetings with staff at all levels of seniority. Priority should be given to identifying openings and developing strategies for recruitment, but this requires investment and commitment from the Faculty and University.

#### **Political Science**

The Department is successful and confident, high achieving, well organized and ambitious. One danger is that it might be susceptible to complacency about its continued ability to deliver high quality research.

The Department could perform better in terms of high-quality publications. To reach their stated ambition of being a top European department, they will need to publish more in top level journals and books in university presses. International rankings indicate top journals such as *American Political Science Review, American Journal of Political Science, International Organization,* and *Comparative Political* 

*Studies*. However, the Panel recommends that there should be a Department-wide discussion to identify the best journals, particularly given the potential tensions or conflicts between aspirations for pluralisms against discipline rankings.

The Panel recommends the Department consider a shift in emphasis to focus on high quality external funding, and especially that, rather than many individual grants, there are efforts made to bring staff together around e.g. ERC applications. If successful, this has many benefits; consolidating research groups and enabling senior and early career staff to work together; and signals the international standing of the Department and its research.

There is a particular need for a more systematic approach to career counselling and mentoring – at present early career researchers are dependent on individual advice from supervisors.

Finally, more effort should be going to consolidation and maintaining internal dialogue, so that key issues, such as career paths and funding priorities, quality research outlets, are discussed. This would also enable a reflection on the opposing forces of individual versus collective approaches to research, who benefits and whose interests it serves.

#### Faculty of Social Sciences

A number of issues emerged in the assessment which require Faculty-level attention. The Faculty is crucial in providing structures, procedures and policies to enable individual Units to achieve high quality research, and to ensure that this does not come at the expense of teaching and administration, and does not exert undue stress or pressure on individuals at every, or any, career stage. It must also ensure that there is parity and equity across individuals and units.

First, the Panel recommends that the Faculty needs to review and reflect on its ability and commitment to support interdisciplinary research. Whilst this is expressed as an overarching objective of the Faculty – and recognising that the Faculty itself is both multi- and inter-disciplinary - the Panel observes some contradictions and imbalances in how the Units are regarded. There are important disparities between how departments – conventional discipline-based entities – and centres – more interdisciplinary – are treated; for example, how they access funding from the University, the autonomy they have for recruitment and spending, and their capability to apply successfully for external funds. The Panel is concerned that whist the Faculty actively espouses the benefits of interdisciplinarity, it does not have the experience and expertise, nor procedures and processes in place to support interdisciplinary research in comparison to more conventional disciplinary endeavours. The Faculty needs to work with Units, and learn especially from interdisciplinary centres, to develop shared understandings of interdisciplinary research and its particular needs and challenges.

Second, there should be a consideration of the advantages and disadvantages of the resource allocation model. This has recently been changed, so whilst not advocating another significant shift, the model must be examined to make sure there are no in-built biases that favour particular units over others. Although a new model less dependent on performance indicators has been developed, it is not clear the extent to which units compete with each other for resources, and the amount of discretion at faculty level to invest in special initiatives. The Panel understands that LUCSIS and CMES are not funded through this model.

Third, the Panel observes that there are different expectations and experiences of workloads across units, and it would be helpful to have a transparent Faculty-level analysis of this. This would help to support high quality research by relieving pressure on individuals and certain groups of staff who currently feel that they don't have sufficient time to undertake high quality research, and sometimes, to apply for external grants to fund their research. Fourth, the Faculty – and University more widely – needs to examine the recruitment policy and how the faculty appointments panel works, as Units expressed frustration that appointments and recruitments was a long-winded process, that often, they had little control over.

Finally, it was not clear from the Panel interviews and other information available, how Faculty strategy is implemented and how Departments or Units respond – in other words the basis for the relationship between Faculty and Units. Some individuals obviously felt that this was a hierarchical relationship that left Units disempowered. Others identified structures that were beneficial. But clearly, as the CMES experience shows, there is room for improvement, especially in how the Faculty is able to support the research centres which have recently been integrated. At the very least, it is important that Units are represented in Faculty-level decision-making. At present there is ambiguity about this representation on Faculty Board and some lack of clarity about where ultimate decisions are taken.

#### Lund University

There are a number of higher-level matters which the Panel believes the University should examine and act on, in consultation with Faculty and Units themselves, in order that Lund University maintains and enhances its capacity to undertake high quality, excellent and world-leading research in diverse fields.

First, the Panel observed that there are many problems with career progression across Units. There are bottlenecks or even a "glass ceiling" evident at different stages. Some important sticking points are: at junior levels, prevalence of short-term contracts and job insecurity; difficulty in getting on first rung of tenure ladder; at a senior level, the complexities of making senior appointments, and the constraints on internal promotions to professor. Some of these relate to idiosyncrasies of Swedish employment law, others are established customs, or traditional practice. But each does impinge on the ability to do high quality research. For example, early in a career, there may be a tendency to take on lots of teaching which will take time from research. Lund University as a leading institution should take a position in addressing these issues. This may involve lobbying to re-draft employment laws which, though aiming to promote job security, seem sometimes to have the opposite effect.

Related to this, there needs to be consideration of the tensions between teaching and research and the different mechanisms and practices that exist across Units to ameliorate them. These tensions are manifest in different ways, including stress and workloads, but importantly they affect different individuals at different career stages, differently. The equity dimensions of these tensions, and their ultimate impact on high quality research need to be considered. But if Lund University promotes the synergy between high quality research and best practice teaching, then it must make sure that procedures and practices are in place to ensure everyone does both and has opportunity to excel in both. If not, then there is the risk of dual or opposing career paths developing; top researchers who become more and more distanced and eventually absent from teaching, compared to (often younger) teachers who carry large workloads and have little time to get established on a research career path through successful grant applications or high-impact journal publishing. This, the Panel believes, is an inequitable and undesirable – but not wholly unlikely – scenario.

It is recognised in all Units that the Swedish Higher Education system has moved to a situation where external funds are becoming increasingly necessary to support research. Indeed, this repeats a pattern found in other education systems in Europe and across the world. The shift is inevitable in many respects. However, the University must ensure that it does not result in undue pressure on individuals to have to apply and win highly competitive funding in order to thrive and excel at their scholarship. There are clearly differences across fields of research, but it is a pressure that is felt, and was commented on, in each of the Units the Panel assessed. The University must have in place Professional Services and enabling structures

to help individuals and groups of academics to seek funding, and to make sure that those who are not successful are not unfairly discriminated against, in terms of e.g. workload, promotion or job security.

In terms of recruitment, there is an apparent contradiction between an emphasis on being embedded and relevant in Sweden, including the requirement to teach in Swedish, versus a need to be more international and open, more competitive in a global research context. Again, these are issues that each Unit assessed was grappling with in different ways, but where University-level steering – and support – would be helpful.

Finally, there are many challenges associated with a general move towards interdisciplinary research within an established University such as Lund. The report highlights some of these in its recommendations to the Faculty. It is clearly not enough to say that an institution supports and encourages interdisciplinary research. There must be procedures and structures in place that ensure that interdisciplinary research is valued and rewarded on an equal footing with more conventional and familiar disciplinary scholarship. There are many different approaches and models of interdisciplinary research. The University must accept and engage with them if it is to support the Units the Panel assessed and to assist them in competing globally. For example, shared understandings of what constitutes quality and excellence, what journals and different forms of research outputs are appropriate, what partnerships and collaborations are important and need support, and above all, what interdisciplinarity means for career trajectories of scholars who dare to follow these paths, must be forged.

The issue of research quality underpins the assessment here. Quality is not just about getting published in journals that rank highly because of the number of citations. Research quality is reflected in the type of funding (is it competitive, peer reviewed, international?); in the rigour with which it is performed (are there stringent ethical procedures, is there adequate training and technical support, infrastructure?); and whether the research findings are impactful, meaningful and important for society. The University needs to facilitate and convene discussions around these issues of quality at every level of its operations. At the Faculty and University level, holistic and inclusive understandings of plural approaches to research quality need to be developed, that do not, for example, privilege or value one type of methodology (quantitative) over another (qualitative). In each unit, definitions and shared understandings are necessary to develop strategies for funding priorities, publication, career support and training.

These issues can only be negotiated and navigated with open deliberation and open minds across the University. But doing so will contribute positively in making sure that Lund University sustains its global reputation for research excellence.

# 10. Joint Faculties of Humanities and Theology (HT)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 3	TOTAL NO UoAs: 20
SUBJECT PANEL NAME	UoA NAME
Archaeology and Ancient History, History, Cultural & Educational Sciences, and Languages & Literature	Archaeology
	History
	Intellectual History, Book history and Media History
	History of Art, Musicology, Fashion Studies, Intermediality
	Ethnology, ABM and Digital Cultures, Studies of Book Market
	Educational Sciences
	Educational Sciences; Higher Education Development
	Literary Studies, Film Studies, Theatre Studies, Creative Writing
Languages & Literature, and Philosophy	Linguistics and Phonetics
	Nordic Languages and Rhethoric
	Studies of English, German and French
	English Literature, German Literature, Studies of Spanish, Italian and Romanian
	Arabic, Latin, Ancient Greek, Modern Greek, Russian, Japanese, Yiddish
	Chinese Language, East and Central European Studies
	Practical and Theoretical Philosophy
	Cognitive Science, Cognitive Semiotics
Theology and Religious Studies	Studies in Faith and World Views
	History of Religions
	Biblical Studies
	Church and Mission Studies

# Foreword by the faculty leadership

The Joint Faculties of Humanities and Theology consists of two faculties and a large number of subjects. We were assigned three panels (where each panel could include a maximum of eight UoA). Despite this we decided that one of the panels should be wholly assigned to the Faculty of Theology. It is one of the oldest faculties at Lund university and is conducting research on a high international level. But it has also been facing structural challenges for some time, and to closely monitor CTR's development and potential was considered strategically important. The two remaining panels (called by us H1 and H2) included all subjects belonging to the faculty of Humanities. It was impossible in general to preserve departmental, let alone disciplinary, structure. Instead, these two panels and corresponding UoA reflect – from an organizational point of view – actual or possible configurations of relevantly similar humanities subjects. The legacy from RQ08 was of particular importance, but the UoA were identified and negotiated in close collaboration with the departments. Slightly different strategies were therefore adopted in the construction of UoA. In order to be able to identify potential synergies, a couple of departments wished to combine their different subjects into one UoA whereas the subjects of other departments were dispersed. While maintaining a structure based in the similarities between subjects the construction of H1 and H2 combines lessons from earlier research quality evaluations (RQ08 and HTRQ14), strategic, and more practical/pragmatic components.

643



# External panel reports

# Archaeology and Ancient History, History, Cultural & Educational Sciences, and Languages & Literature

# Panel overview

The H1 panel consists of eight units of analysis (UoA), which – with the exception of educational sciences, media history and fashion studies – are co-located at the LUX campus together with joint IT-support, administration, half of the humanities and theology library, reception and a café. In turn, each of those UoAs is made up of individual subjects, ranging from one to six per UoA. In total, the number of subjects in the panel is 26.

Traditional subjects co-exist with new ones and there is substantial variation regarding how many researchers belong to each subject. Some subjects are historical in their orientation while others focus on contemporary issues. The differences in scope and tradition also have bearing on publication patterns and publication language. Thus, in most cases, bibliometric measures like SciVal are ill-fitted for representing our subjects. Having said that there has been a steady increase in international peer-review articles authored by researchers within panel. Still, it needs to be emphasised that publications in other formats (e.g. monographs, edited volumes, or anthologies) and publications in Swedish are important for most of the subjects represented.

Most of the UoAs include more than one subject. In some instances, they are grouped together because they are co-located in the same department and while in other cases it is because of clear similarities in the scope of their research. Consequently, it is challenging to describe and compare the organisation of the different UoAs. Another consequence of the way the UoAs have been formed is that the more subjects (or groups) a UoA incorporates, the less space is there for describing each subject. This is particularly true in those UoAs where larger subjects are grouped together with smaller ones. Therefore, the format of the research evaluation disadvantages smaller subjects, independent of the actual quality of their work, simply because they are largely invisible in the self-evaluations.

In many of the self-evaluations, the heavy dependence on education is emphasised. In Sweden, humanities education is underfunded, at the same time as the subjects depend on the number of students for their funding. This combination runs the risk of deprioritizing research in relation to education. However, reading all self-evaluations, it is difficult to not be impressed by the diversity and amount of research carried out, and also by its quality.

# External panel report

#### Executive summary

In general, the panel found the research environments in the seven units evaluated to be impressive and of high quality. The collegial cultures are in general working well. Many of the research environments articulated an interest in and preparedness for further renewal and sustainable development. The panel has observed many good and inspirational examples in the individual self-evaluations. However, the multitude of subjects and research areas, some very small in size, offers strengths and weaknesses that the panel urges the Faculty to address, for example by encouraging even more cross-disciplinary approaches in research and collaboration between researchers and groups but also across departments and faculties as well as nationally and internationally. The panel noticed a lack of overarching research strategies and explicit performance goals. Explicit performance goals may be controversial but they strengthen research profiles, safe-guard research time and help staff to balance research/teaching engagements when the financial conditions for undergraduate teaching impact on research quality. We also noticed that because the allocation of funds for recruitments are decided on Faculty level, departments and subjects have difficulties in planning for succession and renewal. There is also a lack of clear structures relating to tenure and promotion for younger scholars.

# Introduction

This panel has assessed 26 subjects of different sizes grouped together in seven Units of Assessments (UoA). Each UoA thus consisted of several subjects or divisions. Some of the UoAs were Departments (History including Human Right Studies and Centre for East and SouthEast Asian Studies; Archaeology and Ancient Studies; Educational Sciences), others were composed of subjects that do not necessarily collaborate on a daily basis or operate in a shared organizational framework, but rather were grouped together due to similarities in the scope of their research. The panel included one UoA with subjects from the Department for Language and Literature (Comparative Literature, Film Studies, Theatre Studies and Creative Writing), as well as three UoAs from the Department for Arts and Cultural Sciences (1. Book History, History of Ideas and Sciences – including Media History, an HT subject belonging to the cross-faculty Department of Communication and Media; 2. Art History and Visual Studies, Intermedia Studies, Fashion Studies, Musicology; 3. Archival Studies, Digital Cultures, Information Studies, Museum Studies Publishing Studies and Ethnology). Due to the composition of the UoAs it took the panel some time to create an overall understanding and context for their evaluation.

Having said this, the composition of the panel was well-balanced with expertise covering the different subjects. The panel consisted of Jørgen Bruhn, Professor in comparative literature; Hans Dam Christensen, Professor in Cultural Communication; Solveig Jülich, Professor of History of Science and Ideas; Steve Murdoch, Professor of Early Modern History; Elisabet Nihlfors, Professor of Educational Sciences; Anne Nissen, Professor of Medieval Archaeology. It was led by Bodil Axelsson, Associate Professor in Studies of Culture, Media and Society. Professor Anne Nissen joined the panel as late as April 23.

The special circumstances of spring 2020 made its mark on the panels' work. The panelists started to review the self-assessments in early April in pairs per UoA including one subjectspecialist for the UoA being assessed. From our initial readings and assessments, we formed questions for the scheduled interviews with the UoAs, Heads of Departments and Faculty leadership that took place via Zoom between the 5th and 7th of May. The panel held one preparatory meeting via Zoom on the 4th of May and a subsequent post-interview review meeting on the 8th of May. A further meeting to finalize the report was held on the 15th of June. In the period between the interviews and the finalization of the report, the panel collaboratively wrote and edited this report via Google Docs.

Because the UoAs had very similar challenges we decided to expand the general observations and also write specific recommendations. Observations and recommendations on individual UoAs are inserted at the end of the document.

# Observations

#### Leadership

#### The overarching research strategy

In general terms, it is the panel's impression that distinct and easily recognizable research strategies are not present in this area. The many individually productive and often very successful researchers each pursue individual and clearly defined research goals (entailing external funding and publishing). However, both in the written self-assessments and subsequent interviews, explicitly stated strategic research goals were rather unusual. Most UoAs emphasized the importance of a flexible framework in order to develop innovative research – resulting from the small size of several subject-areas. This appears to favour bottom up decisions in research orientation as favoured by the Departments. However, in favour of stated goals, one should not under-estimate the significance of clear Departmental research objectives that often anchor individual applications for external funding, if such strategic goals are required by the institution which grants them. Nevertheless, the panel often met a more or less explicit dichotomy expressed as research questions and strategies being produced from "below", by individual researchers, or in very small research groups – as opposed to research strategies being imposed from "above", from beyond the researcher's grasp at either Departmental or Faculty level. Whether such antagonism actually exists, or if it mostly functions as a rhetorical strategy from researchers wishing to define and pursue their own interests, remains unclear, but such a discourse was present in several of our interviews. One rather flexible research-oriented strategy is the idea of encouraging "research nodes" or other cross-disciplinary thematic working groups. During the interviews we had the impression that whereas some of the more traditionally inclined research disciplines were perhaps not particularly engaged in cross-disciplinary research hubs, smaller units often embraced the possibility of cooperating more actively, creating research questions (and even applications for external funding). There may be quite legitimate reasons for both embracing or avoiding such research hubs, but perhaps the larger, more well-established research traditions could make use of transdisciplinary research meeting points.

#### The balance between activities in research, education and external engagement

The relationship between research, teaching and outreach has been a problematic question for decades in Sweden, and this is no different at Lund University. It is a problem that has to do with both the traditional prestige of research and the time-consuming nature of teaching, in particular. The delicate balance between the three activities has not been solved in the units we assessed, but is under constant renegotiation and change. This is manifested both in the individual workload of the UoAs in question, and in more strategic discussions on different levels of the university.

Several of the subjects evaluated by this panel have relatively good track records in both publishing and attracting external funding, that is, the two fundamental parameters of expected research activity. Also, the panel found very positive indications of the societal impact of the research. This was considered important for the researchers, thus balancing the more conventional research outputs. Concerning the need for external engagement, the official demand of "samverkan" (cooperation), is clearly interpreted differently: whereas writing for Swedish outlets has traditionally been considered important for some disciplines, for other subjects it was rather a questioning of directly reaching out, for instance to schools and teachers or companies; formalized collaboration with local and national heritage institutions or archaeological firms also demonstrates "samverkan".

As noted above, the question of teaching is high on the agenda for all subject areas. But here structural problems occur. Applying for and receiving external funding is an important goal for the facilitation of
research. Moreover, it is economically important for both Faculty and Departments as there is then more money available. This becomes problematic particularly as regards the smaller units, where the increased research time can only fit the tight teaching schedules with difficulty due to limited staff. Collaboration among colleagues partly resolves this, but this problem should be discussed again, probably at the Faculty level. Moreover, there are also limitations on where money can and cannot be spent, and more transparency on the origin and purpose of available finances should be freely available.

In the panel discussions all interviewees expressed interest in, and sometimes enthusiasm for teaching the regular students; whether this relationship is always so cordial is hard to say, given that the assessments rarely incorporated students' perspectives. This was reflected in the fact that no students (apart from PhD-students) participated in the interviews. However, an even less visible group is the Teachers' Education cohort. In particular, the research underpinning their work – which was very rarely explicitly mentioned – was almost invisible in both the selfassessments and the interviews. The panel got the impression that the research that supposedly structures the teachers' education the most, despite being an important source of income for some subjects, is probably not considered a prime focus point.

#### Priority setting, including goals for external research funding

Due to the UoA's various constellations, the question of priority setting should be answered according to different levels of involvement. At the levels of divisions, subjects, nodes, etc., external funding is often highlighted as a required objective, although the ways of actually obtaining funding are less frequently addressed. Overall, priority setting in terms of objectives, milestones and deliverables for the various research activities seems not to be in the majority. Ad hoc priority setting within departments and divisions also occurs with regard to, for example, nominating candidates for the Wallenberg Scholars programme and which projects to co-fund etc.

#### Recruitment, promotion and succession

Several self-assessments mention the fact that numerous lecturers have attained the competences needed to become "docents" (associate professors). A recurring issue in the self-assessments centred on the lack of any possibility to become promoted to a professorship, or for recruitment at the level of professor. Quite recently, a new professor programme has been launched, and this might reduce discontent and frustration among associate professors in terms of career paths. When the panel asked the different groups their opinion of the programme, there was a lack of clarity on the subject. There remains no consensus among those interviewed as to whether this new programme is strategically defensive, neutral or offensive in nature in comparison with the former programme. Generally, after the discussions and after having read the background material, the panel concluded (albeit impressionistically) that there is a risk that the professor programme may not resolve any structural problems, but seems a rather stop-gap measure seeking only to fix a period of neglect driven by economic restraints. Possibly a more strategic programme should have been implemented. This, of course, may have entailed the risk of distressing some milieus or groups that were not offered new or renewed professors' positions. Nevertheless, it may have resulted in a more secure future.

In the related document, Recruitment of professors at the faculties of Humanities and Theology (HT), a number of expectations for professors is listed together with a "Basis for determining required qualifications" addressing the required level of research activities, teaching abilities, supervision of doctoral students, interaction with society and leadership and development. These requirements might be considered a recipe for acquiring professorial competences. That said, some staff, during interviews, nevertheless expressed discontent with not knowing "when it is going to be enough", for example, with regard to acquiring external funding. In general, detailed research performance goals for staff are not expressed in the self-assessments. Heads of Department might discuss, for example, external funding and the like dur-

ing "medarbetarsamtal" (personal development reviews) and make priorities by way of higher salary to productive researchers, but, as it is mentioned in some self-assessments, the individual UoA can include highly productive researchers as well as staff very less productive in terms of research.

An issue often addressed by the panel during the interviews was the question of "inbreeding" (academic cronyism). With regard to research quality, the issue of "inbreeding" encompasses questions of reduced mobility, diversity, biased recruitment processes, etc. Whether this is a specific problem for Lund University (compared with other Swedish institutions) remains a moot point. Nevertheless, the panel wanted to discuss the issue with the UoAs to gain their impressions of the extent of Humanities staff with Lund degrees. Notably, responses often corroborated the idea that large numbers of staff attended Lund University as undergraduates or doctoral students. Some incoming researchers pointed to the dangers and vulnerabilities of doing things as usual, others pointed rightly to the fact that although they were educated at Lund University, they might have been away for several years before obtaining their permanent position.

The question of "inbreeding" also concerns the recruitment of doctoral students. A small number of self-assessments addressed the significance of doctoral students in terms of recruitment and renewal of research topics. Doctoral students are the largest group of new (fixed-term) recruitments, and, in particular, one self-assessment explicitly addressed that the UoA wants to recruit candidates internationally, whereas most self-assessments did not raise the issue of recruitment of doctoral students. However, several subjects that wish to develop PhD programmes often indirectly point to internal recruitment by way of students attending current BA and MA programmes. This might not be a problem in itself. Recruitments at higher levels can also be a balance between holding onto highly qualified internal candidates and recruiting external candidates. If the number of qualified applicants to a position is high, it might be a minor problem. Perhaps, the problem lies in the fact that the balance in question is rarely addressed.

#### **Publication patterns**

Notably, various UoAs address problems with the bibliometric assessment system, for example, that edited volumes are underrepresented in SciVal. In general, a certain scepticism to bibliometrics was articulated in some self-evaluations and interviews. However, the UoAs follow general trends in publication patterns. Although these varied according to the self-assessments of the individual research fields, a growing emphasis on peer-review articles in international journals was visible throughout. Specifically, this was evident in the increased publication of articles written in English for engagement beyond Sweden or the Nordic countries. For some UoAs, monographs in Swedish remain an important publication channel. Moreover, book chapters and edited collections also remain a predominant form of output within the Humanities. In addition, Swedish is still the dominant language within certain UoAs, in particular, of course, when it comes to disseminating research to a broader audience within a regional and larger Scandinavian context. Publications in Swedish are an efficient method to assert the social utility of the discipline and to strengthen the links with the non-academic world both regionally and nationally. Such publications may also have an impact in securing competitive national or Nordic funds. Furthermore, the existence of good academic national journals (often with English abstracts) should not be neglected (e.g. Fornvännen [Archaeology] or Historisk tidskrift [History]). Sporadically across some UoAs, we observed an increase in the number of coauthored articles being mentioned, nationally and internationally.

#### Collegial culture

The prerequisites for collegial culture vary between the UoAs due to the way they are composed and the staffing differences of the various subject areas concerned. All UoAs comprise research environments of varying sizes and strengths with thematic overlaps between the subject areas of which they are composed. Here one finds small research environments with less than a handful researchers (sometimes only one or two) that seem vulnerable in several respects. For example, there may be difficulties for these research environments in sustaining a productive and creative seminar series with implications for both subject renewal and sustainability. Moreover, we were made aware of the difficulties faced in such areas as teaching cover where staff are absent. This could occur in cases such as the receipt of external funding, staff illness or career mobility leading to staff leaving Lund.

Collegial culture in terms of the way in which people collaborate on a daily basis is hardly discussed in the self-evaluations. However, during the interviews, we heard researchers from nearly all UoAs described an amalgam of seminars, regular meetings, formal and informal strategy meetings adding to the collegial environment. It is striking how much of the collegial culture we reviewed is dependent upon seminars (and for one department, also interdisciplinary research nodes, see below), and these are at the heart of collegial culture described to us. They fulfil several functions and are crucial for sustainability and renewal of research strengths as well as for quality in applications and publications emanating from the Humanities. For larger subject areas – those with PhD educational programmes – the seminars are key in upholding and developing disciplinary traditions. The self-assessments and the interviews reveal the fact that research environments increasingly organize seminars to develop and optimize research not only for publications or other outputs, but also for developing high quality research applications.

The general conclusion of RQ14 pointed out in Book History's self-evaluation that most individual divisions at the Department of Arts and Cultural Sciences experienced difficulties in attaining a critical mass for the development of strong research. That the Department would benefit from further cooperation in this direction is, to some extent, still a valid observation. However, there are also good examples of interdisciplinary collaboration, particularly in the seven research-nodes in which scholars coalesce around emerging research topics, or endeavours such as the establishment of a new journal on Popular Culture. In addition, Media History draws together researchers from both the Department of Arts and Cultural Sciences and Media and Communication Studies from the Faculty for Social Sciences. Yet another example is the merger of ALM and Digital Culture and its close connection to Publishing History and Ethnology. During our interviews, staff described the ways in which they cover for colleagues and teach in adjacent subjects. It is the panel's impression that whereas the Department of Arts and Cultural Sciences has deliberately sought collaboration between subjects and divisions, the Department of Language and Literature seems to instead encourage larger and stronger units to support smaller ones. The newly reestablished Department of History (2019), consisting now of one large division and two smaller, partly new divisions, is working on solid departmental integration, while maintaining freedom in research. The Department of Educational Sciences is dependent on several other departments also outside the Faculty to fulfil high quality of both teacher education programmes and in teaching higher education itself.

#### Sustainability and renewal of research strengths

It is obviously a challenge to achieve both continuity and renewal when the environments are small and resources sparse. The units reviewed by this panel consider their PhD students to be important for innovation and subject revival. Several interviewees explicitly stated that early career researchers are actively encouraged to be independent and innovative. This also aligns with the way that the UoAs value researchers' individual freedom to formulate their projects. At the same time several of the self-assessments

we read also acknowledge the value of good mentoring, for example in introducing PhD students to pertinent research fields by attending conferences with senior scholars It is also noteworthy that the environments that emphasize their encouragement for young scholars to develop as independent researchers also describe themselves as collaborative environments that strive to break out from the old structures within the Faculty, with lone scholarship being discouraged.

Several self-evaluation reports highlighted the difficulties in being able to make long-term plans, knowing when to hire PhDs and post-doc researchers due to the fact that the resources are in the hands of the Faculty and the Department rather than the individual subject areas. There are thus no possibilities for Divisions or subject areas to develop long-term planning, for example by managing their own resources in order to hire several PhDs at the same time. There are also presently subject areas without either PhD students or professors. This leaves them in a condition that severely impacts the development of a collegial culture based around high quality research. It should also be noted that some of these research environments voiced the importance of being "close" to leadership when applying for the renewal of resources. Some felt they did not have this access which represents the flip-side of collegial culture usually mentioned and appreciated at Lund University.

Very few, if any, of the research environments assessed by this panel are provided with resources to support the recruitment of a critical mass of PhD students. In recent years, resources have been allocated by the Faculty for approximately 23 new PhD students per year. The main principle for the distribution of students between subjects has been equitability, which has led to the dissemination of doctoral students across subjects. To make up for the small cohort of PhD students within each subject, departments, divisions and subject areas develop both formal and informal collaborations. Nearly all subjects with a historical orientation are allied with the National Graduate School in History (Nationella forskarskolan i historiska studier). Both selfevaluations and interviews testify to the importance of this infrastructure for courses and networking. In addition, PhD students within the Department of Art and Cultural Sciences have a joint seminar series and feel connected thanks to being placed in the same building. Some research environments, such as ALM & Digital Culture and History of Ideas and Sciences have developed close collaborations with similar departments in Sweden. Art History and Visual Studies as well as Educational Sciences are discussing the need of sustainable research schools to build up and expand the competence in various fields but also to cover the demand for new recruitments.

#### Opportunities for early-career researchers to develop their originality and independence

A thriving collegial culture requires scholars of different generations and at different career stages to participate. This requires explicit and well-defined career paths. As stated above, the Faculty have met the perceived lack of opportunity for promotion to professor with a new programme and many lecturers have been able to qualify for associate professorship. What is strikingly invisible in the self-assessments are discussions on the absence of career paths for younger scholars. An exception is Kultur 3 which describes the way in which they support graduated PhD students in their careers by encouraging them to use the Faculty's and the Department's support system for grant applications, at the same time as they support them to look for work at other universities.

The mobility of former PhD students is sometimes looked upon as a "double-edged sword". On the one hand mobility is considered as a sign of scholarly independence and quality of the education, on the other hand it is experienced as a break in continuity. As pointed out by the Division of Book History, in research environments with few scholars, the impact of PhD projects might be difficult to sustain when the PhDs leave the department. Staying on after graduation relies to a great extent on any former PhD students' ability to obtain external funding.

Faculty post-doctoral positions are advertised internationally and the competition is tough due to the fact that only approximately four positions for the entire HT Faculties are advertised annually. In addition, there are limited possibilities for recently graduated PhDs and postdoctoral researchers to attain tenure. The number of open lectureship positions is restricted and dependent on the number of HÅS (full-year students). This is also the reason why the Faculty has decided not to hire associated/junior lecturers (biträ-dande lektorer). Several UoAs highlight the general structural erosion of resources for undergraduate education and the problems of being dependent on declining numbers of students. Interviews and self-assessments both point to an insecure working environment for post-docs as well as part time lecturers who are dependent on external funding for continuing employment as researchers and full time work respectively.

# Academic networks and collaborations outside the unit

National, intra-Nordic and international networks are a common denominator for most UoAs. Collaboration seems to pertain to attendance at conferences and workshops, or via publication projects rather than collaborative international research projects from major funders, with a few exceptions, notably archaeology.

# Diversity, integrity and ethics

Diversity, ethics and integrity is most commonly referred to in the self-evaluations in terms of gender balance among professors and PhDs. Occasionally it is discussed in terms of international collaboration and recruitment. Ethical dilemmas pertaining to research are mainly highlighted in subjects that work with contemporary material such as Ethnology and Educational Sciences or are international in scope such as Human Rights Studies and the Centre for East and South-East Asian studies. Also worth noting is Archaeology's initiative in the wake of Metoo to secure safe environments during fieldwork. Ethics and integrity are further discussed in the self-evaluation of Educational Sciences with regard to how its staff move in between their roles as researcher and teacher respectively, and the danger in considering teaching situations as data. We did not find anywhere in the self-assessments any discussion of ongoing staff training with regard to Diversity, Integrity and Ethics and during the interviews it was confirmed that there is none after the initial appointment process.

# Quality in applications and publications

Quality in research was discussed in terms of successful applications for funding and either peer review of articles in international journals or monographs published by leading international publishing houses. The encouragement and reinforcement of these quality indicators is gleaned from the ways in which the Faculty allocates resources to support them. For example, this can be via seed money or the allocation of additional teaching relief hours for the preparation of project funding applications; the co-financing of indirect costs; or support granted to publish in English.

# **Quality ecosystem**

# Research strengths and how these are reflected in the educational portfolio

This is a research-based Faculty and, in general, there is a demonstrable link between education and ongoing research. However, its articulation varies between the departments and within them. Some departments such as Educational Sciences and History are deeply involved in the educational sphere and numerous, if not most of their graduate students, will be teaching. In some departments, the future careers of the students are related to research or managing of cultural institutions or firms. Fieldwork is an important component in these studies and it often heavily depends on research-led teaching, which appears crucial to undergradu-

ate as well as master students. On-going research projects also appear as efficient tools for graduate students in creating their networks and strengthening professional experiences. In some subjects collaborations with cultural institutions, the industry and large-scale research projects also motivates undergraduate students and supports their integration into professional networks. So does the journal *Provocatio* published by Human Rights Studies at the Department of History, that issues revised versions of students' theses.

The staff generally appreciate the dynamics between research and education considering that the former guarantees the quality and diversity of teaching, which in turn inspires research. The research-based courses may however complicate the replacement of teachers and some courses may not attract a sufficient number of students. This can be a threat to highly specialized teaching and innovative scholarship. The general need of broader courses should not be neglected and some courses, for example in teacher training, must be offered even if there is no ongoing research.

# How external research collaborations influence the quality of research

Research collaborations with cultural or educational institutions and the participation in largescaled national or international projects appear decisive to the quality of research and the outreach of the departments. Some departments are also involved in commissioned courses (uppdragsutbildning) or aspire to be. In some departments, members of the staff have a professional background outside the university. Several have worked at museums, the National Swedish Heritage Board or archaeological firms and their experiences enhance the research in several ways. In return, some cultural institutions even finance PhDs, in order to improve the scientific level of their staff or to engage high quality studies related to, for instance, archaeological excavations. These collaborations are mostly related to individual researchers. It is important that these contacts have a collective benefit. However, it is surprising that only one Department (Archaeology) mentions the ERASMUS teaching exchange as an opportunity to explore new research-led teaching environments. The Centre of Scandinavian Studies (CSS) created by Literary Studies at Lund University and the University of Copenhagen is a fine example of the benefits of international collaboration between universities. Thanks to the web portal *International Web Community for Scandinavian Studies* and the internet publication *Rethinking Scandinavia* it has gained widespread visibility, attracted grants and opened interdisciplinary exchanges.

There is in general a very positive attitude toward external engagement. It is both considered as a response to the quest for high quality knowledge in the society and a way to show the social role of humanities. One very important avenue of outreach that has had a broader impact in the Swedish public sphere is Humtank, a think tank aimed at strengthening the humanities and cofounded by one of the staff of Media History. The regular collaborations with museums and other cultural institutions in many (but not all) departments facilitates further possibilities to engage the wider public. However, problems can be noted in the sphere of publication, where English is essential in an academic and international framework whereas well-balanced and nuanced publications are best when written in one's native language and high-quality translations are expensive. Altogether, the use of English versus Swedish appears well-balanced. The opportunity to subsequently publish in English via Lund University Press, or even highly esteemed international publishers, is to be encouraged and applauded and shows a commitment to sustaining both national and international outreach projects.

# How UoAs deal with integrity and ethics, including potential conflicts of interest, in relation to collaboration

The problems related to integrity and ethics cannot be dissociated from the framework of collaborative projects. The challenge is quite different when dealing with colleagues, external collaborators, stakeholders or institutions. Educational Sciences underlines that these questions are important and complicated

when supposed to contribute to both development in the research environment as well as to educational authorities and schools. For as the external collaboration in a Swedish context, the self-assessment concludes that potential conflict can only be handled when the collaboration is considered as a meeting of equal partners. International projects may face other cultural contexts or even non-democratic governments e.g. the Centre for East and South-East Asian Studies at History. Globally, integrity and ethics are considered, but most prefer to handle possible problems on a case by case basis. The panel has not detected signs of internal conflicts. The generally transparent way in which departments, subjects, and seminars are organised provides important spaces of exchange. The largely transparent organization within departments and subjects as well as the seminars appear as important spaces of exchange.

# How UoAs use and capitalize on available research infrastructure, in Lund and elsewhere

All parts of the Faculty are highly dependent on very good library facilities and strongly dependent on digital tools (including IT-services). The increasing importance of digital scholarship is pinpointed by nearly all departments, and most consider its development as priority. The Centre for Language and Literature, the subjects in UoA Kultur 3 and Archeology and Ancient Cultures already have a solid experience in this domain and the professor programme has allocated a new chair in Digital Cultures. The Faculty has allocated funds for a webmaster related to the above-mentioned CSS since 2015 and it has upgraded the DARKLab of Archaeology to a national infrastructure. One should also mention the Humanities Lab (Humlab) at the Joint Faculties of Humanities and Theology, sustaining quantitative and mixed methods in research. These infrastructures are very federative as well within the departments as beyond them. They could proffer even more on collaboration and exchange between subjects and department because they favour interdisciplinary exchanges as well as national and international visibility. Their aim is however quite different, the web-portal of CSS appears principally as an efficient tool of communication, whereas DARKLab (and LUARK) are research-tools created to analyse archaeological data.

# How UoAs is aligned with any of the University's strategic research areas (SFOs) or any other

strong and broad research area, how opportunities from such connections are utilised The importance of natural sciences in archaeology has created links between SFOs. The collaborations with the likes of LINXS and the further connection to MAX IV and ESS opens for a leading international position. Possibly, other departments (Kultur 2 et 3, History) could benefit from such collaborations if given the opportunities.

#### Recommendations

Before this report goes into observations and recommendations for each UoA we want to bring up some general points that could be considered to create productive environments for research, teaching and outreach. Rather than point out what the Divisions, Departments, the Faculties for Humanities and Theology of Lund University should do, we draw attention to areas for discussions that can be addressed in the appropriate fora for this. We indicate where concerns have arisen several times and believe reiterating the recommendations here adds weight to their importance. Finally, we point to some other recommendations that we believe must be articulated in order to establish "Best Practice" for future review processes.

# General recommendations stemming from RQ20

Like everywhere else the Humanities are under pressure. Nevertheless, there remains a strong will among the researchers within this domain to contribute to, or be accounted for, in Lund University's strategic research areas.

# Issues that call for immediate attention

We have noted that overarching research strategies are rare in the research environments assessed by this panel. Whether such are necessary or productive is of course a question in itself that the panel does not have an answer to, but this discussion should perhaps be addressed in suitable forums.

We have also noted that the UoAs expressed difficulties in planning for succession and renewal as the allocation of funds for PhD students, post-docs, lecturers and professors are decided on Faculty level. For example, the current principle of equity makes it difficult for Subjects, Divisions and Departments to strategically take on a group of PhD students. This is something that could be considered by the Faculty.

Self-assessments and interviews highlighted the lack of clear structures relating to tenure and promotion. The professor programme has been high on the agenda in recent years but there is room for improvement regarding junior scholars' career development too. For example, the Faculty may consider outlining clear objectives for the attainment of career advancement, mentor programmes, hiring associated lecturers or encourage careers elsewhere such as in teaching and the wider public sphere.

Both self-assessments and interviews directed our attention to the particular difficulties for smaller subjects with one to five researchers. If Lund University is interested in their development, they should decide on how to support them. Resilience and robustness for smaller research environments depend not only on the allocation of resources, but also on opportunities for interdisciplinary collaboration between subjects, abilities to network nationally and internationally, clear plans for succession, possibilities to take in extra staff in case of landing external funding and activities in master and post-graduate education.

Networking opportunities for PhD students are appreciated, for example, the National Graduate School in History, seminar series for PhD students, national research schools, national and international collaborations. In case of small subjects and PhD programmes, the possibility of connecting to broader networks must be emphasized in order to secure high-quality research environments.

Applying for and receiving external funding is an important goal for the facilitation of research. Moreover, it is economically important for both Faculty and Departments as there is then more money available. This, however, becomes problematic, in particular in smaller units, where the increased research time can only fit the tight teaching schedules with difficulty due to limited staff. Collaboration among colleagues, also between different departments can solve part of this, but this problem should be faced in some way, again, probably at the Faculty level.

The situation for the Department of Educational Sciences seems fragile as it is dependent on collaborations with other research colleagues at different departments. The questions; both about quantity and quality of Teacher Education and Teaching in Higher Education as a long-term commitment, have to be handled in the appropriate fora. Because there is a need for the programmes as well as research in educational science there are opportunities to develop the field both nationally and internationally. The maintenance of top-quality teaching in higher education is essential for the teacher education programmes to retain their excellence. This requires that teaching is based on research. The allocation of research money is here an issue for the Department, the Faculty and not the least the leadership of the University as the research needed is both multi- and interdisciplinary and cannot rely on external grants alone.

Throughout RQ20 we observed that numerous UoAs expressed the need for clarity in the decision-making processes whether on departmental management, funding, recruitment or in the application of research grants. Moreover, to reduce stress in connection to applications, there could be more transparency regarding available finances and the calculation of OH.

#### Issues that need to be addressed in the long term

We have noted that research performance goals (e.g. annual number of publications or publications within a limited amount of years) are rare or non-existing in the UoAs assessed by the panel. These goals could be in terms of specific staff categories or in terms of individual performance. Such performance goals might safe-guard research time. This might seem paradoxical considering the current teaching loads, but if the departmental management requires such research performance goals, the management must also make sure that they are obtainable in terms of the imbalance of research/teaching obligations. Again, whether such goals are necessary or productive is of course a question in itself that the panel does not have an answer to, but this discussion should perhaps be addressed in the appropriate fora for this.

The question of teaching is high on the agenda for all subject areas. But here structural problems occur. Education is underfunded and dependent on a declining number of students. Under these circumstances it distracts attention from research. Measures need to be taken to avoid structural problems being carried on the shoulders of individual researchers. The balance between research and teaching is an important strategic issue at an overarching level in Sweden. The Faculty, as well as Lund University more generally, should consider supporting the Humanities with resources to balance teaching and education.

At Lund University both the Faculty and the University should take cognisance regarding staff concerns over increasing pressures upon them from above to continually seek external funding. Encouraging the writing of research applications can be a good strategic tool, but it needs to be balanced with – for instance – diminished administrative or teaching burdens. In particular, the complexity of this question appears when a subject becomes dependent on external money for research. Writing and planning research applications can actually be viewed also as a possibility: it forces researchers to launch innovative ideas, adjust to funding requirements and to exchange knowledge and to establish research groups and national or international research networks.

Many colleagues expressed a certain reluctance to follow the new bibliometric demands. However, first it should be noted that the utilisation of bibliometrics is a widespread quantitative way of assessing high quality research within many fields of the scientific community, in Sweden and internationally. Obviously, it has its pros and cons within the Humanities.

Nevertheless, the importance for the individual researcher is not just to publish research in highly esteemed international publications but also to take part in the international scientific community. In doing so, they may compare high quality research, acquire external funding and obtain both promotion and enhance their career development. Also, we would like to add, publishing internationally and in peer reviewed channels gives researchers the possibility to not only follow other researchers' work, adding to one's personal CV but also – and this the panel did not hear this articulated often – to set a new research agenda, or at least to contribute significantly to ongoing international scientific debates.

There are opportunities for enhancing knowledge on ethics, diversity and integrity. We observed that there are no mandatory systems in place to ensure that staff continue with their own development once tenured.

# Observations and recommendations for each UoA

#### Archaeology and Ancient History

*Leadership and collegial culture.* This UoA comprises four divisions. Three of them represent cultural areas and periods set in a long-term perspective: Archaeology (ARCH); Classical Archaeology and Ancient History (CAAH); Historical Archaeology (HARCH). The fourth one Historical Osteology (HOS) is anchored in archaeological sciences. Archaeological sciences and digital archaeology are prioritized in the research strategy and they have obviously strengthened cross-disciplinary collaborations within the

UoA. The self-assessment illustrates well the nature of leadership and the general organization. Its content is the result of collective discussions and several authors wrote the final text. The staff is very attached to this organic governance considering that it facilitates collaborative clusters or networks, flexibility and adaptability. The system is supported by research seminars which prove valuable for education and priority setting. Some have a disciplinary appeal and concern each sub-division, whereas others are transdisciplinary and cover outreach and fund-raising.

The unit has two infrastructures to sustain its research and its research strategy: DARKLab (Laboratory for Digital Archaeology) that the Faculty has upgraded to a national infrastructure in 2017 and LUARCH, which identifies possibilities for collaboration with different labs at Lund University. The geoarchaeological workgroup LINKX at MAX IV has been created in the latter framework. The key position of Digital Archaeology and Archaeological Sciences in the research strategy and their importance to fund-raising raise the question of the balance between the humanities and "hard archaeology". It is striking that the impressive network of the UoA hardly includes humanities other than archaeology. However, the interview revealed a real attachment to the humanities, which is also sustained by projects such as Uppåkra, although some preferred integration between the humanities and digital sciences.

The unit has a good international profile; the QS *University Ranking by Subject* has thus classed it ca. 51-100 among the world's archaeological departments. More large-scaled national and international research projects depend on the unit, which has an increasing success in attracting funds. Actually, external finances support 44% of the research, where DARKLab has attracted more important funds and international collaborations.

*Quality ecosystem.* Increased teaching and administration loads impact both research and the capacity to attract funding. This in turn has consequences for teaching and learning. This is tightly linked to research involving student participation, especially fieldwork. The early career staff and especially the senior lecturers are particularly affected and their perspectives of internal promotion next to none. The OH is a complementary problem. Their level is not known in advance causing anxiety and has hindered participation in for example EU projects.

The outreach of the UoA is demonstrable in both the academic sphere and in external public engagement. Its publication record is impressive (442 publications 2014-2018). The UoA's major research outputs are in English, whereas Swedish papers ensure outreach to a broader Nordic audience. The scientific papers mainly appear in renowned international reviews and the monographs, which retain a strong position, are integrated in high-quality international collections. The outreach to the general public is good, notably through social media, excavations, expositions etc. On the web e.g. *The Swedish Pompeii Project*, 3-D visualizations offer welcome alternatives to find documentation.

The UoA's attachment to the rather organic organization should be considered. Hitherto it has proved successful and formal framework risks to break existing dynamics. Individual research is favoured but it generally integrates a flexible collective framework and does often federate staff and students. It has also proved efficient in the setting of strategies.

The UoA has assets to open new ways for Digital Archaeology and the Humanities. LUARCH has hitherto focused on the scientific labs. Similar efforts within the Humanities and the Social Sciences could sustain innovative research. At Lund University, chronological gaps apparently thwart such initiatives. Methodological and comparative approaches may however reveal fruitful.

This challenge will depend on the Faculty. Financial incentives could also encourage collaboration with other Departments of the Faculty. Last but not least, the Faculty should consider investing in more PhD positions to favour long-term research strategies.

#### Department of History: History, Human Rights, East and South-East Asian Studies

*Leadership* is not clearly discussed in the Departmental self-assessment, nor was it during the interview. This applies to research, recruitment and the running of the department with an emphasis to collegiality over firm top-down leadership being universally expressed. The importance of individual freedom for researchers is continually expressed across the Department, indicating a light touch approach to 'leadership' being taken. We struggled to ascertain any overarching research strategy other than protecting research time available for the permanent staff. In both the Centre for Human Rights Studies and the Centre for East and South-East Asian Studies more concrete strategies were articulated for securing external funding and the development of research clusters which bound staff and students together.

We learned from the interview that Administrative leadership is achieved by a Board which decides on the most pertinent decisions relative to all colleagues, while each Division retains autonomy regarding decisions relative directly to their group. Ultimately, decisions rest with the Head of Department via a self-defined transparent consultation process across the Divisions. Nevertheless, it is self-evident that there is a tension relating to leadership arising from a lack of clarity as to the ultimate direction of the Department. This is caused by a difference in the perceived views which were aired. These were articulated as the Faculty's apparent fixation on the Department having to constantly apply for external funding on the one hand and the Department's focus on the protection of teaching and research time on the other.

Considering the information provided and the comments we received upon it, we believe that very positive aspects to the running of the Department. The flat collegial structures and the encouragement of senior staff to mentor junior colleagues has led to the establishment of numerous networks, research nodes and outreach projects. However, it is equally apparent that the smaller the division, the more problematic it might be to gain studentships, post-doctoral positions, additional staff and promotion.

*Collegial culture.* The Head of Department and the interviewees emphatically articulated the collegial culture within the Department and across its various Divisions. Numerous seminars and networks both across the Department, the Faculty, the wider-community and internationally have been established. Moreover, PhD Students and post-doctoral researchers praised mentoring schemes and the ability to talk freely with colleagues at all levels. While this reflects well on the collegial culture, a worrying aspect is nevertheless present. This centers on the ability of Divisions and Centers to recruit students, post-doctoral researchers, new staff and gain promotion. In short, the opportunities for early career colleagues to develop their originality and independence of thought is good, while their prospects to gain academic positions and/or promotion is weak. The lack of promotion opportunities to the rank of professor (and promotion in general) was aired as a grievance directed at both the Faculty and the University. Within the Department, concerns relating to the allocation of PhD studentships also found expression, as did the ability to fund new ones with a view to any longer-term strategy. The problem of the professorships has been somewhat resolved, albeit our information regarding this came woefully late. The Department stated that any new appointment would have to accept the collegial nature of the Department and that willingness to work for the benefit of all the Divisions within it is encouraged.

*Quality ecosystem.* There is a confidence in the Department that the quality of the research produced is of the highest standard. We were very satisfied with the variety of research strategies being undertaken including academic writing, public history engagement, and the thoughtful choice emphasizing the appropriateness of language choice (Swedish or English depending on the intended audience). The engagement at all levels via a number of output formats – regionally, nationally and internationally – is highly commendable. That said, higher prospects of job retention and promotion, combined with the removal of mounting pressures to continually seek external funding would only amplify the quality of work being undertaken.

#### Kultur 1: Book History, History of Ideas and Sciences, Media History

*Leadership* is not very clearly addressed in the self-assessment, nor was it during the interview. All divisions emphasized that they preferred the planning and the organisation of the research to be a collective, collegial responsibility rather than a top-down leadership. Media History was the only one with a more explicit and ambitious and successful research strategy: this has been crucial to secure external funding as well as for attracting younger scholars and developing an international research network. Book History mentioned the small size of the division as the main reason for lack of research strategy. History of Ideas and Sciences did not see an overall research agenda as desirable but rather wanted to encourage initiatives taken from all staff categories: the one mentioned, a co-authored volume on "polarization" was proposed by a PhDstudent.

The lack of possibilities for promotion as well as for advertising new Faculty positions and postdoctoral researchers was generally understood as stemming from a lack of financial resources (decided at the Faculty level) rather than lack of leadership on the division level. The external funded professor of Book History and the Professor of History of Ideas and Sciences are described as valuable but with too much administrative work on their shoulders. Media History repeatedly asked for a professorship to gain stability and visibility.

Many valuable things have come out of these research environments. The bottom-up organisation and the encouragement of senior staff to junior researchers has led to external funding, the establishment of a number of networks, research nodes and outreach projects. This is definitively what the representatives we spoke to agreed upon and stressed time and again. However, it is also evident that the small size of the divisions makes them vulnerable for external changes (for instance lack of funding – or general cuts from Faculty level) and at the risk of being fragmented. Collaborations within and outside the unit seem to be key but this probably will require some strategic planning and explicit leadership to develop in a dynamic fashion.

The aspects of collegial culture brought up in discussion mainly centred on the professorial promotion. The groups also emphasized that in terms of recruitment the permanent staff and PhD students have to a large extent been recruited from other universities than Lund. This signals a welcome awareness of the need for mobility to achieve diversity and fresh ideas from the outside which is somewhat lacking in some Humanities units this panel has met with. All divisions stressed the importance of the National Graduate School in Historical Studies. Several other initiatives for supporting early-career researchers have also been taken, for instance research application writing and publishing seminars.

Existing seminars in the individual subjects and between unities seem to be well-functioning and productive. The research nodes are being used by individuals but probably not actively recommended. Rather, various networks directed both on personal and institutional levels appear to provide the needs for collaboration. Everyone agreed that this collegial culture is productive but too many seminars and platforms can lead to fragmentation. Again, a more explicit research strategy could perhaps be helpful.

*Quality ecosystem.* The self-assessment and the interview expressed confidence in the high research quality. However, the descriptions of the quality ecosystem could have been more detailed. Concerning publication, the unit is still relatively traditional: a large part consists of material in Swedish, but change is coming, as elsewhere. External collaborations and engagements are ambitious even if not easily evaluated in terms of "impact".

All divisions mention that research specializations have resulted in courses and programmes on different levels but there seems to be space for more initiatives. For Book History a masters-level course would be a good bridge between undergraduate and PhD levels of study. The wide range of perspectives included in History of Ideas and Science offer rich opportunities for collaboration on education across disciplines and faculties.

#### Kultur 2: Art History & Visual Culture, Musicology, Intermedia Studies and Fashion Studies

*Leadership.* According to the self-assessment, the organisational structures and histories differ among the four divisions. Consequently, the self-assessment consists of four parts plus shared final remarks and transversal themes, which mainly reflect initiatives at higher levels; notably, however, the common concern is that the University management should take more care when considering the Arts and Humanities. The quality of the divisional self-assessments is inconsistent, and the diverse structures are not clearly addressed. In particular with regard to the three minor UoA divisions (Fashion Studies, Intermedia Studies and Musicology), the limited number of employees seems to limit the potential of variation. No formalized collaboration between the four is to be found apart from the research nodes and other activities at the departmental level. Noteworthy, however, is the fact that this UoA is strongly engaged in these nodes, several lecturers have been promoted docents in recent years, and a number of researchers are very productive at a high-quality level; however, others are less productive and, unfortunately, even non-productive in terms of research publications.

A common trait is the lack of clear research strategies within the UoA. The divisions are satisfied with the current collegial structures and consider the absence of a long-term strategic plan a freedom to make decisions and obtain responsibility at this level. Thus, researchers follow their own interests, although some initiatives to collaborate have been taken, in particular with regard to the largest UoA division, Art History & Visual Culture, which presents a funding plan. In contrast, Fashion Studies states that applying for external funding has not been an option due to a heavy teaching load; similar teaching loads are addressed from other sides as well. Musicology considers itself in a rebuilding phase, among other things trying to re-establish its PhD programme. Art History & Visual Culture and Musicology have documented well-established national and international research networks, and both divisions are involved in external collaborations about funding; the remaining two divisions make imprecise references to their external and international partners. All divisions put up goals for the coming years; however, many goals are stated without further indications of how to get there.

*Collegial culture.* In particular, strong engagement in the above-mentioned research nodes is significant. Moreover, Art History & Visual Culture is engaged in the Pufendorf Institute for Advanced Studies, and Musicology is responsible for the Sound Environment Centre, both at Lund University. Musicology is also in the process of restarting its research seminar. Fashion

Studies points to the fact that the absence of experienced staff affects the research environment. Moreover, the location of the division in Helsingborg reduces the opportunities for informal contacts with departmental colleagues and leadership. This should be a matter of concern. The self-assessment contains few, if any reflections on how to improve opportunities for earlycareer researchers to develop their skills, although Art History & Visual Studies has taken initiatives concerning a national symposium for PhD students. Focused comments on diversity, integrity and ethics are lacking as well. The overall impression of the panel is that the small divisions are heavily dependent on education and currently without convincing robust research environments and viable plans. A recommendation might be the merger of the small divisions into a large research unit in order to safeguard a high-quality research environment and, furthermore, ease administrative tasks.

**Quality ecosystem.** To a certain extent, all divisions address issues of external alliances and use of research in the educational portfolio. In particular, Musicology connects to several other environments to develop a track from undergraduate to graduate education. Art History & Visual

Culture has a long-lasting partnership with Lund University's Skissernas Museum. Fashion Studies makes efforts to create a quality eco-system by combining research, education and regional business. This division also has high visibility in the national media, although the significance of this for research is

not clearly stated. Asked about societal impact of research, all divisions seem to agree on its importance. The overall impression of the panel is that they are aware of the importance of external collaboration for

### Kultur 3: Ethnology, Archival Studies, Information Studies and Museology, Digital Culture and Publishing Studies

high-quality research quality and educational relevance.

*Leadership.* This UoA comprises separate divisions organized in two research seminars, Ethnology Seminar and Research Seminar for Mediated Culture and Information (encompassing Archival Studies, Information Studies, Museology, Digital Culture and Publishing Studies). Both set high standards for their work, and both have a strong research focus and organisation including leadership and collegial support in matters of research. In general, the self-assessment is written in a clear manner including reflections and understanding of the significance of both PhDs and departmental research support. The UoA aligns with the Department of Arts and Cultural Sciences overarching strategy for 2018-2020 aiming at high-quality research activities with a high proportion of competitive applications, connections between research and education and visibility in both academia and in wider society. The UoA uses available resources from the department as well as from the Faculty to strengthen application writing and publishing. External funding is highly prioritized and this goal is integrated in the research environment. The UoA funds extra PhD scholars, open career paths for younger scholars and supports the promotion of lecturers to docents. There are 2-4 research application seminars and meetings every winterspring and UoA members read one another's application proposals. After their defence, PhDs can use workplace/affiliation for at least six months to write applications.

*Collegial culture.* The self-evaluation signposts that the divisions actively work with sustainability and renewal of research strengths within the given parameters. During the interviews, it became apparent that the divisions actively nurture their respective seminar series for disciplinary continuity and the seven departmental research nodes for renewal and interdisciplinary collaboration. The Research Seminar for Mediated Culture and Information is a merger of subjects often with less than a handful of researchers. It cross-fertilizes and responds to the challenges affecting smaller subjects in terms of collegial culture by a joint seminar series, co-supervision of PhD students and overlapping teaching responsibilities. At the same time, the interviews displayed that there are still inequalities between bigger and smaller subjects in terms of influence. In the interviews, the Division of Ethnology also came forth as an environment with a strong collegial and collective focus in seeking new areas of research and interdisciplinary collaboration. In addition to the above-mentioned measurements to support PhD students, the students themselves reported on how they were part of national PhD networks as well as felt connected to and supported by the department and PhD students at neighbouring divisions. However, the interviews displayed the vulnerable situation of post-docs and also displayed the need to mentor and support transitions from post-doctoral study to lecturer and/or to the level of docent, and further.

**Quality ecosystem.** The self-assessment describes how the divisions are active in research, education and external engagement, and it highlights when these different tasks are combined. The UoA is highly successful with external funded projects involving 1-2 researchers. Many of its researchers are involved in external projects both within and outside the department. It is particularly successful with national and regional funds, the latter are limited in size and considered as seed money for larger projects and applications. A series of projects involve collaboration with the wider society, for example The Swedish Medical Product Agency, Swedish National Agency for Education, National Library of Sweden, The Swedish Internet

Foundation, Swedish National Heritage Board. The next step could be forming larger collaborative international projects. The overall impression of the panel is that the research environment of this UoA is sufficiently sound and robust to pursue this as a strategic goal.

Strong researchers are present at all educational levels, external engagements are regularly – and strategically – incorporated in educational contributions. However, the report also highlights that the underfunding of undergraduate teaching creates high workloads and impact negatively on research time and resources. High ambitions for education seem to a certain extent to be dependent on extra hours, not paid for or paid for by research. Management needs to take measures to support staff in balancing engagements, for example by explicit performance goals that safe-guard research time.

#### **Department of Educational Sciences**

*Leadership.* This is a young department (2011) which, in addition to research in the field of Educational Sciences, is responsible for Lund University's Teacher Education Programme (for upper secondary school) and Teaching in Higher Education. The Department is a collaborative and administrative "node" in these educational programs, both dependent on and serving other departments at the university. Therefore the two leaders of the Department are creating a framework to develop a common research profile for the two programmes also including researchers in other departments.

Research is fundamental for running these programs and the Department is dependent upon other departments' investment in educational sciences to fulfil the goals for the educational programmes. Hence, the question of leadership also includes Heads of Departments and Deans from different faculties. This raises questions about long-term recruitment plans, the allocation of research money etc. to secure both the quality in education and the amount of students. It is to be noted that the self-assessments from the other UoAs the panel evaluated did not mention teacher education or teaching in higher education even if it turned out during the interviews that in some departments this was quite an extensive part of their remit.

*Collegial culture and quality ecosystem.* Both the self-assessment report and the subsequent interviews gave the panel a picture of a collegiality based on respect for each other's research, common interest in educational sciences as well as in teaching and learning. The collegiality is reflected in a variety of seminar series and also includes several national and international networks. Some seminars especially promote early career researchers to develop their originality and independence in a multidirectional environment. Senior researchers introduce the junior researchers into the field at international conferences. There is also close cooperation with school authorities both with regard to research and education.

The staff members are successful in their work but see themselves as a fragile group; there are only a few researchers and there is an imbalance between junior and senior researchers. Without research schools financed by Lund University or externally, it remains difficult to engage new researchers to build up a new generation responsible for the educational programmes. One way they have developed successfully by enabling colleagues in other departments to work part-time at or for the Department.

All university based researchers are more or less dependent on external research money and it is clear that the Department of Educational Sciences successfully has secured funding and regularly publishes both books and journal articles in English and Swedish as appropriate. In Higher Education Research they also co-publish with researchers in Medical and Natural Sciences. But again it is a fragile situation. Professors do research, PhD students both research and teach. As common in many departments, lectures take care of teaching but lack research time. All of this feeds into the question of promotion opportunities, or lack thereof. The fragility of the situation is increased because both Teacher Education and Teaching in Higher Education are long-term commitments that cannot be resolved on an annual basis and it is not only a question for one department or one faculty.

# SOL 1 (Section 2, Centre for Languages and Literature): Literary Studies, Film Studies, Creative Writing and Theatre Studies

*Leadership.* The question of leadership/research agenda is not clearly discussed in the selfassessment, and during the interview it was not apparent how this group positioned itself to the question. We were informed that academic leadership can consist of senior staff serving as rolemodels for younger colleagues, i.e. as more representative examples or mentoring structures than leadership. The lack of possibilities for promotion was understood as a question of economic resources and not a deficiency in leadership. The suggestions of Literature Studies' professors' profiles were discussed: Literary Studies had suggested two professorships (äldre litteratur and litteraturteori). We learned only in passing of Didactic professorships – probably a sign that Didactics is not on top of the research agenda. Older Literature and Literary Theory are selfevident choices, but does a lack of explicit and conscious strategic choices and academic leadership lead to conservative solutions in regard to the new professorships? Uncontroversial solutions may turn out to be unattractive and unproductive in the long run.

We conclude that the strong research output, and the national/international networks and impressive outreach projects, are not the result of any defined research agenda or of explicit academic leadership. This was definitely supported in the interviews undertaken by this panel.

*Collegial culture.* The question of professorial promotions arose, and the degree to which either the Faculty or the subunits of it are supposed to decide on the recruitment of PhDs or post-docs were also mentioned and discussed. Both questions led to the airing of concerns. An issue concerning recruitment (representativity and diversity), and the importance of bringing in new ideas from outside the university. Lund has a reputation for recruiting internally. Film Studies confirms this. The interviewees stressed the uncontroversial question of imbalance in age (forthcoming retirements), whereas any such issues are absent in the Literary Studies' report. During the interview there was not much movement in this question. Perhaps provocatively, we conclude that it is not necessarily ethnic Swedes educated in Lund who will renew Film and Literature Studies in the future. An explicit agenda or strong leadership could undoubtedly make a marked difference in order to avoid things proceeding more or less as usual.

As part of the collegial structure, seminars (located in the individual subject areas) exist and are functioning well both as common meeting grounds and places for the development and discussion of research ideas. It seems as if other clusters – perhaps the interdisciplinary research nodes – could be combined with some of the seminars, but that is probably not the case yet. Several researchers across different groups mentioned that there may be too many seminars, albeit they are each interesting. Could a research agenda be established to sort out such concerns?

*Quality ecosystem.* Neither in the report nor in the interview do representatives of this unit express worries that their research reflects anything other than the highest quality. This aspect is most apparent in particular within the larger and more well-established units that this panel has encountered. We believe it is healthier for this to be judged by external evaluation and peer review. Nevertheless, two associated issues arose in both the self-evaluations and interviews and these directly related to quality ecosystems: publishing patterns, and renewal of ideas by way of PhD-students. Literary Studies and Film Studies have been very successful in attracting funding and publishing, the "objective" criteria in Swedish academia. That said, both subject areas expressed a certain reluctance concerning the ranking of publication based on bibliometrics. Even though no external measures are required (for instance a number of published articles corresponding to the research time), there is a concern as to whether a good balance can be found between "hardcore" research publication in anglophone journals and Swedish texts directed towards a general public. This might turn out to be a question of quality too, and discussions and perhaps guide-lines provided at Faculty and University level might make the choices of the individual researcher easier.

663

A well-functioning academic structure requires PhD-students: this is lacking in Lund, as elsewhere in Sweden, and there are worries that the number of PhD-students will be few and unevenly distributed.

# Recommendations on the review process

The review panel was not supplied with all the documentation either required or available in order to conduct the present review to the best of our abilities. Specifically, three significant omissions were particularly galling:

A: The review panel was not made privy to the "New Professor Programme" until after we had conducted our initial reports on the various Departments. This left us feeling that our reports, and our preparation for the interviews were already outdated by the time we submitted them or had the face-to-face conversations. In each UoA the subject of professorial appointments had been raised in the written submission and we worked on those concerns only to be blind-sided with additional information at a stage too late to be of value to us.

B: It took one of our panel members to establish that not only was there a Strategic Plan for the University (2013–2017) with which we were provided but crucially, another existed and is available (2019–2024) that we were not directed too. Once again, with this information to hand we may have framed both our interviews and initial reports quite differently.

C: Also, in the self-assessments, the publication information was documented rather unevenly: whereas some UoA's had full documentation, others had not filled in the necessary information.

Our obvious recommendation here is that there is full disclosure of the available documentation and that reviewers are alerted to any significant change in University policy or practice at the earliest convenience. This would avoid last minute alterations and allow for more constructive interviews based on the most up-to-date information.

# Languages & Literature, and Philosophy

# Panel overview

Panel H2 consists of eight units of assessment (UoA), which encompass disciplines at the Centre for Languages and Literature, The Department of Philosophy and The Department of Communication and Media. The disciplines are located close to each other in the neighbouring SOL and LUX buildings. Some of the units has researchers from two disciplines (e.g. SOL 2 or Fil 1) while others cover the research in a number of disciplines (e.g. SOL 6 with seven disciplines). Especially in UoAs covering more than two disciplines, the coordinators have had a challenging task – and managed successfully even though they have had the same space for their self-evaluations.

The number of disciplines in panel H2 is between 25 and 30, depending on how a discipline is defined. English is e.g. defined as two disciplines (English Literary Studies and English Language and Linguistics) while French is defined as at least French Linguistics and French Literary Studies but also could be interpreted as two additional disciplines as also French Didactics and French Philology are specialisations in the general syllabus for Third Cycle Studies for the degree of Doctor in French Studies.

The variation in age between disciplines is considerable – from Latin which has existed since Lund University was founded to the new disciplines of Cognitive Semiotics and Neurolinguistics. There is a richness and diversity in theoretical approaches, methodologies, research interests, publication patterns and languages of publication. In some disciplines English is the obvious choice for research publications, while Swedish and English are of equal importance in disciplines such as Swedish and Swedish as a Second language. In several of the language disciplines the languages of publication are more than two. Peer-reviewed articles in English are important for all disciplines, but there are also other important means of publication such as monographs, book chapters, anthologies and popular science.

Finally, a few words on the conditions for research. There are three levels of faculty funded research at the Joint Faculties of Humanities and Theology: full professor 40–50 %, associate professor 25 % and lecturer 20 %.

# External panel report

# **Executive summary**

The units of assessment, UoA, evaluated are quite diverse as far as research fields and size are concerned. Some of them (SOL2, FIL1, FIL2) are quite large compared to the others and a comparison is not that simple. On the other hand, there are problems which all have to deal with in different degrees. Three main fields for improvement can be singled out:

- Creating guarantees that Faculty funded research time is used more effectively, not being consumed by teaching and administration.
- Better integration of research in an overarching framework based on LU's general profile paying special attention to the disciplines with very few employees.
- Better contacts between separate disciplines and units with higher echelons especially SOL and the faculty creating a culture of cooperation and influence from the bottom up.

# Introduction

The Panel H2 was entrusted eight units of assessment (UoA) which encompass disciplines at the Centre for Languages and Literature, The Department of Philosophy and The Department of Communication and Media. The number of disciplines in Panel H2 is between 25 and 30 depending on how a discipline is defined. All UoA's have submitted extensive self-evaluations. Six evaluators were appointed. Each evaluator was entrusted one UoA within his specialty by the chairman (JR). However, all members of the Panel took part in the interviews and have contributed to the final text of the report, based on their reading of the self-evaluations of all UoA's, the interviews with their representatives and the responses from the units on specific questions from the evaluators. The interviews took place on-line May 4–6 2020 and the panelists had the opportunity to pose complementary questions to the UoA which had to be answered before June 12. Due to the current pandemic no site visits were made.

- Composition of the Units of assessment:
- SOL2: General linguistics, phonetics.
- SOL3: Swedish language, Swedish as second language, Nordic languages, Icelandic, Danish, Communications and media, rhetorics.
- SOL4: English language, German language, French language and literature
- SOL5: English literature, German literature, Spanish, Italian, Rumanian.
- SOL6: Arabic, Latin, Ancient and Byzantine Greek, Modern Greek, Yiddish, Russian, Japanese.
- SOL7: East and Central European Studies, European studies, Chinese, Mideastern studies.
- FIL1: Practical philosophy, theoretical philosophy.
- FIL2: Cognitive Science, Cognitive semiotics.

The Panel consisted of the following members: Björn Melander, Uppsala University Kevin Mulligan, Università della Svizzera italiana Pieter Muysken, Radboud University Andreas Olsson, Karolinska institutet Jan Retsö, Gothenburg University (chairman) Jobst Welge, University of Leipzig

# Observations

In order to get a clear profile of the evaluated UoA's a survey of how they see their own strengths and weaknesses is presented below in the form of three tables corresponding to the three main fields of evaluation: leadership, collegial culture and quality ecosystem. The tables aim at showing the general outline of the research framework in relation to the 18 sub-items mainly as it has appeared in the self-evaluations. A plus sign indicates that the UoA on the whole is satisfied with the current situation. A minus sign means that there are problems which could/should be amended. The comments will concentrate on the minuses.

# Leadership

UoA	Priority setting	Recruitment Promotion Succession	Publication patterns	Balance between activities	Research Strategy
SOL 2	+	-	+	-	-
SOL 3	+	-	+	-	-
SOL 4	-	-	+	-	-
SOL 5	+	-	+	-	-
SOL 6	?	-	+	-	-
SOL 7	+	+	+	-	(+)
FIL 1	+	-	+	-	+
FIL 2	+	_	+	+	+

# Comments

# SOL2

**Recruitment:** The unit claims it has little influence on recruitment etc., lacking possibilities to fulfill larger ambitious programmes. If the unit were in charge of its economy a more far-sighted plan for recruitment of personnel could be developed.

Balance: Asymmetry between research time and other duties.

Research strategy: There is no explicit research strategy. This is partly connected with lack of control of resources.

# SOL3

**Recruitment:** Students are few; possibilities of promotion limited; little concern from the leadership at SOL for the national aspect of the disciplines; professorships reduced since 2014.

Publication: Good but no publication policy; publications in Swedish not much rewarded.

**Balance:** Conditions not that bad but research time tends to be absorbed by educational and administrative duties; no resources allocated for outreach.

Research strategy: No overarching strategy; few common fields of research.

# SOL4

Priority: No explicit goal except general encouragement.

**Recruitment:** The moratorium on promotion has created problems. Recruitment only considered for teaching, not research.

Balance: Problematic

Research strategy: No overarching strategy

Research strategy: No documented strategy; the tradition is to choose one's own topic for research.

# SOL5

**Recruitment:** Very restricted opportunities for recruitment of new members; replacements of retirees absolutely vital.

Balance: Less time for research in the unit than their peers internationally

Research strategy: Key aspects beyond unit's control dependent on LU research policy in general.

# SOL6

General: The unit consists of seven linguistic/philological disciplines which are all extremely small and diverse. The problems concerning leadership etc. noted here are all due to this and the fact that they do not see themselves as a natural research community.

Recruitment: Urgent but some new recruitments are announced.

Balance: Similar situation in all sections: research time is eaten up by other duties.

Research strategy: No common strategy, fields are too heterogeneous.

SOL7

Balance: Great imbalance between activities, little time for focused research

Strategy: Unit's own unwritten strategy related to that of the faculty.

FIL1

**Priority:** The fact that funding decisions are made on higher levels reduces the possibilities of influencing funding policy.

Recruitment: The section of practical philosophy sees the situation as somewhat 'fragile'.

FIL2

Recruitment: little or no possibility of influencing promotion. This is decided higher up on faculty level.

# **Collegial culture**

UoA	Opportunities for young researchers	Research strengths	External academic networks	Integrity Diversity	Quality in applications & publications
SOL 2	+	(-) / +	+	+	+
SOL 3	+	-	+	+	-
SOL 4	+	-	+	+	+
SOL 5	+	+	+	+	+
SOL 6	(+)	(+)	+	+	+
SOL 7	+	+	+	+	+
FIL 1	+	+	+	(-) / +	+
FIL 2	+	+	+	+	+

# Comments

# SOL2

Opportunities: On the whole good but limited possibilities for long time planning of careers.

# SOL3

Research strength: Lack of internal cooperation; reduction of number of professorships;

Integrity: Room for improvement.

Quality: Little focus on publication patterns/policy; publications in Swedish has low status.

# FIL1

Diversity: In the section of Practical philosophy the employees are mainly male.

# **Quality ecosystem**

UoA	Research vs.Education	External collaboration and research	Integrity ethics	Local research infrastructure	Alignment with university research strategy	
SOL 2	+	+	+	+	+	
SOL 3	-/+	+	+	+	-/+	
SOL 4	(+)	+	+	+	?	
SOL 5	+	+	+	+	+	
SOL 6	+	(+)	+	-	-	
SOL 7	+	+	+	+	+	
FIL 1	+	+	+	+	+	
FIL 2	+	+	+	(+)	+/-	

# Comments

SOL3

External networks: Very good at the moment but unsecure due to few persons involved.

University strategy: Unit not part of overarching strategy of research.

# SOL4

Research/education: Not in complete harmony.

# SOL6

Local infrastructure: No interdisciplinary collaboration.

Strategic research areas: Poor.

# FIL2

Infrastructure: The unit by and large creates its own tools but receive support from LU

# Reflections and comments on the evidence from the tables/self-evaluation, interviews, and complementary questions.

The Units of Assessment to be evaluated by our panel consist of quite different disciplines which means that most of them show complex structures. The UoA's were set up for the evaluation process which explains their complexity making the evaluation more difficult. Most of them do not seem to constitute natural research communities. There is also a considerable difference between UoA representing general linguistics (SOL2) and philosophy (FIL1, FIL2) on the one hand and the UoA's composed of language specific disciplines and area-based studies (SOL3–7) on the other. The two first ones (as well as several others not treated in this report) are dealing with questions, problems and methods of a general nature, the answers of which should have relevance to all humans. Philosophy and linguistics seek answers to questions relevant for every human being (what is the nature of the human language? What is human knowledge? What are moral values?). These 'general disciplines' as we may call them are defined by the kind of questions they pose to the 'real world'. The language/area specific disciplines on the other hand are primarily defined through their object, the actual data they investigate and the questions they pose to reality are often dependent on their data. The latter tend to be 'multi-methodological' in a way different from the former. The classic example is traditional philology defined as making textual material available through textual editions. A philologist has to be a jack-of-all-trades: linguist, historian, historian of comparative literature etc. The result is that each object-oriented discipline tends to have its own unique profile, often the outcome of a long tradition within the field. This does not necessarily imply that these different kinds of disciplines are watertight compartments. Even a researcher of general comparative literature may have a specific literary corpus in a specific language as his starting object. But his discipline is interested in answers of a more general kind. Neither does it mean that the object–orientated disciplines are completely dependent on the general disciplines and may not develop their own methods. There are many examples of how methods from the object–oriented disciplines have enriched the tool-box of the general disciplines.

Disciplines with theoretical, general ambitions are cosmopolitan. They are associated with journals published in English with serious refereeing procedures and regulated competition. The journals themselves are typically ranked by specialists in the relevant fields. Disciplines devoted to individual objects, on the other hand, often have regional journals only, which are published in languages other than English and follow idiosyncratic procedures. The former, unlike the latter, are encouraged by the internationalisation efforts of the University. Obviously, it is much easier to evaluate work in the first type of discipline rather than in the second type. This is one of the reasons why research funding tends to go to disciplines of the first type. And international research funding, in particular, more rarely goes to work in disciplines of the second type. All this makes a comparison with the other units difficult. Even within the units there are sometimes wide discrepancies between the disciplines.

These distinctions are relevant for the evaluation of the UoA in this report even if it is not a main issue in their self-evaluation. But there is an obvious difference between UoA's like SOL2, FIL1 and FIL2 and the others which is clearly visible in the self-evaluations and the interviews. This holds not only for the different kinds of activities but also for the position of the individual disciplines in the academic world. Some of the object-oriented disciplines due to their specific traditions and objects of research often have difficulties in relating to other disciplines. This is reflected in the comments on the formation of the UoA's by several representatives. Many (most?) of the object–specific UoA's did not see themselves as a natural research community. There seems to be a lack of dialogue between the disciplines evaluated here. It was pointed out by some representatives that they had good contacts and exchange with disciplines not included in the UoA's, not the individual disciplines within the UoA's.

Further, SOL is not perceived as directly supportive of research. Even if UoA's like SOL6 and SOL7 have features and problems in common with the other UoA's, the discrepancy between them is seen as considerable. UoA's like FIL1, FIL2 and SOL2 include disciplines whose structures and kinds of research are quite different from those of the others. For example, in light of its research activities, Cognitive Science (which sorts under Philosophy) is an oddball in the field of humanities, and would fit better in a context of social and natural sciences in terms of methods and theory.

A general impression is that, to a fairly large extent, the people working within the disciplines represented in the UoA's are relatively satisfied with the working conditions. We had the privilege to talk to a group of very competent and dedicated scholars. The Panel is also impressed by the amount of qualified research that is being done, even by disciplines with very few employees, as is obvious from the documentation of research in the form of articles in international journals.

In I, *Leadership*, publication patterns receive good credentials. In II, *Collegial culture*, the overall verdict is quite positive: units are satisfied with external networks, integrity/diversity, quality in publications. In III, *Quality ecosystem*, the general picture is that the connection between research and education works well. So does external collaboration, integrity/ethics and the use of local research infrastructure.

The weaknesses can be found within four main areas

#### **Balance between activities**

A common complaint by all units and disciplines involved is the balance between research time and other duties. An assistant professor (universitetslektor) is allotted 20% of his/her time for research. This means at best one full day per week. In practice, this time tends to be consumed by other duties and faculty funded research *de facto* receives low priority. Considering the fact that 20% of a position as assistant professor is financed with funds ear-marked for research, quite large amounts of money are not used for the purpose they should. The matter becomes even more serious if one takes the basic principle of a university into consideration, viz. that the activities in the academy should be pursued based on a 'scientific' and 'scholarly' basis (vetenskaplig grund). If research has low(est?) priority and the funding allotted for it is used for other activities the legitimacy of the whole university system is at stake. It is true that the university encourages researchers to apply for external funds which is necessary and laudable. The competition is, however, tough and even good applications are often in vain. A first step should be that the university shows concern about how its own resources are being used.

Several units point out that the duty of 'outreach' (tredje uppgiften), i.e. the spreading of the results of research and the activities of the university in general to a larger non-academic public, is not regulated as far as time and money are concerned.

#### Research strategy

Due to the composite character of the UoA's research strategies tend to be absent at the UoA level and one of them puts doubts at the value of such research strategy. Research items tend to be chosen according to the scholar's personal interest or within the specialty of the supervisors. This might be true and too much steering and coordination could be detrimental to originality and individuality. Overarching research strategies fit better in science and medicine where also larger internal and external funding is involved. This notwithstanding, it can be asked if it would not be useful to have a strategy which especially takes the 'small' disciplines, like the languages (linguistics as well as literature) evaluated here into consideration. A common research strategy could (1) facilitate optimal expansion of research staff/ research themes; (2) strengthen mobility and (3) coordinate communication with the central levels at LU to promote better funding for (i) faculty and (ii) postdoc, as well as (4) secure better recognition for their work on outreach ("tredje uppgiften").

There does not seem to be any research strategy at LU relevant for most of the disciplines within the UoA's evaluated here, let alone the UoA's themselves. Particularly striking and indicative are the absence of the humanities from the University's Strategic Plan.

There seems to be an urgent need for Lund University to better integrate the humanities into its strategic plans for the future. Several of the units of evaluation that our panel has covered have made remarks such as:

- Our unit is not aligned with any of the so-called strategic research
- areas (SFO) at our university. (SOL7 p. 12)
- None of our current research aligns very well with any of the twelve strategic research areas currently identified by LU (FIL1 p. 15)

- our work does not fit into any of the existing strategic research areas (SFOs) of the university (FIL 2 p. 17)
- We do not align with any of the University's strategic research areas, as these areas mainly fall within medicine and natural science (with one exception, The Middle East in the Contemporary World). (SOL3 p. 13)

There appears to be little reflection at the department level about the directions the research in SOL should take. This is left to the individuals or at least to the separate departments which leads to a highly fragmented and vulnerable research landscape. Over time, this research tends to dwindle across the subjects, particularly in the smaller disciplines, and research will only remain in the larger departments.

There is, in fact, a lot of individual cooperation between disciplines but this does not seem to have any concrete support from SOL which is not perceived as directly supportive of research. SOL is perceived by some as little informed about what is going on in the subject units, as regards research and a wish was expressed by several representatives that SOL should be better informed about their activities. On the whole, we did not see much evidence of clear research strategies.

The Forum for Comparative Literature (*Komplitt*) seems certainly an extremely important initiative to provide an interdisciplinary perspective and to foster a dialogue between the various disciplines. Since these disciplines (here: German, French, Spanish, Romanian) are often very small, such an interdisciplinary forum seems indeed all the more justified and important. One could also envisage a *Komplingv* furthering a similar interdisciplinary perspective for the linguistic disciplines.

The impression is, however, that the boundaries between this Forum, the individual disciplines potentially concerned with Comparative Literature, and the autonomous section of *Litteraturvetenskap* (sometimes translated as: Comparative Literature) are somewhat ill-defined. The well-designed website of *Komplitt* provides indeed very sophisticated reflections on the specifically Swedish formation of *Litteraturvetenskap* and here one can see the potential conflicts and convergences with the Forum. A similar problem is predictable between a *Komplingv* and the section of general linguistics.

# **Recruitment and promotion**

One issue singled out by many is the problem of promotion and recruitment. A specific discipline cannot independently have control over resources such as faculty funding; instead such decisions have to be made at higher levels, such as the department or the faculty. But it is of course important that these decisions are made in an open and transparent way, and that the units affected by what is determined feel that they have a chance to have a say in a process leading up to strategic choices of various kinds. During the interviews we sometimes got the impression that this is not so – at least at SOL – at the moment. There seems to be a wide-spread frustration that the concrete need for promotion and recruitment on the department level is not taken into account. A general issue (not perceived as an issue by the UoA's themselves) is the low mobility, including international and national recruitments and placement of former graduate students as faculty at other universities.

# Administration

From the interviews we got the impression that many felt that Lund University, at least with regard to the humanities, regarded research to be a "luxury" or something that is done "for fun" (those where the very words used). Administrative and leadership measures were, according to the spokespersons, mainly concerned with matters related to teaching, and teaching and administration always had priority over research. As a telling example, two UoA's, totally independent of each other, said that during the last few months there had been a lot of communication from the leadership regarding how the corona virus

crisis affected teaching, but not a single word had been heard about any possible effects or problems for research. One writes: "The administration is mainly occupied with educational activities and less so with complicated research activities."

There is a general problem concerning the relations between the units/disciplines and the university authorities: SOL, faculty and central administration. Many of the comments by the representatives of the units deal with the difficulty of influencing decisions taken on higher levels. SOL seems to be a complex and not very transparent institution.

Administrative support on the department level is not optimal. This has nothing to do with personal relationships but rather with structural problems. Administrative and economic routines take too much time. The SOL – Centre for Languages and Literature – is very large, which sometimes results in slow decision making and a lack of clarity regarding who is responsible for what, this in spite of an unusually large number of administrative positions.

# Recommendations

#### **Research time**

It appears essential to organise the activities in such a way that research in terms of priorities is on par with teaching, and so that the time allotted to research is not consumed by teaching and administration. This seems to us to be one of the most important and urgent tasks for the leadership at all levels – if the ambition is to have research on a high internationally recognized level. The internal resources are self-evidently limited, and therefore it is vital that they are put to optimal use. A concrete suggestion would be to guarantee the possibility for an employee to be able to concentrate his/her research time for a longer coherent period dedicated to research only. It is recommendable that the 20% given to an assistant professor should be concentrated to a coherent period during the academic year when he/she is forbidden to do anything else in the Academy than research. Due to the expansive nature of administration and teaching assessments it could even be suggested that a univerity employee has an obligation to fulfill his research duty.

The abolishing of sabbaticals at Swedish universities is enigmatic if the aim of the university is not only teaching but research, even excellent research. Since this is a decision taken on the political level one could suggest a joint action from all academic institutions in the country to act as a pressure group. From an international perspective it is essential that this question is actualized.

The task of outreaching should be integrated into the general planning at the units with some funding set aside for such activity.

#### Administration

Researchers at the professorial rank should be better represented (by making themselves available for administrative tasks, to be sure) at the level of the SOL board.

It would seem fitting to have a closer look at what might be done about the efficiency of the administration and not the least the alarmingly high overhead costs (60 %). A general plan for making administration more effective and thus give more time to researchers would be welcome.

#### Research strategy

It seems to us important that the university formulates in an explicit way its vision of the role and function of the humanities in both the near and distant future, taking the specific structure of these disciplines into account (see introduction to Reflexions) realizing that they differ quite considerably from e.g. the natural sciences. Some concrete suggestions: The national philologies and cultural area studies have their own preferences for certain theoretical frameworks; yet, given the relative smallness of the departments, it could be feasible to offer seminars on narratology, postcolonial studies, etc., that are not exclusively directed at one philological section. The gap that exists between general disciplines and object-specific ones should be diminished.

The network of spontaneously organized joint seminars within the different disciplines could be gradually transformed into a more structured set of research groups, bottom up and with the participation of all researchers. These research groups could help secure and monitor the research time of the participating researchers. In the beginning this process will be complicated, since not everything fits automatically. With time, however, the themes of these groups will grow in substance and quality and they will act as magnets and anchors for attracting outside funding.

This could ultimately initiate a process towards a single joint PhD programme at the level of the SOL department, in which all qualified researchers participate, with separate strands in language studies, literature, and area studies. This programme could organize a set of joint courses complementary to the subject courses, develop common monitoring procedures, help with job orientation, etc.

Creating a joint PhD programme and structuring the collaborative research seminar network will in the beginning require extra investment on behalf of the faculty, but will ultimately be a source of strength and stability of the research in the SOL department.

#### **Recruitment/promotion**

It would seem urgent to have a dialogue about the ways recruitment and promotion issues are handled, and what can be done to improve the situation by giving the units a stronger voice in the process. A possibility worth considering is to have at least a small part of the faculty funding allocated according to some kind of performance and quality criteria. Common examples of such criteria are the amount of external research funding received, the number of doctoral theses completed, and bibliometric data. An enhanced emphasis on open recruitments and mobility of both junior and senior researchers (internationally as well as nationally) is strongly advised.

#### Funding

Lund University needs to seriously discuss what kind of resources are needed in order for a subject area not only to survive, but to also be competitive in an international perspective and attractive for both future PhD students and researchers.

Attention should be payed to the different structure of disciplines with general theoretical ambitions on the one hand, and those devoted to individual objects as outlined in the introduction to *Reflexions* on the other.

#### General

It must also be a task for the disciplines in question to make themselves relevant and important by formulating what they have to offer. In some of the self-evaluations there is not very much to be found in the way of clearly stated visions for the future. Considering the smallness of several disciplines a tighter and more formalized cooperation between colleagues on the national level is highly recommendable. Such a cooperation on the national or even a Nordic level could increase the pressure on the local university authorities to pay more attention to these disciplines than seems to be the case at present.

# Panel overview

The following four evaluations are the result of collegial efforts to contribute information and analysis regarding the activities, strategies, and organization of their units. The four units of the Centre for Theology and Religious Studies (CTR) are Faith and Worldview Studies, Biblical Studies, Church and Mission Studies and History of Religion. These areas reflect established collegial bodies through which decisions are taken with regard to teaching, research, and training in these subject areas. Even as the units are presented as separate clusters in this evaluation, there is significant cooperation across these boundaries.

The political and existential role of religious traditions in public life has come to the fore in recent years both nationally and globally, leading to the emergence of new educational needs and research areas. However, economic resources for religious studies and theological education have diminished. Despite these circumstances, the CTR has been able to create conditions for cutting-edge research and draws in research funding from private and public external sources. Although the growth of the department has slowed in some areas, it has seen promising developments that speak to the vitality of its sub-disciplines and their relevance to historical and contemporary issues.

A new position of Deputy Head of Department was created in 2015 in order to encourage the increase of grant funding income and encourage new cross disciplinary research. This role oversees research and outreach activities, communicates information relating to research and funding, and supports research project development.

Some features of the CTR's activities are evident across all units. These include well-developed international research networks and publication strategies with an emphasis on monographs, peer reviewed articles, book chapters and reviews. The units have seen changes in staff numbers and volume of research output. Some units emerged from previous evaluations with strong ratings (RQ08 and HTRQ14) but have seen a reduction in staff numbers during the current evaluation period due to reasons beyond their control (2015-2018). In other units, however, we have also seen the converse trend. The evaluations show that all units are vulnerable to economic and structural changes due to their relatively small size (approximately 3-4 senior lectures/professors per unit).

Going forward the CTR will continue to focus on internationalization, digitalization, outreach and strategic recruitment. These foci require improved international publishing strategies, new kinds of Faculty support for creating collaborative interdisciplinary research opportunities together with external partners, and considered investment in recruitment.

# External panel report

# **Executive Summary**

*Centrum för teologi och religionsvetenskap* is a research institution for theological and religious studies on a high international level. The evaluation reveals an increase in high quality research output, substantial societal engagement, wide knowledge dissemination, extensive external funding, educational programs based on research, good doctoral education with solid recruitment, strong international networks, highly motivated and hard-working staff, instruments for maintaining good collegial interaction, and access to a library with formidable services. Still, CTR is facing some challenges, and may be facing more in the years to come. The most serious challenges pertain to economic and structural conditions along with academic tradition pushing towards individualization and fragmentation of the CTR research environment. Related to this is a slowly waning ability to support early-career scholars. This threatens the renewal of CTR research strengths. Other challenges relate to CTR's ability to strategic action, due to a lack of unbound resources for research, and to the need to establish more strategic publication patterns. This report identifies points of action that could be considered for implementation to help prepare for these challenges and continue improving upon CTR's excellence.

# Introduction

The RQ20 process was designed to review the quality of research units at LU and, in particular, to assess *preconditions for quality* in research – as these are expressed in research procedures, strategies, resource allocation and use, and in research networks. The aim was not to rank research environments relative to each other but to provide advice for future action by leadership on all levels at LU. To conduct such a review of research in theology and religious studies, the university named the following evaluators: Professor emerita Eila Helander (University of Helsinki), Professor Jan-Olav Henriksen (MF Norwegian School of Theology, Religion and Society, Oslo & Agder University), Associate professor Ruth Illman (The Donner Institute, Åbo Akademi University), and Professor Terje Stordalen (University of Oslo & Aalborg University) as chair for the panel.

The RQ20 process was intended to peak with a series of on-site interviews with the units of assessment (UoAs). Due to the corona pandemic, this was not possible, and the interviews were converted to videoconferences, which did not provide for the rich encounter and interaction initially foreseen. The self-evaluations and bibliometric data were designed to match the original format, and both left details to be explored and clarified during the interviews. Since the redesigned process did not allow for detailed engagement, the assessment was steered more in the direction of overarching questions and underlying traditions and conditions.

This report follows the design proposed by the RQ20 leadership, adding before "observations" a section of "descriptions" (of CTR as a totality and of the individual UoAs). This is to provide the context for the "observations", in part by highlighting underlying structural elements. Our section of "observations" also specifies observed "challenges". Due to the specific constellations at CTR, a few of the RQ20 focal points could have been treated under more than one of the three major headings ("leadership", "collegial culture", or "quality ecosystem"). In order to prevent a fragmentary discussion, we located the points where they seemed to make the best sense.

# Descriptions

The factors that most fundamentally impact preconditions for quality at CTR are not accessible for manipulation within the institution: state funding of the university sector, internal university regulations for distributing state funding; students' preferences and educational trends, and policies for funding enforced by external sources. At best, CTR could hope to indirectly impact some of these bodies, precisely by documenting the quality of the institution. At the same time, CTR should retain some measure of strategic agency that might go contrary to the impact of these external conditions. All this means that *preconditions for quality in research need to be interpreted and formulated at the crossroads of partly conflicting considerations*. One should seek to develop the quality in such a way as to render CTR research legitimate to university stakeholders, attractive to students, prestigious to external funding agents, and sustainable in view of the development of the CTR organization. What we were missing in our evaluation materials was a recognition of this complexity of the concept of quality and also explicit and concretely articulated *strategies* for generating and securing preconditions for quality in research at CTR.

#### Academic Structure

CTR and the Faculty of Theology at Lund University is a unit with a long and reputable history and a strong tradition of excellence. In its current form, as reflected in the professorial program recently instituted for the joint faculties of Humanities and Theology, CTR reflects the design of traditional institutions of theological and religious studies. It has chairs in the five traditional disciplines of theology, one chair in philosophy of religion and ethics, one chair named in missiology, two chairs in the history of religions (one with a contemporary orientation), Islamic studies, and Jewish studies, and one planned chair related to the strategic area of religion and law. However, this is the ideal situation. At the time of the RQ20 interviews, there was no professor in philosophy of religion and ethics, <sup>63</sup> Islamic studies, or Jewish studies, one professor in history of religions, and the appointment in religion and law had not been established. So, at the time of review, the number of regular professors was seven (two of them in part-time positions), against 15 in 2008 and 11 in 2013. This is an alarming decline within a relatively short time span for an institution like CTR, which covers so many research subjects. The drastic changes are partly due to the policy of hiring and promotion implemented, and recently updated, by the HT faculty.<sup>64</sup>

CTR units of research are defined as disciplinary units, organized around the chairs. The units are typically small, sometimes consisting of no more than a professor and a group of doctoral fellows. The educational programs accordingly reflect conventional disciplinary discourse. Practically all disciplinary units at CTR compensate for their small size by seeking relevant networks, either internally at CTR, across environments at LU, or (most often) in the international disciplinary sphere.

#### **Research Economy**

Over the years 2014–2019, on average, a little more than half of the expenditure for research was acquired from external sources.<sup>65</sup> The success rate is remarkable. It has rendered several CTR researchers able to provide rich opportunities for research and publication, leaving the institution to be very visible in the national and international context of research.

The advantage of substantial external funding for research compensates for the fact that university funding for the research of the permanent personnel is relatively weak. Professors nominally have 50 percent of their time allocated for research, while readers are supposed to research 20 or 25 percent of their time. However, the interviews conveyed what the HT leadership confirmed in an initial meeting with the panel chairs: Teaching at LU is often under-financed so that many teachers have to spend research time for teaching purposes. In addition, "research" at CTR is defined very widely so that e.g. the supervision of doctoral projects is included – even though it is an accentuated politic for the recruitment of doctoral fellows that they are allowed to pursue any topic within the field of the discipline, i.e. not necessarily tied to the research area of the professor. Several colleagues explicitly said that they did not have much time for research unless they acquired external funding. Within the context of traditional research universities, to which LU belongs, this is a remarkable, almost unique, situation. Interviews and self-evaluations indicated that heavy administrative assignments, along with a myriad of small issues and daily business, interrupt the chances for maintaining contiguous time for research. Indications provided by the CTR leadership might suggest that this situation could be leading to early stress symptoms for some of the staff.

<sup>63</sup> That is: the chair is formally vacant. However, Svenungsson is appointed to a chair in systematic theology, with competence in philosophy of religion.

<sup>64</sup> As the HT professor program was recently passed, CTR now plans to announce two professor positions before the summer 2020, in Islamic Studies and in History of Religions with a specialisation in Contemporary Religion

<sup>65</sup> We rely on figures provided by the CTR leadership. The figures are not referring to the total economy of the institution, only the part going to fund research activities.

Research economy at CTR is in reality (but not in terms of the budget) connected to the funding of the educational program (see more below). Over the last years CTR has produced less student ECTS than is stipulated as the basis for the financing of education. If this situation persists, it could result in decreased university funding. The development in student numbers not only reflects general university trends. It also relates to the Swedish policy for higher education, which in the field of theology and religion has resulted in a large number of small academic environments offering competing education. This undermines the need for a critical mass of students at any one of the institutions.

### **Individual Units of Assessment**

#### CTR 1

This unit consists of a group of comparatively young scholars, all engaged in research and teaching with contemporary focus and working on topics that have relevance and actuality in the broader context of Swedish society. At the time of the interview, the faculty in this unit consisted of one professor and three readers. In addition, 11 doctoral students belong to the research environment. The interview with the staff underscored the content of their self-evaluation report: The scholars in CTR 1 understand themselves as a unit and not only as individual scholars who happen to work together. They pointed to the collegial atmosphere as the one most positive condition for their research. They appear as a community fully dedicated to a common task. Although the bibliometrics does not indicate much common work but points mostly to individual contributions, no scholarly individualism can be detected in the unit's self-presentation. Because contemporary scholarship increasingly needs to be anchored in communities rather than excellent individuals, this is a good sign, and suggests that the research environment works well.

The unit covers a broad range of topics, among which several are interdisciplinary. They seem to employ and make good use of the chances that their disciplines have for interacting with other subjects in the university, as well as with external agencies and audiences.

Systematic theology traditionally comprises three sub-disciplines: dogmatics, ethics, and philosophy of religion. In their actual research profiles, the present staff covers the latter two very well. They admit, however, that the weakest part is dogmatics. Although this subject is covered in teaching, none of the present faculty orient their research towards topics traditionally covered in that discipline. The unit nevertheless notes that they want to maintain the close ties between research and teaching.

Some concern was expressed concerning the lack of recognition of the discipline's actual research contribution: Similar to other universities in Europe, presently there is more interest in funding research in historical disciplines and the social sciences that in normative and systematic approaches. Hence, to break through with insights and knowledge based on systematic and philosophical reflection was experienced as a challenging task. Despite this experience, the unit seems to take on their responsibilities towards the larger society very seriously.

CTR 1 has considerable co-operation with other research institutions, both nationally and in an international context, as well as across disciplines in LU (e.g., philosophy, Jewish studies). The staff also contributes regularly to international seminars and conferences. Clear strategic considerations about how to further develop international research co-operation are present in the self-assessment.

The staff reported that administrative work, and all "smaller" tasks, contribute to fragment the time for research. However, no one in this unit did complain about the time needed for teaching as a problem for research.

As for teaching and supervision, they pointed to the difference between time allocated for supervision for professors and lecturers: whereas professors with less than three PhD candidates have no specified

hours allocated for the supervision of doctoral students,<sup>66</sup> readers have. It is not fully transparent how this difference affects the time for (collaborative) research. Still, it is clear that for the staff as a whole, time for research seems to be one main factor when it comes to the potential for improvement of research conditions. The panel nevertheless wants to remark that despite what is said about limited time for research, the actual research output in terms of publications is very impressive – both quantitatively and qualitatively.

With regard to support from the administration and faculty leadership, the unit is content with and expresses gratitude for what they experience. Such support is present and well received.

As for the organization of regular meeting points and arrangements, two specific entities are relevant: (1) the weekly research seminar, which comprises scholars, doctoral students, and MA students. Here, papers are presented and discussed by all participants, including everyone from junior scholars to senior scholars. The PhD candidates seem very pleased with how this seminar works. (2) The other organizational structure important for exchange is the national research schools in the three sub-disciplines of systematic theology, which meet for one day every term, and which consist of paper discussion and lectures, and in which participants from all relevant institutions in Sweden meet to provide a critical mass for exchange of scholarship.

CTR 1 appears as a robust unit for research. The cooperative mode of interaction suggests that the competencies presented are shared and do not rely only upon the individual scholar. Hence, their research ecology seems sound and promising for future, high-level scholarship, given that the external conditions are favourable.

#### CTR 2

CTR 2 includes the disciplines of History of Religions, Jewish Studies and Islamic studies. These fields are approached in past and present perspectives, using various methods and ethnographically focusing on a wide variety of geographical locations, cultures, languages and traditions. CTR 2 has a strong international status and reputation and has attracted significant amounts of research funding from competitive national and international research financers over the years. The number of relevant, active and productive international networks is also remarkable. Diversity is held in high regard and both junior and senior researchers are free to pursue their research interests individually. During the panel interview, independence and the opportunity to teach and research within one's own area of expertise were brought up as the most satisfactory aspects of the work.

The balance between research activities, education, and external engagement was regarded as somewhat challenging. As stated in the interview, "teaching always takes precedence", eating away resources from allocated research work. The fact that supervision of doctoral students counts as research was also seen as a complicating factor. Even if concerns for circumscribed research time was expressed, the unit is productive, with 163 reported publications, ranging from opinion papers in local newspapers to peer-reviewed articles in top-quality journals and books at leading international publishers. However, the share of open access publications is hard to establish, and strategic efforts may need recalibration to meet the strategic goals of the faculty and secure external funding in the future. The researchers at CTR 2 report to have experienced that "the sky is the limit" for individual research funding. Large-scale, institutionally anchored research applications, on the other hand, seem less strategically driven and attractive in an academic culture that appears as rather individualistic.

Regarding recruitment of personnel, high hopes were expressed for the future professors' programme, which will strengthen the pool of professors in the unit, the academic quality of the disciplines, and the

<sup>66</sup> We are informed that the supervision of externally financed PhD candidates is always compensated.

possibilities to admit doctoral students. This would put an end to the many temporary arrangements in teaching and research caused by retirements and long leaves of absence: "the future looks bright", as stated in the interview. The collegial culture in the unit seems excellent despite this instability. Early-career researchers express great satisfaction at the support they receive from senior colleagues both in form of supervision, in active and meaningful research seminars with broad attendance by colleagues from other disciplines in Lund, and from national and international networks, in international contacts and opportunities for travelling.

The report mentions twelve paid and three unpaid doctoral students at the unit. However, not a single doctoral student was admitted to the unit in the last three years due to current faculty level regulations. Also, only three doctoral dissertations were defended between 2014–2018. As confirmed above, however, the researchers are confident that this lack of rejuvenation and threat to future excellence will be amended by the new professors' programme and the subsequent heightened research status of the disciplines.

The educational programmes offered at CTR 2 are unique and give the unit a strong competitive position in the national educational landscape. However, the number of students is decreasing and the concern that too many competing programmes are offered in Sweden today was aired. Yet the CTR programmes have clear profiles, offering world-recognised expertise in relevant fields, supported by international and transdisciplinary networks including travelling opportunities and strong avenues for societal impact and engagement. Thus, the research strengths of the unit are remarkably well reflected in the educational portfolio.

The results show that the researchers are highly qualified, productive and internationally well connected, but the situation is not ideal in terms of creative incentives and conditions for qualitative research on the highest international level, since the structure is vulnerable to changes and dependent on individual efforts rather than institutional structure and conscious strategy. That said, the unit works diligently to stretch its resources. Especially within Jewish Studies, the situation has improved with the help of both internal and external funding, facilitating the employment of additional staff. In Islamic studies the situation is somewhat troublesome, since much teaching next fall will have to be outsourced to temporary lecturers "due to unfilled vacancies, parental leave, and secondment to administrative duties among others."<sup>67</sup> This may endanger the quality of teaching, supervision, research and publishing.

Previous assessments (RQ08 and RQ14) show that the disciplines in CTR 2 hold strong potential. This claim is undoubtedly still valid. However, the quality ecosystem is vulnerable as it seems to be upheld by the professional and diligent work of the few, but dedicated, persons employed at the unit rather than by structural factors to create and maintain academic quality on an institutional level.

# CTR 3

CTR 3 consists of biblical scholars in the two disciplines of Old Testament and New Testament studies. During the period 2014–2020, this UoA featured one professor and one or two senior lecturers in each discipline (the numbers have fluctuated: at the time of the interview, only one senior lecturer in NTS). All current lecturers received their PhDs from Lund, so this UoA has been able to provide opportunities for early-career scholars. This has partly been due to good success in acquiring external funding. There is currently no post doc position connected to either of the two disciplines.

Both disciplines perceived of their small size as a challenge, and both have worked successfully to provide a larger research environment. Both disciplines have a group of emeriti and there is a number of researchers connected as part-time teachers, docents, etc. People from these categories take part in the respective weekly research seminars, and members of the two disciplines also appear in each other's semi-

67 We are informed that new permanent colleagues covering this field will take office in January 2021.

nars. Both disciplines have extensive networks geared towards exposing doctoral fellows for international research. The interviews indicated that these networks serve well and that the overall experience of collegiality is very good. The two professors explicitly point to their responsibilities for providing intellectual and academic support for PhDs and the research environment. Over the years 2014–18 three doctoral theses were completed in this UoA, and the web page lists eight doctoral students, some of which were for various reasons not active at the time of the interview.

The permanent staff has in the period since 2014 carried a heavy burden of administrative assignments in addition to teaching obligations, supervision, and other institutional responsibilities. The time for actual research within the ordinary position is insufficient. And yet, the record of publication is impressive. The bibliometric data indicate a steady stream of publications in national and international peer-reviewed and non-peer reviewed channels, and also a rich engagement in newspapers and other popular media.

The overarching research strategy seems to be individual freedom – for professors, lecturers, and doctoral fellows alike. Research is said to follow the themes and needs of the educational program – which is organized according to a disciplinary rationale. Somewhat paradoxically, also to themselves, the researchers, especially in one of the two disciplines, maintain that their mutual diversity renders them able to involve constructively in each other's research. We interpret this to indicate that "research strengths" is in this group perceived to be a sort of disciplinary generalist competence. These strengths are clearly reflected in the educational portfolio. Judging from the reports on collegiality and mutual involvement such strengths have been successfully renewed over the years.

The report from this UoA argues that the general interest for biblical texts and their reception in society is a strength for their research quality. At the same time, it identifies the declining number of students in the educational program, and also a too low number of doctoral students, as a major threat. We did not hear any explicit strategy to address these perceived challenges or to relate them to the perceived research strengths.

The overall impression of the UoA is that of two well-functioning research ecologies that have been able to provide research quality on a high level. At the same time, both seem to become increasingly challenged by economic and other structural factors.

# CTR 4

CTR 4 consists of Global Christianity and Interreligious Relations (GCIR), Practical Theology (PT) and Church History with Patristics (CHP). During the period 2014–2018 the number of personnel has fluctuated. After Theology of Religion was included in GCIR there have been four professors, a postdoc for two years and one part-time (20 percent) tenured lecturer. Currently two professors are partly retired and there are no postdocs or readers.<sup>68</sup>

External funding has been high on the unit's priority list. The unit has been successful in obtaining external financing for several research projects, which has enabled the temporary employment of several researchers. The cut down of tenured staff and the dependence of young researchers on external funding make long term planning unstable both in research and teaching. Furthermore, even though the unit has prioritized and succeeded in its doctoral training (2014–2018: 11 dissertations), its future is in jeopardy due to present limited recruitment possibilities of doctoral candidates. International doctoral recruitment provides a brighter perspective, and implementing *Cotutelle*-agreements would increase the critical mass.

The disciplines do not form a coherent research unit. The overall CTR research strategy is recognized. Research strategies vary within the disciplines, and individual freedom seems to be a dominant feature. Early-career researchers are free to pursue their own scholarly interests, but they often relate their work to

<sup>68</sup> The CTR leadership reports that Gudmundsson serves as a reader in Church history but formally holds a position as lecturer in didactics of religion. Westergren has applied to be appointed reader, but the application is not yet granted.

fields of research where the unit is strong, which strengthens and develops the unit's expertise. For example, in Early Modern Church History joint work of senior and junior researchers has led to the opening of new fields of expertise.

The unit has actively enhanced its research quality by establishing academic networks and research collaborations outside the unit. The cross-disciplinary research seminars within the CTR and the unit's active co-operation in research and doctoral training with other Nordic universities and increasingly with universities in and outside Europe have increased the critical mass. For example, Lund has become an important hub for post-doc and PhD research in the study of World Christianity and interreligious relations. Moreover, CHP has established, together with other departments and faculties at LU, a Faculty-supported digital library and research tool *Monastica* for international scholarly collaboration. In some cases, co-operation across disciplinary and faculty lines within LU seems to have been more on an individual level and in teaching than in establishing larger research clusters. Active research collaboration is primarily with scholars from other universities. Members' active co-operation with prestigious international academic societies, international world organizations, institutes and academic journals and research networks, and several leadership positions in them have undoubtedly enhanced the unit's research quality.

Administration and teaching duties, as well as responding to society's high demand of the unit's expertise, cut down research time. This point notwithstanding, the unit has published extensively in peer-reviewed fora and communicated research results to a broader audience (over 330 publications).

The unit's research strengths are the high expertise of individual scholars and obtaining external funding, successful doctoral training, active international co-operation, and publishing. Teaching is research-based, and disciplines share responsibilities in teaching. Research ethics is followed. It can be concluded that the unit has strong, internationally acknowledged research areas, but their future is in jeopardy. It is necessary to build up the critical mass through various means (e.g. increasing the number of large thematic cross-disciplinary research clusters), which will contribute to the sustainability and renewal of thus far robust research areas.

# Observations

# Challenges

The introductory section of the RQ14, dealing with the joint faculties of Humanities and Theology, summarized the identified problems in this way: 'No time for research', 'The smallness of subjects', 'Problems with external funding', 'Too few doctoral students', 'Too many Lundians', 'Collaboration: missed opportunities', and 'Organizational issues' (p. 34f). The two primary strategic replies to these descriptions developed by the JFHT at the time are listed as improved infrastructures and the formation of areas of excellence. There are obvious points of continuity between these descriptions and what follows below, pointing to the fact that several of the challenges that CTR has to face are due to structural factors beyond the immediate reach of institutional strategies. And yet, we have tried to identify areas of agency within the given situation.

# Leadership

# Strategies and Priorities for Research

**Observations:** The HT faculties have a strategic plan for 2019–2024. Formulating overarching goals and strategies, the plan is fairly general, and it does not identify specific challenges and specific solutions. Major attention is given to developing a good working environment and localities, and also to the development of doctoral education. The plan gives priority i.a. to increased publishing activity, cross-disciplinary

research, internationalization, and societal contact. It sets a goal to increase public understanding for the societal importance of humanist and theological learning – apparently primarily by communicating what is already going on in the HT environment.

The CTR document *Prioriteringar för perioden 2017–2023* formulates the current strategies locally at CTR, meant to reflect the overarching HT strategy. Our assessment of this document and of the status of strategy work at CTR demonstrates how complex it is to promote quality in research. The document explicit addresses some of the relevant challenges, but we also note that significant topics are not addressed at all in it. For a start, the document does not address the question of how to deal with a situation where a professor chair is left vacant for an extended period of time. The document also does not address the questions were left out because they were not considered to be in the area of competence for the Faculty Board, <sup>69</sup> or because these issues were not pressing at the time (spring 2017<sup>70</sup>). The question of available time for research for permanent faculty also is not addressed in the document, even though it is noted in the HT faculty strategy. This recommendation is strongly present in the 2014 review, where it is considered to be the most critical factor for research quality at CTR, LU, and Sweden in general. When considering preconditions for quality in CTR research today, these questions need to be explicitly addressed.

Returning to what *is* addressed in the document, it departs from the primary vision of LU: to understand, interpret, and improve the world. As means to obtain that, the institution wants to give priority to certain academic "focus areas" as well as to internationalization (in education, research and institutional co-operation), digitalization (apparently primarily in education and dissemination of research), and co-operation (making CTR competence available to society, also on a local and regional level). These strategies correspond to contemporary best practices in universities internationally.

The strategic plan lists several points of action for implementing these priorities. Many of these are quite specific, and therefore relatively easy to measure and control. Among them are the recruitment for and organization of doctoral education, development of research seminar culture, and increased international publication. As seen in the above descriptions, the institution is successfully pursuing these goals. The same goes for several goals formulated more generally in the HT plan, such as increased publication volume, substantial international co-operation, and the establishment of a good working environment.

**Challenges:** Several CTR professor chairs have been left vacated for longer time. Strategies should be developed in order to deal efficiently with the detrimental effects of such vacancies.

The threat of falling student numbers needs to be explicitly addressed, and in a more dynamic way. CTR should strive to identify student needs and interests and develop attractive educational programs. In relation to external competition, CTR should capitalize on its truly unique factor: it is located at a fullblown university. Furthermore, CTR, HT and LU should remind Swedish policymakers about the effect of the current policies: the fragmentation of a sector of knowledge that is going to remain important to societal discourse for many decades to come.

Another issue that needs to be addressed is the lack of time for research for permanent staff when they are not engaged in externally funded projects – an issue that is also addressed more generally in the HT strategy. This means that the overwhelming part of research at CTR is set in the context of specific projects, which leaves little capacity for research that is planned and defined as part of the *institutional* agenda (see more below). Allocating the resources in this way, CTR provides itself with minimal resources for active planning of institutional change.

<sup>69</sup> We are informed that the issue of student recruitment is constantly discussed on leadership level and in conversation with the faculty leadership.

<sup>70 2017</sup> was prior to the drastic increase in professor vacancies.

It has been instructive to observe both how the document is conceived (what is discussed and what is not) and how it is received in the collegium. A first challenge pertains to the aim of increasing the number of applications for external funding. One small issue is that there is no specific goal for obtaining such funding. More importantly, the strategy offers no reflection on how external funding contributes to the academic development of CTR. External sources for funding have their own policies and requirements. The type of grant conventionally pursued at CTR often does not allow for the funding of PhD fellows or early-career scholars. External funding obtained by CTR researchers pushes toward organizing research around individual professors' competence and preferences. Since CTR research is so heavily dependent upon external funding, these policies take part in forming the institution. In the long run, this could impoverish the recruitment of doctoral fellows and the ability to provide predictable conditions for early-career scholars.

Furthermore, we noticed that even the university's funding scheme seems to contribute towards the individualization of research. When the set target for performance is not met, the cut down of the unit's finances can be supplemented through external funding: the unit receives 24 ore for each externally earned krone as additional support. No difference is made between individual small-scale funding and funding for large projects covering several researchers. Due to the heavy dependence on external finances, there is a risk that applications may be increasingly directed to small scale and less competitive funding agencies. Research will easily become sporadic and individual-oriented since the limited and short-term funding does not make it possible to establish large-scale research projects. In the long run the system does not support the building up of strong research milieus. Increasing the amount of the additional support for money received from highly competitive financiers (e.g. Vetenskapsrådet, Riksdagens jubileumsfond, NordForsk and ERC) may direct research towards large scale cross disciplinary and international research project and thus increase the level of ambition and the quality of research.

The self-evaluations and interviews indicate that parts of the institutional strategy are unknown in the collegium; the strategy document is mentioned in one of the four self-evaluations. Certain action points are not applied or implemented, although it might have been natural in the context of actual research. A few action points in the strategy may be contested by some members of faculty, in particular the aim to develop cross-disciplinary and cross-institutional research and to enhance electronic publishing and open science. Some (certainly not all) colleagues seem to regard cross-disciplinary research as being of a lower quality, and some conceive of an orientation towards current societal needs as potentially destructive to disciplinary research. The fact that research strategies are contested, or unknown, suggests that the institution needs to develop a more explicit discourse on strategy and to find ways to anchor essential points in the strategy among the faculty members.

The challenge for developing cross-disciplinary work is, however, not limited to the question of organizational anchorage. Developing cross-disciplinary and cross-institutional research requires long time processes, the building up of large networks, and the slow alignment of different disciplinary discourses. It costs time and money and usually has to be done as part of large projects. However, the pattern of external funding works in a different direction, and there is already a lack of research time free from project ties. Hence it would presumably be challenging to fund the development of cross-disciplinary research, but the strategic plan does not formulate any view on how a reorientation would be funded.

While the self-evaluations are mostly lacking in strategic reflection, the interviews conveyed that there are *de facto* strategies at work for formulating research projects and applying for funding. The success rate would indicate that this competence is good, but it is often not *explicit*. Perhaps the fact that research projects are conceived and organized on an individual level, often by talented professors working alone, may explain this situation. CTR would be well served by sharpening its strategic plan, explicating differ-
ent strategies for forming and funding different kinds of research projects, and initiating a conversation among the faculty to ensure common influence upon and ownership of the established strategies.

#### **Publication Patterns**

**Observations:** The output of research from all four UoAs at CTR is formidable. Admittedly, the bibliometric data provided was not always easy to interpret. Still, it is clear that the volume of publications in international languages has grown since 2014 – which corresponds to the advice offered in that evaluation. Two thirds of all journal articles are in peer reviewed channels. The number of doctoral theses written in English has increased with 15 percent. Around 60 percent of the total number of titles are in Swedish, mostly those oriented towards knowledge dissemination and the public audience. CTR researchers, both junior and senior, are highly productive, contributing to academic publications of the highest level as well as to the general discussion in society.

**Challenges:** There seem to be challenges related to the question of open access publication. The EU publishing initiative Plan S is advancing rapidly and will be implemented from 2021: https://www.coalition-s. org. The requirement to make research openly accessible will soon affect also Swedish funding agents. Lund University Library has been one of the pioneers in assessing the quality of OA publications ever since it launched the influential *Directory of Open Access Journals* (DOAJ) in 2003: https://doaj.org/about.

The bibliometric data did not specify the category of OA. However, the modest number of bibliometric entries equipped with DOI-identifiers – increasingly regarded as the primary indicator of high-quality journals in general and OA journals in particular – may indicate that the volume of OA publications at CTR is modest. This impression was confirmed during the interviews, as it became apparent that some colleagues explicitly choose to disregard the open access alternative for publishing, and only a few were able to identify quality OA channels in their field of research.

Obviously, qualitative options for OA publishing are not yet readily available in all fields represented at CTR. Quality and academic influence cannot be compromised in the interest of enhancing open science. But the apparent ignorance concerning available avenues for OA, along with the misidentification of OA with predatory grey-zone hybrid journals charging authors, calls for formulating clear institutional strategies at this point and for anchoring these among the researchers of CTR.

Another challenge for CTR publication practices relates to the fact that many in the permanent staff have insufficient time available for research, as seen above. The combination of high output and lack of time has two potentially detrimental effects. One relates to the development of quality over time. One might interpret some of the interview information, and possibly the bibliometric data, to the effect that researchers feel pressured towards collecting what is called "low hanging fruits", i.e. that some of the publications do not reflect as intense and profound research as one could have hoped for. This is not to imply that the research is bad; CTR staff publishes in the best international channels. But it seems possible that the publications could have been even better, had there been more time available. Another effect of keeping pressure on publishing activity for over-worked colleagues is that it may, in the long run, have negative effects on the work environment.

#### Policies for Promoting Excellence

Possibilities for promotion to professorship are now heavily regulated at the HT faculties. We have not been informed about other mechanisms for promoting excellence, like extra research time or additional funding.<sup>71</sup> We think the acknowledgement of excellent performance is a strong incentive for inspiring colleagues to aspire in their field and contribute to the well-being of the working environment.

<sup>71</sup> We are informed that excellence is meant to be reflected in individual salaries.

#### **Collegial Culture**

First of all, several of the UoAs are explicitly enthusiastic about the collegial culture at CTR. One seems to have found a balance between individual freedom, diverse research interests, and the ability to interact and to support each other's research. All the young scholars that we met were happy about their opportunities to develop originality and independence.

#### **Doctoral Education**

**Observations:** The competition for a funded doctoral position at CTR is hard. The institution receives 4–5 positions each year, and the hired candidates are evaluated by the quality of their merits – nominally without any consideration of where recruitment is needed, or which unit may have a need to increase its critical mass. Swedish regulations, but even more so the collegial structure of CTR make it difficult, if not impossible, to locate doctoral positions strategically in specific areas/disciplines. CTR does not have much external funding for larger projects that include doctoral students. This further prevents the strategic recruitment of doctoral fellows.

Once a fellow has been appointed, she or he is introduced to the subject and the resources available. There are well-established structures for such an introduction. The doctoral fellows have sufficient access to funding for travel and conferences, and all fellows that we met seem very content with supervision and co-operation with senior scholars and other research environments. The supervisors, on their part, seem to take the responsibility of exposing the young scholars to international research contexts and networks very seriously.

CTRs new location at LUX has provided opportunities for doctoral students to meet more regularly also across disciplines – internally at CTR and even across HT. This re-location contributes to a sense of belonging and community, which is of importance when there are so few doctoral students within each discipline. This may contribute to an inducive environment for cross-disciplinary study. Several of the younger scholars we met had explicit cross-disciplinary interests and projects, which is promising for the future research development.

In general, doctoral students, as well as permanent faculty, seem satisfied with the weekly research seminars organized within the different doctoral educational units. This is the most regular meeting-point for doctoral students. We could also observe that there was overall satisfaction with supervision, and the doctoral students seem to be well integrated into the community. They are systematically exposed to international networks, seminars, and conferences. Other, more or less regular meeting places for doctoral students are the national research schools, which meet for a day every term. These provide the chances for doctoral students to get a sense of belonging to, and become exposed to, a broader research environment in their discipline than the one they experience at CTR.

Given the relatively few positions at CTR, and in particular project positions for researchers in the second phase of their career (cf. above), the chances for pursuing a further career at CTR seem somewhat restricted for most doctoral students.

**Challenges:** Overall, the conditions for doctoral students' research at CTR seem very favourable. The only severe challenges we see, apart from the fact that pursuing a doctoral project in itself entails several challenges, is the relative dearth of career options after having completed the PhD. If this remains over time, it might hurt the attractiveness of CTR as a place for doctoral education. One other potential challenge relates to the fact that CTR disciplinary research environments are small, and therefore vulnerable. If for some reason, a supervisor is unable to provide supervision, the PhD project might be in trouble.

#### **Renewal of Research Strengths**

**Observations:** The staffing situation at CTR is vulnerable. All UoAs have few permanent university-financed tenured positions. When a chair is vacant for a long time, doctoral training in that discipline is jeopardized. Not all disciplines have a full-time associate professor. CTR features several internationally recognized strong research areas built on the excellence of individual scholars. In the past, that format seems to have worked well: The current collegium represents the "production" of CTR over the last decades. There has been a transfer and renewal of research strengths in several disciplines, as exemplified in Islamic studies, patristics, church history, philosophy or religion, or the biblical disciplines. CTR features the academic culture and the individual competencies to renew its research strengths. However, as the strategic impact of external funding increases and the state funding for strategic research decreases, this seems to be changing. In the current situation, early career scholars often seem to depend on competitive external funding, which makes long term planning unstable. In the long run, this could have serious implications for CTR. There has, in fact, been declining numbers of early career scholars over the last years, due to the lack of large externally funded projects.

In order to obtain a more vibrant research environment, the CTR strategy formulates the goal to develop "focus areas", but so far this has not really materialized.<sup>72</sup> Many disciplines at CTR have established contacts across disciplinary and faculty lines, both within LU and with universities inside and outside Sweden. In some cases, this has resulted in joint research endeavours, mostly on a small scale. Another strategy has been to pool resources, especially in doctoral training, for example by arranging joint research seminars and utilizing video-based seminars. Also, Nordic research seminars have served this purpose, and they have all worked well for the doctoral fellows.

**Challenges:** Since CTR research projects usually concentrate around an individual professor (and PhD fellows), there is little building of institutional competence and academic capital. When the professor (and the PhD fellow) leaves, the academic capital produced in the project is easily lost for the institution. In this setting, early career scholars are likely to become particularly vulnerable, not finding many options to pursue a career after having completed a PhD. This calls for a strategy that aims at anchoring competence more in the research communities and not only in the excellence of individual professors.

In the contemporary university world, the continuity of a robust research environment demands critical mass. To start generating such mass CTR scholars could pursue research co-operation across discipline and faculty lines; create large, thematically oriented, research projects (international, domestic); increase the number of doctoral students using *Cotutelle* agreements. However, CTRs academic structure, paired with the great success in acquiring funding, steers research towards small, disciplinary defined projects. This is the format that many CTR researchers practice, and they have been successful in terms of intellectual production, academic build-up, and economic outcome. It would potentially be costly for the institution to give up this format of research because it is so economically important. So, while it may be essential for CTR to find ways to start forming a critical mass of research and researchers, this is a task that meets serious counter forces. We believe the slow implementation of the CTR strategy on "focus areas" is related to this complex.

<sup>72</sup> We are informed that the CTR leadership sees the contours of two such focus areas in the making: a) Antiquity, Judaism, and New Testament Studies, and b) Christianity, Nationalism, and Populism. None of these are, however, thematized in the self-evaluations.

#### **Quality Ecosystem**

#### Tradition and Renewal

**Observations:** As reflected above, CTR relies on traditional disciplinary discourse for its quality, apparently often perceived as a generalist disciplinary competence. This format has been practiced over a long time, and there is functional coherence between activities in research, education, and external engagement in this regard.

**Challenges:** We do not see many challenges in the current practice. However, if CTR will reconfigure parts of its research in the direction of cross-disciplinary or disciplinary cutting-edge scholarship, discrepancies may evolve. It might become necessary to identify additional areas both for education and for societal engagement. In particular, knowledge exchange across disciplinary borders within the university might be a promising prospect.

#### Infrastructure

**Observations:** CTR has made productive use of its new location in LUX. Especially the younger staff has been able to profit from improved possibilities for engagement across conventional academic borders, both within CTR and across HT.

**Challenges:** It appears from the interviews that not all colleagues are aware of the very competent services provided by Lund University Library regarding OA publishing.

#### Integrity. Ethics. Diversity

**Observations:** CTR research in its current form validates integrity as a major factor of quality in research, especially in relation to maintaining freedom in research and to honour disciplinary standards.

Research ethics pose a special challenge when studying religious experiences and religious life, especially in cross cultural situations. Sensitivities in legal and personal matters have been recognized and when needed, projects have sought approval from the Swedish Ethical Council.

The strong abilities of CTR in the past to renew its research strengths has generated the current situation where the overwhelming majority of the permanent staff received (part of) their doctoral education in Lund, and only one professor is not of Swedish origin.

In terms of gender balance, CTR is slowly developing towards more gender equality.<sup>73</sup> In terms of fulltime equivalents, there is still a male dominance on professor level. The gender balance among lectors has been more shifting, with a slight male dominance. On post doc. level the balance is also shifting, but on average it has been fairly equal. On the level of doctoral students, the balance shifted in favour of women since 2016, and in CTR as in most comparable institutions, there is a stable recruitment of slightly more female than male students.

**Challenges:** The sense of integrity seems, in some instances, to be so firm, it may constitute a challenge for being able to recognize the existence and practicing of alternative concepts of integrity and intellectual standards.

The relative homogeneity in background of the permanent staff might be considered an ethical challenge in itself. If, indeed, CTR would for the future not be able to offer good opportunities for early career scholars, one additional challenge would emerge as the university would rapidly go from one end of the scale (fairly homogeneous faculty) to the other (most faculty educated abroad).

CTR needs to continue the process towards gender balance and increased ethnic and national diversity.

<sup>73</sup> We rely here on historical statistics carefully prepared by the CTR leadership for the years 2014–2020.

## Recommendations

### Leadership

Colleagues at CTR express great hopes that the implementation of the new professor program should solve many of the challenges CTR has been facing recently. However, the distribution of chairs will be subject to continuous evaluation by the faculty, and the implementation of the new chairs also depends on the economic abilities of CTR itself. And in any event, the recruitment of new professors would not alone solve all challenges related above. Hence, we recommend that the following points be considered.

- Earlier evaluations comment on the strong individual (individualistic) orientation for planning, organizing, and funding research at CTR. It is time for the institution to address the effects of this format, and to complement it with more collective-based strategies [cf. RQ08].
- CTR should develop a *more explicit strategic discourse* on different forms of research funding and their impact on the development of CTR. This strategy should address different kinds of projects: small and individual projects, medium-large disciplinary oriented projects, large cross-disciplinary projects [cf. RQ08 and RQ14]. It should consider the entire research ecology: the need for knowledge within the disciplines and society, the research context necessary to produce knowledge, the options to find funding, etc. Such strategic discourse would need to be anchored throughout the institution.
- CTR's success in attracting external funds comes with the risk of being subjected to external policies that are harmful to, or impede the strategic development of, CTR [cf. RQ08, RQ14]. To maintain a space for strategic action, CTR should plan for making university resources available for institutionally planned research.
- There should be a continued focus on increasing the number of doctoral students [cf. RQ14]. In particular CTR should seek modes of operation that would allow for locating doctoral positions for targeted recruitment in vulnerable subjects/disciplines.
- It is of vital important that CTR develops *Cotutelle* agreements with other universities in order to enhance critical mass and to promote inter-institutional co-operation.
- CTR should document the time for research actually available for employees and develop best practices for securing contiguous time for research [cf. RQ14]. Different mechanisms could be considered, such as sabbaticals, condensing teaching assignments, reduce teaching load [Cf. RQ08 and RQ14].
- There should be explicit institutional strategies responding to serious challenges, such as long-time vacancies [cf. RQ14] or failing student recruitment.
- CTR should formulate clear strategies and best practice policies for OA publication and open science practices.

## **Collegial Culture**

- In order to build institutional competence and intellectual capital in addition to that of the individual scholars, CTR needs to develop focus areas with a higher critical mass, for instance, by pooling research resources and environments internally at CTR / LU and connecting these to international networks [Cf. RQ08 and RQ14].
- CTR needs to develop organizational and economic measures to help researchers connect and cooperate across disciplinary units.
- CTR should intensify the work to provide career options for young researchers after the completion of the PhD education [Cf. RQ8 and RQ14].

## **Quality Ecosystem**

- Several doctoral fellows concentrate on topics with contemporary relevance and are developing contacts and networks accordingly. CTR should employ its body of talented and innovative doctoral fellows as a resource for building cross-disciplinary and cross-institutional research, and to attract public attention, and hopefully more students, to CTR.
- CTR should develop course descriptions for basic education, summer education, and other public engagements that make visible the contemporary relevance for the subjects offered.
- In terms of its strong national competition, research (and education) at CTR should make the most out of its location within the broader context of the university.

Medio June 2020 Eila Helander, Jan-Olav Henriksen, Ruth Illman and Terje Stordalen



# 11. School of Economics and Management (E)

# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 2	TOTAL NO UoAs: 6
SUBJECT PANEL NAME	UoA NAME
Business Administration, Business Law and Informatics	Business Administration
	Informatics
	Business Law
Economic History, Economics and Statistics	Economics
	Economic History
	Statistics

# Foreword by the faculty leadership

The Lund University School of Economics and Management was assigned two panels for the RQ20 project. The basic structure of the panels was suggested quite early by the disciplinary composition of the School. One panel centered around the broad and somewhat unwieldy area of business, including the business administration department with a number of sub-areas, including marketing, organization and entrepreneurship, and business law and information systems with distinctively different disciplinary roots but an applied orientation towards business. The other panel centered around economics and quantitative social science, with the departments of economics, economic history and statistics covering different parts and angles of this ground.

In forming Units of Assessment, the disciplinary basis and the disciplinary distinctiveness of the departments was the over-arching principle. Such considerations led immediately to a department-wise formation of UoA's except for the largest department, business administration, and the smallest one, statistics. In final considerations, the fact that research matters in terms such as PhD program, funding etc, to a large extent are managed at the department level in business administration led us to define the department as a single UoA. In the case of statistics, it was deemed desirable to obtain advice on how to best develop the subject matter of statistics in relation to other bridgeheads of statistical/quantitative research at the School and throughout the University.

## External panel reports

## Business Administration, Business Law and Informatics

## Panel Overview

This panel consists of one large unit of assessment, Business Administration, and two relatively small ones, Business Law, and, Informatics.

At the faculty level, the School of Economics and Management recognizes the power inherent in the pursuit of bottom-up initiatives by individual researchers, whose curiosity and dedication are fundamental to knowledge creation. The organization of research is therefore fundamentally decentralized. The School does, nevertheless, pursue strategic initiatives to initiate and support research activities, primarily by means of ear-marked co-funding of external grants and support of recruitment efforts.

The School, moreover, supports research and collaborative activities in partnerships with the corporate world and the public sector, most notably by the network of companies that engage at the School level through the School's Partnership Foundation. Moreover, the proliferation of the School as a highly-regarded business school by means of international accreditation, ranking and the maintenance of an attractive educational offering is an important foundation for attractiveness for faculty.

The Department of Business Administration is organized in four sub-units: Accounting and Finance; Strategy and Entrepreneurship; Marketing; and, Organization. All areas are quite teaching-intensive. The department has distinct research strengths in Organization and Marketing, and strong collaborative interfaces in the corporate world, not least in the area of Strategy and Entrepreneurship.

Research in Business law contributes to the theoretical framework and understanding of legal issues relating to domains and markets of particular importance for social welfare, such as business, innovation, entrepreneurship, labour, taxes and contracts. As a consequence, the domains of interest to Business law are also of interest to a number of other social science disciplines. Among them are inter alia economics, business administration and political science.

The Department of Informatics researches and teaches design, implementation and the effects of Information Systems (IS), that is viewed as the bridge between technology and human activities. As an academic discipline, information systems (which in a Swedish context also is called Informatics) is defined "as the effective design, delivery, use and impact of information [and communication] technologies in organizations and society". The current and future research at the department can be described as focusing on Designing Digitalisation, i.e. the current digital transformation of society, human activities, and how we contribute to this transformation as designers and developers.

## External panel report

#### Executive summary

LUSEM's departments of Business Administration, Business Law, and Informatics are different – staff, funding teaching burden and standing in research. LUSEM is part of an elite university, which is important symbolically for staff and students. There is no doubt that in principle, research is the motor behind activities. Yet, there is much deliberation about the constraints imposed by teaching. It is as if, as an administrative entity, LUSEM is a teaching institution that has an addendum of research.

A recurring theme during the interviews was what the panel interpreted as the *tension between age and time*. We observed with some surprise that, in a world that is changing fast, there appears to be no sense of urgency at LUSEM. At a general level our recommendations address this tension and possible resolutions, in three recommendations.

*Research and education.* First, the elitist research culture of an old university is in some tension with the Swedish university system, which favours education over research. A frequent concern with our informants was too little time and money for research, particularly for young faculty. The panel recommends that the top management puts this issue on their top agenda, and initiate structural measures and incentives to improve the balance between education and research.

*Academic silos.* Second, the tradition of high-profiled individual researchers maintains the strong university brand and position, but can hinder academic renewal. We observed academic silos in all the departments, and between them. We live in a time of climate change, COVID-19, and digitalisation, which

all require interdisciplinary research, and we observed little language of cross- disciplinary reflection in terms of theory development and integration. We therefore recommend that the business school develops a strategy for interdisciplinary research.

*Governance*. Third, the panel observed a tension between a traditional academic freedom and managerial practices. The governance model of Lund and LUSEM was not clear; it appeared that managers tend to coordinate day-to-day activities, while individuals do the strategic choices. We think that, in particular to develop the younger academic staff and groups, it would help to formalize a governance model, which clarifies the responsibilities of managers and different levels.

#### Introduction

This panel, which engages with three of LUSEM's groups: Business Administration, Business Law and Informatics, consists of the following members:

Professor Bendik Bygstad, University of Oslo (informatics)

Professor Ulrike Mayrhofer, Université Côte d'Azur (business administration)

Professor Jan Mouritsen, Copenhagen Business School (business administration) (convener)

Professor Siri Terjesen, Florida Atlantic University (business administration)

Professor Thomas Wilhelmsson, University of Helsinki (business law)

The panel has experience in undertaking external evaluations and all members have or have had managerial positions in a university even to the level of rector, and in a variety of different types of schools. The panel is knowledgeable about business schools, and it recognises that there is a variety of business schools and universities across the world, with no one best model.

The RQ20 raises the question about precondition for quality, and is thus a process of elevation more than a process of evaluation, although these are hardly independent of one other. However, in the spirit of precondition, the panel's aim is to inquire into the ways that LUSEM prepares for quality.

What is a precondition? We suggest a precondition concerns activities that can be increased or decreased by means of money, time, attention, and/or effort; the increase/ decrease of these activities carries with it an increase/decrease in an effect that can be understood as a quality.

The panel's brief mentions three types of preconditions: leadership, collegiate culture and quality ecosystem. 'Leadership' asks how staff becomes followers of ideas and/or of people; 'collegiate culture' asks how staff interact with each other and generate knowledge and coordination; and the 'quality ecosystem' mobilises qualities that staff pursue in the course of their research and teaching qualities. For all these preconditions, the question is not only whether they work (evaluation) but also how they work and which possibilities there might be for them to work differently (elevation).

The panel undertook work under the particularly novel condition of the corona situation where we had to use Zoom as the main means for communication. We have never before acted as a unit across spaces as we had to do here. This has hampered the length of time we could spend together, and therefore, it may be that certain issues have been discussed less than we would have liked. We did not, for example have time and opportunity to discuss all the detailed questions asked in the brief to the panel in detail neither amongst ourselves not with respondents to the group interviews. Therefore, there may be lacunae.

We attempted to mitigate this problem by taking the idea that this is a process of elevation more than of evaluation seriously and attempted to introduce a measure of learning into the process. We asked all panels to share with us what they learnt from the interviews and how they might have found new things to write in their self-evaluation reports. We had two items of feedback – one by one person and one by a group.

We also tried to mitigate this risk by notetaking. We were fortunate that one member of the panel had immaculate capabilities in note taking. This helped us maintain a record of even quite subtle interactions during group interviews.

Last, we complied the report around the three departments which are quite different. Then we added a few general reflections to these three accounts.

#### General observations

In our discussions with panels, a general theme of a tension between *age* and *time* surfaced repeatedly. The self-evaluation reports often note that LUSEM is part of an old university and that this is an advantage for the identity of faculty. On the other hand, staff pay attention to time as a fraction of employment such as the 80% rule<sup>741</sup> by which time becomes a barrier to research. This distinction does not say everything about the preconditions for quality, but it does open for some aspects of them.

Regarding *age*: LUSEM is part of an old university. One interpretation of this is that Lund University has a grand history, which translates into an elite notion of knowledge production. This air of elite is generally accepted and quickly translates into being a research-oriented university.

Research is identity and quality.

Age also translates into administrative procedure in the sense that much responsibility is placed on individual faculty to perform as a successful academic with research money, international collaboration, and publications. The rendering of the role as a successful academic and her relationship with the school generally, is not easy to untangle. There seems to be tacit knowledge organising the responsibilities among staff. It is not so clear, for example, which language or set of concepts there is to talk about organisational and collective preconditions. There is clearly a tension with conditions in the Swedish university system, which seems to favour teaching resources but has little to say about research that to some extent is performed under the limitations provided by private and public research councils. This reduces the time horizon of research activities, and makes research short term with a lot of uncertainty and ambiguity, it is argued by staff.

This is probably not a good situation for a university that considers itself elite, which is a university that insists on a continuous inflow of research money. In LUSEM, this task belongs primarily to researchers. The university system seems not to be highly involved in this. The notion of elite favours a romantic notion of the researcher, but the question is whether this pays too little attention to the point that current universities are organisations that presumably have to not only delegate to faculty but also coordinate precondition and teaching arrangements that seem to prevail in a matrix type structure. The language of coordination is difficult in the presumption of elite university that pertains to LUSEM.

Regarding *time*: LUSEM seemingly runs by state regulation: 80% teaching for certain positions and 50% teaching for others. This rule is the key precondition. This administrative rule is used when faculty account for the constraints to their activities. Teaching is the main drive of activity, and time constraints the ambition to develop more research. Everyone utters that research is a raison d'etre of the university (as in elite) but it is also clear that teaching (80%) is an absolute barrier in discussion about the burden put onto faulty and it is a main argument for having difficulty with raising external funding. In Human Relations terms, which claims that activity depends on motivation, skill, and opportunity, when faculty mobilises time as a constraint it blames opportunity. Faculty and management seemingly do not blame motivation (everyone wants to do research) nor skill (everyone can do research) even if there is significant differences in research efforts across the school!

<sup>74</sup> This rule says that 80% of time is for teaching and 20% is for research. The bureaucratic rule is a 70/10/20 rule, but this version did not seem to matter in our interviews.

When time is not considered a constraint but a measure of quality, faculty realises that it is impossible to think time literally. Therefore, it is even easy to spend time in excess of what is required by the percentage of weekly time for the sake of the wellbeing of the institution. This happens in successful research groups where time is not a strong issue because of inflow of research money. It also happens when individuals rationalise their teaching efforts. As it is happens, when 80% of time is spent it is easy to spend even more time on teaching for the benefit of the student.

Rather than making time a constraint in this situation, it (presumably the 20% that can be extended beyond the arithmetic of the standard week) becomes a resource liberally distributed to add to the 80%. Students get more. This is a quality here.

Whether students want more, or rather want better, is debatable, however. In the ethos of the old elite university, research is a motor for everything that happens. Even here, much time spent on research is an advantage for students. Students may not want quantities of teaching; they may want quality teaching in the sense of research based teaching. Therefore, there may be an inverse relationship between teaching and quality! Perhaps the best way to put quality into the frame of activity is to constrain it. Perhaps, compared with other, younger non-elite universities the problem is to find ways of rejecting the 80/20 rule, which also applies there. Accepting the 80/20 rule would make LUSEM similar to other non-elite schools. This probably requires more attention to preconditions that currently, as we propose, operate through tacit knowledge. Perhaps making language and concepts about LUSEM more precise and oriented to all the things for which time becomes *placeholder*, would make it more possible to think about qualities at more places in departments and at management levels of LUSEM.

This might respond to a general strategic question that seems not be strongly articulated at LUSEM: Do we compete with younger, non-elite universities? If the institutional requirement of 80/20 pertains to all Swedish universities, abiding with it and allowing it to be a central argument about opportunity, also makes all universities the same. Elite status disappears. Perhaps the main advantage of a more detailed language about what happens and what faculty and students may need and want would be a mechanism that would relativize and change the discourse established by Swedish state institutions. Otherwise, is not so easy to see how the ethos of 'old' will become a resource and objective of LUSEM activities.

This ranting leads to the following set of general recommendations:

- 1. Reduce the Teaching/research ratio. Consider the following propositions:
  - A. Take time from teaching and spend it on research. Students want research based teaching rather than time in front of teachers.
  - B. Teach courses that has a research content.
  - C. Propose that all teaching syllabi has three kinds of materials: (a) a textbook (if applicable), (b) research papers discussing the applicability of the textbook materials, and (c) research papers that identify critical issues in the themes taught (probably not first year). When students read research, so do teachers.
- 2. Develop research culture. Bring out ideas from drawers.
  - D. Create a million kroner rule: all good ideas will be granted a million kroner for research development by the dean.
  - E. Departments develop a ranked list of research themes justified by current developments in the academic fields. Making research possibilities clearer and present is useful for researchers.
  - F. Consider whether it is useful to think in terms of research groups more than in terms of the strong individual researcher.

- 3. Develop research entities.
  - G. The Swedish system of promotion may encourage universities to spend all money on internal promotions. Consider how it may be possible to increase external inputs not only promote from within but also make LUSEM a place where different ideas meet though external recruitment.
  - H. Seek to leverage the use of part time professors and make their involvement with the development of the departments clearer. Make their contribution clearer in terms of teaching and research. Assume that a part time professor is allocated to one or more research projects and make the person both a supervisor and a co-author in the project.
  - I. Make more use of engaging with other universities. This includes sabbaticals.
  - J. Attempt to deal with the (possibly small) risk that tenured people are interested in dissemination and relations to external stakeholders while junior researchers' focus on research to become tenured. This makes it difficult to be a young researcher and creates a two-tier system of researchers. Interestingly, as a consequence of this observation, only the young would appeal to the symbolism of age as elite in this situation. Reduce the distinction between research and outreach.
  - K. Efforts that make collaboration more real are an advantage. Such projects are emerging, but they are not the rule or norm in all places. This is a way to leverage theoretical and empirical collaboration.
  - L. Centres may be given an expiration date say 5 years. At a certain point, it may be reasonable to expect that the good ideas developed though centres can be incorporated in departments. Otherwise, it may be that new centres with new research agendas will not emerge.
- 4. A little bit on evaluation<sup>75</sup>
  - M. It is clear that LUSEM has world-class professors and areas of expertise. For example, the actives around critical management studies makes LUSEM world famous. With this set-up, that includes not only much research money but also an integrated interaction with research people around the world who work with LUSEM in a productive capacity, it may be possible to let the strategy grow from within including the networks. The primarily risk may be that this strategy currently is based on the performance of not so many people.
  - N. It is also clear that others see themselves as not performing well. For example, 'strategy' and 'accounting and finance' note the lack of senior researchers to be able to execute on a strong research strategy. This may be right, and it accentuates the usefulness of a more comprehensive search process, which includes the potential of external recruitments at the professorial level.
  - O. #b may also apply to Law and Informatics. However, as they have many research links outside LUSEM, it should be made clearer how investments in these departments add competence in addition to handling the obvious teaching tasks that exist. We acknowledge as welcome these departments at LUSEM but also note their inability to explain to other departments why they are here or rather why do other departments not listen to them apart from in coordination on tasks related to teaching?

<sup>75</sup> It seems to be difficult at LUSEM to discuss elevation, which is the problem that we read into our task. The self- evaluation reports are typically about evaluation and the questions asked to the departments are often located in the language of evaluation. Some tension makes evaluation a stronger element in the self-evaluation reports. We have not been provided enough data to make a proper analysis of relative strengths, though, and this would be consistent with the elevation ambition.

## The Departments

#### Informatics

#### Leadership

#### Priority setting, including goals for external research funding

The Department of Informatics is a small department, with one professor, three associate professors, five assistant professors, one PhD student, and two lecturers. There is a heavy load of teaching. The department received EU-FP7 project funding for S-HELP (3 600 000 SEK) and Supporting LIFE (3 200 200 SEK).

The research field of the department is Information Systems. During the period 2014-19 there was no established strategy for the department, and research has been conducted based on individual interests and external grants. This situation has changed with a new management team, and a new strategy is now emerging, focusing on designing digitalization, particularly within eHealth. The ambition is to be recognized as a leading information systems department.

The eHealth strategy is justified by arguing (i) it is building on the internal resources, by combining existing strengths in areas such as IT security and industry outreach, and (ii) that eHealth is an area of increasing impact and growth internationally. According to the department manager and professor, the strategy is strongly supported by the business school. There is some co-operation with other parts of the business school, one example is a project with Dept of Business Administration on artificial intelligence.

The eHealth field may be a good choice, but also presents some challenges for a small department; it will take time to establish, and is quite competitive, as there are many other IS departments that have long experience in the field. To succeed, a number of resources should be mobilized. We discuss these in our recommendations.

#### Recruitment, promotion and succession

From 2014 to 2020 the department has renewed and promoted key academic staff. The department has a tradition of recruiting prominent visiting professors. This has resulted in several publications, but it is not clear how the external professors fit into the new strategy.

#### **Publication patterns**

From 2014 to 2018, the Department of Informatics published 38 journal articles. The quality is generally good, but research appears unfocused; publications deal with quite different topics, and are published in various journals and conferences. Four "basket" papers were published in 2014-18. However, all of these were authored by well-established external adjunct professors, and only one of them were co-authored by full-time Lund researcher. It is not clear how these efforts contribute to internal academic development.

#### The balance between activities in research, education and external engagement

As the teaching load is heavy, the managers express that both grants and more time are needed to conduct more research.

#### **Collegial culture**

The panel notes that the new management team is people-oriented and aims to developing a co-operative culture.

#### Opportunities for early-career researchers to develop their originality and independence

There are large opportunities for research in digitalization, but junior faculty has only 20% available for research. The department is an active part of the national Swedish research school of management and IT. There is a tradition of individual choice of research topics and approaches, which may have been counterproductive for the development of the group.

#### Sustainability and renewal of research strengths

Previous lack of strategy makes it challenging to build a sustainable platform for research. In our recommendations below we discuss possible measures.

#### Academic networks and collaborations outside the unit

Researchers from the department have worked with the visiting professors, and are active partners in Swedish research networks.

#### Quality in applications and publications

As to the publications, see above. The department has received two grants (see above), and aims at a more systematic process in writing new ones.

#### Quality ecosystem

Generally, the quality ecosystem seems to work well for education, but is underdeveloped for research.

#### Research strengths and how these are reflected in the educational portfolio

The department delivers Bachelor and Master courses in Information Systems, and the broad research interests of the staff are well utilized in education.

How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

The department has 54 partner companies, which are mainly used for educational purposes.

#### Recommendations

The panel believes that the new management has taken some right steps, i.e. creating a strategic focus, and aiming for a more people-oriented and co-operative culture. This can work as a platform for further development. However, with a weak starting point and scarce resources, it will be crucial to take effective measures in the short/medium-term. Some possible ways forward are:

First, the eHealth strategy should be elaborated and assessed, and (if found feasible) made into a mediumterm (3-5 years) action plan. This should include recruitment, incentives for staff, external research and industry partners, and grant application capacity. It is crucial to connect to strong external research partners.

Second, the department should establish and develop more cooperation with other department of the business school. The Information Systems field shares many topic and methods with business schools, and the strength of other departments should be leveraged.

Third, the quality ecosystem for research should be strengthened, with clearer roles and aims for the management, establishment of research teams, and arenas for capacity improvement.

#### **Management and Business**

#### Leadership

#### Priority setting, including goals for external research funding

The Department of Business Administration is considerably larger than other LUSEM departments, with 175 employees including 130 academic staff (faculty and doctoral students). The department is organized into four research groups: (1) Marketing; (2) Organisation; (3) Strategy, Entrepreneurship and Research Policy; and (4) Accounting and Finance; and also hosts several centers including the Sten K Johnson Centre for Entrepreneurship, Centre for Retail Research, and LUSEM Sustainability Research Network. The department's total annual research budget was 59.7 MSEK in 2014 and 55.5 MSEK in 2018, which corresponds to a decrease of 7.6%.

The department unit is managed by a collegially elected head of department, four deputy heads (who are appointed by the department head and in charge of a research group), the head of undergraduate

and postgraduate studies, and the head of administration. There is also a head of research and research education (who is not part of the leadership team).

Resource allocation for research is under the responsibility of the department head, but is mainly controlled by individual researchers who receive funding: 55% is directly allocated to researchers through the competitive grant system. Co-funding arrangements exist and allow combining project and institutional funding. Project funding is primarily investigator driven.

The department's leadership can allocate resources for co-funding project research and doctoral students, travel, and other research-related expenses for staff who do not have project funding. New faculty members receive institutional funding for research, which can be increased through project funding.

Except for thematic strategic investments such as Agenda 2030, research agendas are mainly driven by individual researchers and research groups. Each research group can organise its research activities and the degree of coordination varies across groups.

Researchers are expected to respond to two sources of steering signals: LUSEM and university leadership and the general research funding climate. LUSEM leadership's steering signals focus on accreditation and hygiene factors, namely on internationalisation and gender equality. The university's current priorities concern grand challenges and interdisciplinarity research, with some additional focus on research infrastructure.

#### Recruitment, promotion and succession

The general framework for staff recruitment is that for the Swedish Civil Service. The primary HR concerns are gender equality, internationalisation, and tenure track positions for junior faculty.

Despite efforts to offer more structured career paths and tenure track positions for junior scholars, junior scholars mention uncertainty concerning their career perspectives and a lack of transparency concerning promotion.

#### **Publication patterns**

Lund University is one of Scandinavia's oldest research universities, and faculty staff enjoys a high degree of research autonomy. There is no policy to focus on specific publication outlets, but the department follows the general trend of favoring journal rather than book publications.

For promotions, and more specifically for Associate Professorships, the focus is on high-quality journal publications. The department recognizes a diversity of research publications.

For the review period, the number of journal publications increased significantly from 2014 to 2015, but declined between 2015 and 2018. Similarly, top cited outlets and book chapters/entries increased between 2014 and 2016, but decreased between 2016 and 2018.

The department has the ambition to achieve world class excellence, but is aware that this process may take time and should not deteriorate the research climate. The objective is to help faculty to publish in high quality outlets and use this criteria for new recruitments.

#### The balance between activities in research, education and external engagement

The relationship between activities in research, education, and external engagement varies across individuals and research groups. The teaching-research ratio appears to be critical (this is often the case in departments of business administration), especially for those groups with lower research intensity (strategy; accounting and finance).

#### The overarching research strategy

Defined in 2015, the department's research strategy focuses on three pillars: research; education and societal engagement. The objective is to promote quality in both teaching and research. The department also intends to develop executive education.

Strengths	Weaknesses
<ul> <li>Swedish system of Civil Service</li> <li>Research tradition and HR policy at Lund University</li> <li>Size of department</li> <li>Ambition to achieve world class excellence</li> <li>Diversity of staff profiles and research groups</li> <li>Recognition of diversity of research publications</li> <li>Elaboration of a research strategy in 2015</li> </ul>	<ul> <li>Broad research strategy without clear objectives</li> <li>Lack of strategy and coordination for external research funding at the department level</li> <li>Leadership team has limited control on research funding</li> <li>Decrease of annual research budget</li> <li>Uncertain career perspectives for junior faculty</li> <li>Lack of transparency concerning promotion</li> <li>Decline in the number of journal publications and chapters between 2015/2016 and 2018</li> <li>Critical teaching-research ratio, namely for groups with lower research intensity</li> </ul>

### **Collegial culture**

#### Opportunities for early-career researchers to develop their originality and independence

The department has two types of junior scholars with intensive research positions (60-80% research time annually): two-year postdocs and 8 tenure track assistant professors. The ambition is to provide structured career paths and transparency about promotion. For the appointments to Associate Professors and Professors, journal publications are increasingly taken into consideration, but the department also values interdisciplinary research. This explains the importance of book publications. The quality of publications is not taken into account for the promotion to Associate Professor.

#### Sustainability and renewal of research strengths

Business administration is a field offering numerous project funding opportunities which are seized by individual researchers and research groups who received important funds from state funded research councils and private foundations. However, there are no incentives to raise and manage funds at the department level, which creates different conditions for researchers and groups who receive funds and those who do not. The strategy and accounting and finance groups face difficulties in attracting senior research scholars with high quality publications, and they are inviting guest professors to develop research.

#### Academic networks and collaborations outside the unit

Researchers at the department participate in different academic networks and have engaged in local, national, and international collaborations. They participate in the strategic research areas (SFOs) and Centres of Excellence of Lund University, and they are also active in cross faculty research collaboration promoted by the university.

#### Diversity, integrity and ethics

The department applies measures taken by LUSEM and Lund University to promote integrity and ethics in education and research and it participates actively in such initiatives. LUSEM plans to establish an ethics committee to provide support to researchers. The department believes that it is essential to embed good practice in the everyday routine of conducting research. The research committee of the leadership team promotes good research practices and a respectful work climate.

#### Quality in applications and publications

The department provides administrative support for research projects and workshops and it benefits from the central services of Lund University for large national and EU programs. This administrative support appears to be appreciated by researchers. Research groups organise workshops and seminars to support publishing activities, and several initiatives at the faculty and university levels support doctoral students. The department is also managing the transition to open access and open data, and will take specific measures to build awareness among researchers and help them follow this transition.

Strengths	Weaknesses
<ul> <li>Importance of interdisciplinary research and associated diversity of publications</li> <li>Numerous funding opportunities are seized by individual researchers and research groups</li> </ul>	<ul> <li>Quality of publications is not considered for promotion to Associate Professor</li> <li>No incentive to raise and manage funds at the department level</li> </ul>
<ul> <li>Active participation in cross faculty research collaboration promoted by Lund University</li> <li>Active participation in the promotion of integrity and ethics by LUSEM and Lund University</li> <li>Administrative support at the department and university levels for research activities</li> </ul>	

### Quality ecosystem:

#### Research strengths and how these are reflected in the educational portfolio

Most research strengths are reflected in educational programs, except for three areas in public management: research policy, city, and health care management. The department has the plan to develop a master's programme in Public Management, which could benefit from strong networks built with municipalities in the South of Sweden. The department also has the Sten K Johnson Centre for Entrepreneurship Research, which promotes advanced research in entrepreneurship and educates future entrepreneurs.

# How external research collaborations (with e.g. industry, governments and states, county councils, municipalities and non-governmental organisations) influence the quality of research

Individual researchers and research groups have a wide range of relationships linked to their research projects. For the 2014-2018 period, there were more than 200 ongoing collaborations and 25% of them involved jointly funded projects. The collaborations take place at the local, national, and international levels. For example, research policy scholars contribute to national and European policies, namely on research funding and innovation. Researchers believe that external collaborations contribute to the quality of their research, even if they are time-consuming.

# How the unit deals with integrity and ethics, including potential conflicts of interest, in relation to collaboration

Most external collaborations are driven by individual researchers and are shaped by trust and history, thus limiting conflicts. However, the built relationships are difficult to sustain when key researchers leave the department.

#### How the unit uses and capitalizes on available research infrastructure, in Lund and elsewhere

The department capitalizes on available research infrastructure at Lund University and participates actively in initiatives taken at the university level.

# If the unit is aligned with any of the University's strategic research areas (SFOs) or any other strong and broad research area, how opportunities from such connections are utilised.

Management and Business researchers participate in several strategic research areas (SFOs) and Centres of Excellence developed by Lund University, e.g. CIRCLE; LU Water and LUCSUS. They also participate in several initiatives promoting cross faculty research collaboration. For example, researchers from the department lead the areas Big Science and Society and Enhanced Value Relevance and Credibility of Sustainable Information. They are also involved in two Advanced Study Groups at the Pufendorf Institute: ASG DEMIIS and Resourcification.

Strengths	Weaknesses
<ul> <li>Most research strengths are reflected in educational programs</li> <li>Potential for new programs in public management and entrepreneurship</li> <li>Wide range of external research collaborations improves quality of research</li> <li>Long-standing external relationships by individual researchers are built on trust</li> <li>Research infrastructure provided by Lund University</li> <li>Participation in strategic research initiatives taken by Lund University</li> </ul>	<ul> <li>Faculty staff lacks time and resources for doing research</li> <li>Excellence in research relies on few faculty members</li> <li>Lack of dissemination of knowledge about how to manage external research collaborations at the research groups and department levels</li> <li>External relationships are not managed at the research groups and department levels</li> </ul>

#### Recommendations

#### Recommendations for leadership:

<u>In the short- and medium terms (1-5 years)</u>, the leadership team needs to build a research strategy based on clear objectives, the definition of resources allocated to achieve them, and KPIs (key performance indicators). To be successful, this effort should associate individual researchers and research groups to the definition of the strategy.

The department needs to develop stronger research collaboration between individual researchers and research groups. For example, the leadership team could take the initiative to organise an annual (or biannual) workshop to build a stronger research culture at the department level and to share ongoing projects and best practices

Furthermore, the leadership team should develop a strong strategy and coordination for external research funding that could be managed at the department level. This would allow a better control of the research budget evolution.

The head of research and research education should become part of the leadership team.

The department should also take measures to improve career perspectives for junior faculty and improve transparency concerning promotion criteria.

The teaching-research ratio needs to be improved to provide more time for researchers and groups with lower research intensity.

In the long term (5-10 years), the research strategy should aim for world-class excellence to be able to compete with major Nordic universities.

#### Recommendations for collegial culture:

<u>In the short- and medium terms (1-5 years)</u>, it is necessary to improve the collegial culture and to develop incentives at the department level for high quality publications and fundraising.

The criteria for promotion should be clarified and it is necessary to integrate the quality publications for promotion to Associate Professor.

In the long term (5-10 years), it seems essential to offer attractive career paths to younger scholars to dissuade them from moving to other universities.

#### Recommendations for quality ecosystem:

<u>In the short- and medium terms (1-5 years)</u>, the leadership team should attach particular importance to the time and resources that can be dedicated to research at the individual level. This should allow the department to develop a stronger research culture that is shared by the research staff.

External relationships should be managed at research group and department levels. Research groups and the department could improve the dissemination of knowledge about how to manage such collaborations more efficiently.

In the long term (5-10 years), the department should maintain the close collaboration established at the university level and participate in the elaboration of new initiatives taken by Lund University.

#### **Department of Business Law**

#### Leadership:

#### Priority setting etc.

The Department of Business Law is a small department. Its total staff consists of 30 persons, among them 1 professor, 2 senior professors, 2 visiting professors and 5 associate professors. The research revenues are also small. Government funding from the University was only SEK 4 179 000, and external funding SEK 3 245 000.

In this small environment it is natural that the organization of the department is flat. There was an obvious cooperative spirit prevailing among those the panel met. A strong strategic leadership seemed less important than collegial discussions and individual action.

The obvious example is the fact that the department has worked three years on a strategic plan for 30 persons, without being able to finish it before the research assessment. The plan was forecasted to be adopted in May.<sup>76</sup>

There seem to be important strategic issues related to the role of the department that would require a more clear strategic approach. It would be useful if the department could draw a clearer picture of their role as a law department in the business school, at a university that also hosts a faculty of law. The representatives of the department did emphasise that they discuss these issues continuously: how should they profile themselves in relation to the business school and the law faculty?

However, the examples used when discussing this issue were mainly related to teaching. Obviously it is a different task to teach becoming lawyers than economists and representatives from other disciplines. However, the profile in research was not equally clear.

In research there is cooperation with the Faculty of law, in particular in the joint cooperation centre ACLU. That is of course a good thing. But what obviously could be developed more is the research cooperation within the business school. This could and should be the approach that clearly distinguishes the department from the Faculty of law.

Some interesting cooperation projects were mentioned, but the cooperation could be much stronger. There was not so much inter-disciplinary and cross-disciplinary research done as one could expect. And even though the department has listed interdisciplinarity as an opportunity, it seems that much of the research done is a rather traditional "clarification of law in force", as stated in the self- assessment.

However, the development of the opportunity to cooperate within the business school to a greater extent also requires interest from the other departments of the business school. It was at least indicated in the discussion that "both sides" could improve their efforts in this direction.

#### Recruitment etc.

The panel notes the ambition of the department to increase internationalisation through the use of renowned foreign scholars in part-time positions. This policy should continue.

Attempts to recruit in law and economics has failed. Such kinds of recruitments could support a more interdisciplinary profile of the department.

#### **Publication patterns**

As the department has a large field of teaching with few persons, the teaching burden is relatively high. The research output cannot be expected to grow very much without more resources.

Some improvements have been made during the last five years. The panel notes the rising publication pattern of the department. However, it seems that the rise mostly is done by less ranked contributions.

<sup>76</sup> It was adopted on May 13th.

Looking at the points according to the Norwegian list and the peer reviewed publications the curves for the last three years are flat. The explanation given is that some of the publications are book chapters and quite many are in Swedish (even though Swedish journals can be peer reviewed as well).

Even though the panel acknowledges the role of Swedish lawyers to contribute to the development of the Swedish legal system, it questions the balance. The service function for Swedish law does not prevent the researcher from also contributing to the European and international debate in his or her area. In fact, such contributions are important as an external quality control mechanism.

## Balance

As noted already, the teaching load of the department is quite heavy. Therefore the resources available for research are scarce. As to external engagement, such activities are typical for legal units, and the department seems to fulfil its task very well in this respect. The activity in several expert associations is good, and the researchers have been used as experts both by the European Commission, OECD and the Nordic council.

## Collegial culture

The flat culture, and the cooperation with the faculty of law offer good opportunities for young researchers to develop their originality and independence.

## Quality in applications and publications

As to the publications, see above. As to applications, the panel notes with approval that the department has taken measures to encourage the compilation of applications for research grants and to improve their quality. The introduction of special "application weeks" is a good initiative in this respect.

## Networks and collaborations

See above.

## Quality ecosystem

## Research strengths and educational portfolio

The research is focused on various sectors of business law (broadly defined), which is the natural focus of a law unit in a business school. Tax law, intellectual property law, labour law and European law as well as contract law are obvious areas to cultivate in this context. The broad educational approach needed by a business school necessarily implies a high educational burden and an educational portfolio that is broader than the focus of research.

The themes addressed by the researchers at the department include very topical and modern ones, such as AI.

## External research collaborations

The collaborative activities of the department with business and other outside actors are active. This certainly improves the educational offer, but is certainly also contributing to focus the research on topical issues.

## **Recommendations:**

## Leadership:

There should be a clearer strategic focus on the development of research. A research strategy emphasising and making visible the research strengths of the department would support the development of quality of research, funding and networking. It would help focusing research on topical issues with particular relevance for the business school.

The department should emphasise its role as a part of the business school, by increasing research cooperation with other departments of the business school. Generally the less silos that are built within the business school, the better. Natural places for accidental meetings between researchers from different disciplines should be developed, in order to suppress the research silos.

#### Publication patterns:

Even though the department has an obvious task of supporting and analysing the Swedish legal system in Swedish, this does not hinder participation in the international debate as well, through well-renowned journals and publishers. The department might adjust its publication strategy in this respect.

## 5.0 Feedback from departments.

In an email of June 5<sup>th</sup>, the departmetns have made the following comments:

### Fact check Department of Business Administration

There are some factual errors in the description of the management of the department. These errors were in the original evaluation. We present below a correction

The leadership of the department is divided into two structures: a board and a management team. The board is chaired by the Head of Department and includes collegially elected representatives of faculty and student representatives. The management team consists of the Head of Department, four deputy heads, the head of undergraduate and postgraduate studies, the head of student administration and the head of research and research education.

In several places in the report the 80/20 divide is referred to.

A lectureship at the department of Business Administration is 70% teaching, 10% administration and 20% research.

The head of research and research education should become part of the leadership team.

The quality of publications is not taken into account for the promotion to Associate Professor.

The Department uses the Norwegian List Kristin as its main quality criteria for Associate Professor evaluations. No distinction is made between Kristin level 1 and Kristin level 2 publications.

We are thankful for this input. We are not sure that it matters much for our conclusions, and we think that our observations are good expression of what we learned. It may be that we were told things that are not in the guidelines for operations at LUSEM but we consider this a potential finding rather than a non-fact. It may be that facts in guidelines are not facts 'on the ground' so rather than changing our report, we direct attention to the question how may it be that we are left with other impressions?

## Economic History, Economics and Statistics

## Panel overview

This panel consists of two relatively large units of assessment, Economics and Economic History, and a small one, Statistics.

At the faculty level, the School of Economics and Management recognizes the power inherent in the pursuit of bottom-up initiatives by individual researchers, whose curiosity and dedication are fundamental to knowledge creation. The organization of research is therefore fundamentally decentralized. The School does, nevertheless, pursue strategic initiatives to initiate and support research activities, primarily by means of ear-marked co-funding of external grants and support of recruitment efforts.

The School, moreover, supports research and collaborative activities in partnerships with the corporate world and the public sector, most notably by the network of companies that engage at the School level

through the School's Partnership Foundation. Moreover, the proliferation of the School as a highly-regarded business school by means of international accreditation, ranking and the maintenance of an attractive educational offering is an important foundation for attractiveness for faculty.

The Economics Department is relatively teaching intensive, and covers a number of research areas. Recent developments have seen a strong effort to improve research performance in terms of quality, with the leading international rankings of journals and departments as the main indicators. As part of this commitment, the department has focused its recruitment efforts on junior faculty, sought at the main international conferences.

In Economic History, the leading recent development is growth in terms of externally funded research. The department has developed from narrowly focusing on economic history towards a broad department in social science and applied economics, with specializations such as growth, technological change, and inequality; economic demography; development of the Global South; and, sustainability transformations. The research production of the department has developed strongly in recent years.

The Statistics Department is small with a heavy teaching commitment, and it has been a priority in recent years to put some of the recent developments in statistics – in areas such as statistical data mining, methods of artificial intelligence or modern numerical methods of data analysis – to fruition in the educational offering.

## External panel report

Panel 1: Economics, Economic History, and Statistics

In the introduction, we lay out the composition of the Panel, and a brief overview and assessment of background materials, interviews and meetings.

The Panel consisted of five members:

Prof. in Economics Kjell G. Salvanes, Panel Chair, Norwegian School of Economics

Emeritus Prof. in Economics David Greenaway, Nottingham University

Prof. in Economic History Anne McCants, MIT

Prof. in Economics Carolyn Moehling, Rutgers University

Prof. in Statistics Qiwei Yao, London School of Economics

#### Mode of operation

The Panel had access to self-evaluations from the three Departments as well bibliometric information. All three self-assessments were informative regarding the current status of the Departments, recent changes and clear and honest regarding strengths and weakness, as well as challenges. In addition, the Panel asked for more information regarding teaching duties for the different faculty positions, and information on placement of PhDs over the last years.

The Panel had meetings prior to the interviews, and discussed a tentative plan for how to conduct interviews based on our reading of the background material. The Chair also had meetings with the Chair of Panel 2 of the Schools of Economics and Management, and with the administration at LUSEM. Interviews with the Departments, Research Centers and the LUSEM leadership took place from May 5<sup>th</sup> through May 8<sup>th</sup>. We had meetings with all Departments, their leadership, and different representative groups from PhDs to full professors, as well as meetings in common with Panel 2, interviewing LUSUM leadership and the three Research Centers. The interviews were very helpful and we received clear and candid answers to all our questions regarding all areas important for research. The panels had meetings after the week of interviews discussing our general impression and planning next stages.

## Department of Economics

#### Leadership

Over the past decade Economics at Lund has undergone a major transformation, driven by a collective ambition to improve research productivity, and enhance international visibility and standing. The foundation of this strategy is a collective commitment to publication of outputs in internationally highly ranked peer reviewed journals. Research strategy is therefore geared to building the pipeline of papers in such journals. To ensure sustainability, this strategy underpins recruitment activity (which is increasingly international in its reach), progression of tenure track positions (with very explicit publication metrics), and research grant procurement (to facilitate maximisation of time available for research).

Our discussions with both senior and junior faculty confirmed this approach to strategy commands very broad support. Senior staff welcome the freedom and flexibility that comes with success in securing external grants; junior staff were highly supportive of the absolute clarity of tenure criteria in setting expectations for career progression.

There is clear evidence the strategy has been successful. Publications in leading journals have steadily increased in number, and the proportion in the internationally most highly regarded journals has grown. Both are clearly on an impressive upward trajectory. Moreover, as the Department's Self-evaluation demonstrates, this also translates into substantially improved performance relative to Lund's peers in Sweden and the Nordic countries more widely over the last five years. The Department should be commended highly for this success of its strategy.

Economics is an extremely well resourced Department, with resources devolved from the University and School complemented by success in winning competitive external reserach funding. Among other things this means: research leave is relatively straightforward to secure; there is a very active visiting scholar programme; and very positive spillovers to the Doctoral Training Programme. It also facilitates allocation of resources across the Department's five research groups (in the form of placement of Post Docs and PhD students). Finally, it means faculty members are well supported to participate in high level international conferences and symposia.

The Department's PhD programme is very impressive. It is a fully funded five year programme, with an expectation that students will spend a period (normally a semester) at a non-Swedish University (and this too is fully funded). Students are closely integrated with Departmental seminar programmes, and Departmental leaders and supervisors ensure they have excellent access to visiting scholars. They are also encouraged to link with one of the Department's five Research Groups. Moreover they are mentored ahead of job market presentations and interviews. All of this is actively overseen by a full Professor in the role of Director of Studies. The data we saw on placement of graduating PhDs reflects extremely well on the overall quality of the programme.

Although Economics is a constituent Department of LUSEM, the role of the Faculty overall appears limited to disbursing block grant resources allocated by Government to the University and formulaically devolved, and then accounting for their disbursement. There appear to be very few instruments available for influencing Departmental strategy and performance, and promoting collaboration across the School's constituent Departments.

#### **Collegial culture**

Our impression from talking to faculty members at all levels is of a very postive climate of collaboration and opneness to research interests among colleages. In general, we have an impression of an environment that is both very ambitious and collegial. Moreover, the strategic decisions taken a few years ago of a more ambitious plan of recruitment from the international market, and in many ways streamling the Department with more focus on publishing in top journal etc, has not been traded off against the postive and encouraging reserach environment. Also with an international focus both in terms of recruitment and research collaberation, the department is becoming more diverse and more international. However, we did hear hints from more junior faculty that the complex structure of faculty positions, where some junior faculty for all practical puproses are in a streamlined tenure track system, with clear and reasonable hurdles to pass to become tenured, while others are dependent on external funding, and can end up basically as teachers. Although we are fully aware this is fashioned by national funding strategy and not a local decision, we want to stress that this is a very unusual system, and may be counter productive. It seems to creating a hiearchy in the Department(s) that was abandoned in most other countries a long time ago.

Recruitement is an important part of renewing any research environment and may be also creating and sustaining research groups. Both by talking to faculty members and especially to junior members, this as been a highly successful strategy. International recruitment by attracting young faculty from a more diverse pool of applicants than the home market, has rejuvenated the Department. It is a major effort for a department to do this, and it has paid off. Some areas have not been successful, like macroeconomics, however, by stressing the connection to other very successful fields like labor economics in a broad sense, together with the strenght of the data infrastucture, this should be possible. However, we are unimpressed by the gender balance in the Department at all levels actually. There has been some improvements at the junior level, but it is far from a desired level. We are also not so convinced by the recruitment strategy to improve gender balance.

A third aspect we noted is a very active and clear mentoring system for PhD candidates. The system is well described in their own report, and was well explained to us by the faculty leaders. It is a flexible system where students can talk to all faculty before choosing a research field, and with clear mile stones in the process towards a dissertation. Problems were also solved along the way with a senior faculty member dedicated to this job. The mentoring system appears to be a combination of formal and informal, which appears to work well in a small to medium sized program.

#### **Quality infrastructure**

The Department has a long tradition of being connected to the international research community in the different fields. The Panel's impression is that these networks have been strenghtened over recent years, and been extended to more recently successful research groups. A combination of being more visual internationally in terms of publications in top journals, worshop participation and arranging international workshops, has been essential to accomplish this. PhD students and young faculty are then engaged in these networks, and even spend shorter or longer time in highly engaging research departments which both benefits them and the department. Most research groups emphasised the development of international networks in the Panel discussions.

Lund is also strongly connected in the Swedish research community with collaberations and shorter and longer stays at other departments in Sweden. Several of the researchers are also involved in policy work, either by being memebers of "expert committees" for the Governemnt, or writing policy reports. This type of work is time consuming and has to be traded off against a focus on research, but appropriately balanced this is also an important input to the Department since udnerstanding and analyzing polices is at the core of economics.

In sum, the Department is well and maybe increasingly so, engaged in the international reasearch community with visibility in important journals, attending and arranging workshops and conferences. Junior scholars and PhD students especially benefit from being a part of these networks. Moreover, the strong connections the Department has to the rest of the Swedish research community and to the policy world, is both beneficial for the Department as a whole, and particularly in terms of placement of candidates and post docs.

### Strengths:

- Notwithstanding the suggestion in the Self-evaluation that the Department is sub-optimal in scale, Economics at Lund is in fact relatively large. This is a strength in terms of the range of research conducted and number of PhD students that can be recruited, as well as the teaching programmes that can be supported.
- There is evidence that the Department is very collegial, which is reflected in strong morale that almost certainly impacts favourably on research productivity. The senior faculty are clearly committed to sustaining collegiality.
- Junior faculty have enviable access to resources (including the time of senior faculty) and a wide range of opportunities for international engagement.
- The Doctoral Training Programme is well conceived, well resourced, and clearly adds significant value to the Department's PhD students.
- There is strong connectivity between the Department's scholars and the wider international academy, underpinned by both outward and inward mobility, and involvement in major international conferences.
- The Department has strong positive momentum, and there can be a reasonable expectation that its performance in terms of published outputs will continue to improve.
- The departement has a good placement record of it's candidates where many have where placed at high or top universities in Scandinavia such as University of Copenhagen, Copenhagen Business School and Uppsala University, and high level places outside such as University of York. Many of the candidates also where placed at in high level public policy units in Sweden, in OECD etc.

#### Weaknesses:

- Evidence of cross disciplinary collaboration and research is limited, with the notable exception of Health Economics. Given the breadth of the Department, and assets in the University more broadly, there may be opportunities that are being missed. That said, it seems as though discussions on a new initiative built around Artificial Intelligence / Business Analytics are well advanced.
- The Self-evaluation acknowledges that diversity in general, and gender balance in particular, is an issue. The Department is clearly thinking deeply about this challenge, but it does appear to be changing slowly. The strategy here has not been very creative. Other similar departments in Sweden and the Nordic countries with more or less the same composion of fields, has been nuch more successful. There is much room for improvement.
- The prime motive for securing research funding seems to be for teaching buy out rather than building reserach infrasructure (such as major databases, or other public goods). There is also a risk this creates a culture of teaching being a burden, rather than a core activity.
- The size of the Department allows it to support five research groups. Notwithstanding that, there appears to be a deficit in human capital in Macroeconomics. Since this is an important element of 'the core' imaginative solutions need to be found.
- The hierarchical faculty structure, full professors vs university teachers and complex structure for recruitement positions with several paths for tenure.

#### Recommendations:

- The strategy for gender balance has so far not been successful. Some of the strategies used successfully by other places include oversampling women for interviews since we know women are scarce in economics Another option is to develop a strategy for joint hires.
- The complex funding situation for new postions risks creating an old fashinoed hierarchy of positions, and does not appear to be a selling point in hiring. The constant work applying for money, even within the School and Unviersity, appears to lead a suboptimal use for time for faculty members. Our suggestion is that LUSEM rethink the funding that they can control and work for a different funding model in general for Departments.
- As the Self-assessment report admits (the quite substantial sized Department in international terms) is
  not well balanced and lacks critical competences in some areas like macroeconomics. Our suggestion
  is to aim at recruting a groups of young assistant professors in macro who are complementary to
  other groups. The natural choice is the labor group or applied micro group with their extensive
  comptence in the use of and access to micro data for workers and firms. A macro group focussed on
  the labor market should be viable and also differentiate the Department from other strong macro
  groups in Sweden such as IEES in Stockholm.
- This diversity makes it difficult to define what is a "quality" publication. The department leadership should develop a flexible quality assessment process that accounts for the diversity of research within the department. The goal should be to encourage researchers, particularly junior researchers, to aim for the high-impact journals most appropriate for their research agenda.
- The Department should support endeavours to build reserach collaborations with other Departments, both within the School and University more broadly. The emerging initiative in artificial intelligence / data analytics looks very promising.

#### Department of Economic History

#### Leadership

The overarching research strategy of the Department is to be *open and inclusive*, and it is anchored in three key concepts: *relevance*, *internationalisation*, and building *research infrastructure*. The Department leadership has sought to let a thousand flowers bloom. The result is a very productive, creative, and diverse research portfolio.

The Department performs well on the two standard measures of research productivity – external grant funding and publications. The Department has been very successful in obtaining external grants (SEK 260 million from 2014-2018). Most impressive, this success has been very broad-based with 23 different scholars being awarded grants of more than SEK 2 million. The Department has also had great success in securing grants for post-docs. The publication record is equally impressive. The number of publications doubled over the period 2014 to 2018. The list of journals is notable for its breadth. Only about two-thirds of the papers were published in journals classified within the disciplines of economic history, economics, history or demography. This is a direct result of the open and inclusive approach of the Department. Scholars are encouraged to pursue their intellectual interests even if those fall outside the traditional boundaries of economic history.

The merger of the Centre for Economic Demography (CED) into the Department since 2018 has further contributed to the unusually broad research scope of the group, as the Demography group brings with it a number of deep ties to research (and researchers) grounded in disciplines outside of the School of Economics and Management, most importantly public health and medicine. One concern though is that the placement of the CED in the Economic History Department will lead to a narrowing of the research and scholars affiliated with the CED. Although economic historians made up the largest group within the CED before the merger, most of the associated scholars are not economic historians.

Although the department compares favorably with its peers in terms of the overall number of publications, it has a smaller share of publications in the top economic history journals. This in part reflects the diversity of research in the department. For many of the department's scholars, the top economic history journals would not be the appropriate targets. This diversity makes it difficult to define what is a "quality" publication. The department leadership should develop a flexible quality assessment process that accounts for the diversity of research within the department. The goal should be to encourage researchers, particularly junior researchers, to aim for the high-impact journals most appropriate for their research agenda.

The Department's open and inclusive strategy has allowed it to recruit a diverse group of scholars. The Department has doubled in size since the last evaluation in 2014. This rapid expansion has allowed for the disproportionate recruitment of scholars who have traditionally been more marginal in academic research, and especially in economic history. The overall academic staff are 42% female, as well as hailing from dozens of countries beyond Sweden and northern Europe. Both the gender balance and the internationalization of the staff reflect the serious commitment over the last review period to recruitment strategies that are open and inclusive. In particular, the willingness to include a very broad range of research topics under the umbrella of the Department's mission opens a space for hiring more broadly too.

The growth in the Department size has had many positive effects, but it also poses some challenges. Two threats seem most critical: 1) limited availability of outside funding to support further expansion of PhD, postdoctoral, and tenure-line research allocations in the absence of projected growth in student enrollments that would require higher teaching allocations; and 2) limited capacity of senior research staff and tenured professors to mentor an increasingly disproportionate number of junior researchers. Indeed, to this second point, several senior faculty indicated that it was difficult to even know who was in the Department given both the turnover of junior researchers and the large number of them at any one time.

#### Strengths:

- Research strategy of being open and inclusive has led to dynamic and diverse research environment.
- Department has been able to recruit and retain a diverse and impressively productive group of scholars, who clearly enjoy working in such a vibrant environment.
- Department has been extremely successful in obtaining external grants.
- Department has a strong publication record, both in terms of numbers and breadth.

#### Weaknesses

- Success in obtaining external grants has led to a large Department size; this size would not be sustainable if there was a change in the funding environment.
- Due to size of staff and constraints on teaching, postdocs and graduate students have limited opportunities to teach.
- Postdocs and graduate students have unclear and uncertain paths to permanent employment. Department will not be able to offer all postdocs permanent positions.
- Recent (2 years) merger with CED still in early stages, not clear whether it will lead to narrowing of the mission of the Centre.

 The department has been able to place the majority of their candidates at good universities mostly in Sweden and Europe although very few are placed at the top universities in economic historty. Moreover, one third have been recrutied locally a Lund University. This is may be not a bad thing since it reflects an active research environment in the Department, but it may also reflect a weakness since the candidates are not view as attractive at the top economic history universities in Europe.

#### Strength and weakness?

• Department may need to reconsider its identity and place within Lund. It is more than just an economic history department. Should that fact be acknowledged openly, or even celebrated?

#### **Collegial culture**

It should be said at the outset that the broad collegiality of the Department was evident in every aspect of the review process, from initial documentation and in each of the interview panels. We heard generally positive reports about the climate of collaboration, encouragement, and openness to diverse areas of research interest and points of view from every level of the academic hierarchy. We were also impressed with the gender balance and increasingly international orientation of the Department.

A repeated theme of the meeting with the junior staff was the flexibility they enjoyed in pursuing areas of research of particular interest to them. They engage in research collaborations with a wide range of scholars from within the Department, from other programs at Lund University, across Swedish universities, and also around the world. The diversity of funding agencies to which they have successfully applied and the broad range of publication venues are both testament to this flexibility. There is very much a sense of 'let 1000 flowers bloom' that is core to what the junior staff in particular expressed as critical to their enthusiasm for working in Economic History at Lund. Obviously, the limited opportunities for advancement at Lund itself is an issue of concern to them, especially because they find the working environment so collegial and conducive to their academic productivity.

In general, the academic staff at every level, but particularly the junior scholars, benefit from the embeddedness of the university in the larger social structures of Swedish life. These make the precarious positions of the postdocs much less challenging than they might be otherwise. Nonetheless, some of the postdocs questioned the Department's strategy to have so many young scholars in what are only temporary positions. They also noted that although they sensed the senior faculty wanted to advise and mentor them, the senior faculty have little knowledge of the employment opportunities outside of academia.

The large number of young scholars on short-term appointments also poses other threats to collegiality. As noted above, one senior scholar expressed it being difficult to get to know all of the new scholars in the Department. A number of the senior faculty also commented on the decline in attendance at the weekly department seminars on Wednesdays. The sense was that as the Department size grew, many faculty did not think that their attendance was necessary at those seminars, nor would the absence of any one person be noticed. Nonetheless, the collective effect has been to lower the sense of collegial expectations across the group as a whole.

No one raised any issues of concern about integrity or a failure for the Department to behave ethically. This may be a failure of reporting (perhaps especially in the Zoom world where this might be more difficult). Nonetheless, it was striking given the more typical prevalence of such concerns in almost every work environment.

#### Strengths:

- Dynamic research environment that supports broad range of scholars and projects and fosters crosspollination of ideas and methods.
- Junior researchers and doctoral students feel supported in pursuing their research interests and encouraged to attend and present at international conferences.

#### Weaknesses:

- Rapid growth in Department size may limit the interactions among different groups of scholars and, in particular, limit the mentoring of junior scholars.
- Constant pressure to obtain external funding (for themselves, or to support juniors whom they are mentoring) causing stress for at least some senior faculty.

#### **Quality ecosystem**

The department has a broad teaching portfolio including a recently launched undergraduate program taught in English. The doctoral program is very strong and is well-integrated into the research agenda of the Department. Many of the postdocs and junior faculty received their doctorates from the Department. The senior faculty of the Department see this as a strength as it allows them to recruit strong doctoral students from Sweden and elsewhere and has contributed to the diversity of their research staff.

Department faculty are also engaged in a wide range of external research collaborations and in public engagement. This relates directly to the department's emphasis on relevance, internationalisation, and building research infrastructure.

#### Strengths:

- Department has a significant presence in the University, the profession, and the public sphere.
- Department is internationally recognized for its productive environment, and is considered a highly desirable place for economic historians and historical demographers to visit, either in its lecture series or as visiting scholars.
- Years of prodigious research effort has resulted in the compilation of a number of widely used databases that are managed within the Department, a resource of great scholarly and public utility.

#### Weaknesses:

- The rapid growth of the Department is showing signs of stress for both senior faculty who must manage it, and junior research staff whose place in the system is not secure.
- The aforementioned large database infrastructure must be maintained, requiring both steady funding and knowledgeable personnel. This is a high fixed cost to the Department, but one for which funding is harder to secure than for new projects.

#### **Recommendations:**

- The Department needs to assess critically its optimal size. This conversation needs to involve all members of the department from the doctoral students to the full professors. Careful consideration must be given to the costs and benefits of expanding the Department further, or perhaps even to reducing its size in the future.
- The Department should evaluate critically how the merger with the CED has affected the research environment. Has it fostered more or less collaboration with faculty outside the CED? How has the

merger affected the faculty from outside the Economic History Department who are associated with the CED? Are they still as engaged with the CED? Have the joint grant applications increased or decreased?

• The Department might usefully make an assessment of its current resource allocation to the maintenance and personnel support associated with the use of its publically-accessible databases with an eye toward developing a long-run strategic plan for that support into the future.

#### Department of Statistics at LUSEM

The Department of Statistics has three Professors, 1 Senior Lecturer, 1 tenure-track Associate Senior Lecturer, and three PhD students. In addition, two Visiting Professors are employed on a 20% basis. The current HoD is an Emeritus Professor in Economics and former head of the Department of Economics, and is acting on a temporary basis.

The Panel commended the Department on the production of an informative self-evaluation document (SED) which is clear on what the Department is currently doing, provides an honest appraisal on its strengths and weaknesses. The Panel met the Department Management Team on 5 May and the joint faculty on 7 May. Those two meetings were informative and most questions from the Panel were answered in a candid manner.

One criticism of the SED is that it does not set out a sufficiently ambitious strategic plan for the future of the Department, with a medium and long-term horizon. It does not have a detailed plan to develop new initiatives related to data science which is becoming increasingly important and relevant in this information age.

One overarching observation from the Panel is the small size of the Department, which inevitably hinders some aspects of operations in the Department, and potentially more seriously, hampers the otherwise exciting development in both research and teaching in relation to the opportunity and the challenge related to data science.

#### Leadership

Institutional research funding is used to support the positions for three professors, two PhD students and a tenure track associate senior lecturer. The funding from three external grants was used to hire several postdoctoral positions in 2014-2018. The third PhD student is funded by a joint research grant with EM Lyon Business School. While the incentives (such as buying-out from teaching) for obtaining external grants are clearly defined, it seems that opportunities for obtaining external statistics grants are fewer than those for economics, economic history or business administration as the success rates are "often under 10%" (according to the SED).

The low teaching load for the tenure track associate senior lecturer position is attractive, enabling the position holder to flourish in research. He further benefits from the collaboration with a visiting professor in the Department. In contrast, the heavy teaching load for senior lecturers impacts negatively for career progression, especially without external grands.

Future recruitment in the Department rests on the replacement for retirements; apparently, there will be a few retirements in the foreseeable future. The Department aims to recruit in the areas of machine learning, artificial intelligence and business analytics, and is aware of the fierce competition for the talents in those areas as most statistics departments across the global are doing the same.

This is a teaching-heavy Department with the 70% of total income from teaching. Despite this, the faculty members managed to be research active and produced a large number of research papers in the

review period, including 18 in Class II and 57 in Class I, according to the Norwegian Register Classification System.

Given the small size, the Department adopted a "bottom-up" research strategy, relying on the conscientious individual effort. Also to be commended is the effort in developing new courses in machine learning and artificial intelligence, which will constitute an integral part of the new masters program on business analytics currently under construction in Department of Economics.

The number of PhD students in the Department is small. This makes the provision of adequate courses almost impossible. There is also a lack of structure in some aspects of the PhD program.

The increasing demand for quantitative analytic expertise and skills from almost all sectors of society provides an opportunity (and challenge) for statistics to expand. The Panel felt strongly that building a prominent, strong, coherent presence in data science was of critical importance to LUSEM and the University, and the Department should be one of the major players in this endeavor. The initiatives on developing a presence in data science at the University level might have already been taken by other departments to date. The Panel was concerned that the Department might be missing the boat on data science if it does not move quickly and decisively enough. In addition to contributing to the business analytics program from Economics, there is still a large room to explore in developing new data science related courses and programs for students with different background and different career orientations. Furthermore the research programs with a strong data science flavour are also more competitive for external research funding. The Department should also consider the possibility of joining forces with relevant departments such as IT, Engineering, Mathematics for developing joint new initiatives.

#### **Collegial culture**

There is only one tenure-track faculty in the Department at present. He expressed satisfaction with the research environment which gave him time and resource to develop his research agenda.

Though there is no formal mentoring system in place, the small size of the Department makes the communication and exchanges among colleagues easy and effective. Both junior faculty and PhD students are satisfied with the support and advice received from senior faculty and administration support. All past post-docs in the Department have secured permanent positions in Sweden and abroad immediately after they left the Department.

The Panel was impressed by the unanimous contentment (from professors to PhD students) on financial support for attending conferences, visits for collaboration, and other research related expenses.

International links and networks are largely based on individual collaboration with researchers across the globe. The two visiting professors have also brought in new opportunities for collaboration and networking.

Unfortunately, statistics is still a male dominated subject. All permanent members of the Department are male. It is noted that the two visiting professors appointed by the Department are both female.

#### Quality Ecosystem

The Department has made a determined effort to develop expertise in machine learning, though the endeavor so far seems to rest on a few individuals. This also facilitates the development of new courses in machine learning and data mining.

The Department participated in some external research collaborations addressing some societal challenges.

#### Recommendation

• The Department should construct a Strategic Plan to articulate a clear, coherent and ambitious plan for its future over the next 5-10 years, in the context of developments across LUSEM and the University and in the wider statistical landscape. There should be particular focus on leading

statistical development in data science. The plan should demonstrate joined-up thinking with regard to developing new teaching and research programs, building on the Department's own strength as well as strengths and expertise from relevant departments such as IT, Engineering and Mathematics.

- The University and LUSEM should strongly consider encouraging and supporting the Department to take an active role in setting up a common data science strategy with the other departments in the University. The University should consider how best to provide this, e.g. through providing specific guidance on what resourcing and support can be made available, on receipt of a coherent and ambitious plan to lead in this area.
- In relation to one and two above, the Department should set up a clear plan for recruiting in next 5 years through the channel of tenure track associate senior lecturers, as the low teaching load and the generous research funding will make the positions attractive.
- The Department needs to make the PhD program more structured, and should continue to explore the possibility of establishing a national statistical PhD consortium, similar to the existing "National Doctoral School on Management and IT". Within the University, it can also join forces with PhD programs in econometrics and mathematical statistics.

## Recommendations for the LUSEM.

Many of the recommendations given for the three departments cannot be solved by the departments themselves since coordination is needed. We list some of the main recommendations which we think essentially has to be solve by LUSEM in cooperation with the departments:

- The strategy for gender balance in the Economics department, has so far not been successful. Some of the strategies used successfully by other places include oversampling women for interviews since we know women are scarce in economics Another option is to develop a strategy for joint hires. These alternative strategies needs support and cooperation from LUSEM.
- The complex funding situation for new postions risks creating an old fashinoed hierarchy of positions, and does not appear to be a selling point in hiring. The constant work applying for money, even within the School and Unviersity, appears to lead a suboptimal use for time for faculty members. Our suggestion is that LUSEM rethink the funding that they can control and work for a different funding model in general for Departments.
- The Economics department should support endeavours to build reserach collaborations with other Departments, both within the School and University more broadly. The emerging initiative in artificial intelligence / data analytics looks very promising. These challenges clearly requires a coordinated plan at the LUSEM level.
- The Department of Economic History needs to assess critically its optimal size. This conversation needs to involve all members of the department from the doctoral students to the full professors, and the LUSEM centrally should be innvolved in this discussion. Careful consideration must be given to the costs and benefits of expanding the Department further, or perhaps even to reducing its size in the future.
- The Department of Economic History in cooperation with LUSEM should evaluate critically how the merger with the CED has affected the research environment. Has it fostered more or less collaboration with faculty outside the CED? How has the merger affected the faculty from outside the Economic History Department who are associated with the CED? Are they still as engaged with the CED? Have the joint grant applications increased or decreased?

- The Department of Statistics should construct a Strategic Plan to articulate a clear, coherent and ambitious plan for its future over the next 5-10 years, in the context of developments across LUSEM and the University and in the wider statistical landscape. There should be particular focus on leading statistical development in data science. The plan should demonstrate joined-up thinking with regard to developing new teaching and research programs, building on the Department's own strength as well as strengths and expertise from relevant departments such as IT, Engineering and Mathematics. The department as it is now is simply too small.
- The University and LUSEM should strongly consider encouraging and supporting the Department to take an active role in setting up a common data science strategy with the other departments in the University. The University should consider how best to provide this, e.g. through providing specific guidance on what resourcing and support can be made available, on receipt of a coherent and ambitious plan to lead in this area.
- In relation to one and two above, the Department together with LUSEM should set up a clear plan for recruiting in next 5 years through the channel of tenure track associate senior lecturers, as the low teaching load and the generous research funding will make the positions attractive.



# Panel and Unit of Assessment (UoA) overview

TOTAL NO PANELS: 1	TOTAL NO UoAs: 4
SUBJECT PANEL NAME	UoA NAME
Accelerator-, Life-, Physical- and Infrastructure Enabling Science	Accelerator Science
	Life and Environmental Sciences
	Physical Science
	Infrastructure Enabling Research

## External panel reports

## Accelerator-, Life-, Physical- and Infrastructure Enabling Science

## External panel report

Accelerator Science - Life Science - Physical Science - Infrastructure Enabling Science

## **Executive summary**

The MAX IV project has been in operation for several years with external users working on many beamlines in various stages of partial or full completion. It is a major project and investment in a smaller country like Sweden. Hence the project has also become challenging, and serious ressource problems regarding both finances and manpower are visible. Still, the initial scientific results show the fantastic possibilities of this first-in-the-world light source of record-breaking brightness. Although based on many years of experience with accelerators and soft x-rays in Lund, the large scale of the project is new and challenging, both with respect to investment, physical size, complexity, management and scientific breadth.

Below, a list of brief overarching recommendations follows in a bullet form. Much more can be found in the following "Research Environments" sections for Accelerator -, Life -, Physical - and Infrastructure Enabling Science.

The MAX IV project will be able to achieve its potential by, among other things, studying and following the recommendations in the present report. The MAX IV project is in serious need of resources, which consequently must be allocated optimally. This should be helped by a tight governance, management and prioritization.

## Overarching recommendations

- <u>Financial</u>: The ecosystem of MAX IV is threatened by a funding shortfall that may render the outstanding light source unable to realize the promise it holds for Lund University and all of Swedish science. We recommend keeping the budget intact as far as possible; this should involve Lund University AND the private and public funding sources.
- <u>Governance and management and projects</u>: It is strongly recommended to keep the central project office. Setting and communicating priorities of the different projects is still important. Also the roles
and the scope of work of individual staff members should be made very clear. It is recommended to allow ample resources at least for the few so called "flagship projects"; (selected by the present panel). 24h operation and assistance should be made available also at the beamlines. The beamline-responsible scientists and group leaders should be given clear mandates.

- <u>Staff</u>: The dedicated staff work extraordinarily hard in an increasingly resource-constrained environment. Beamline scientists and postdocs should be given a reasonable fraction of their time to build a scientific and training record, which could lead to eventual success in academia at LU and other Swedish universities. This would also increase the motivation and commitment of the staff. If possible, processes that would make job vacancies even more attractive to female candidates than at present should be put to place.
- In-house research: A long-term in-house research strategy should be developed.
- <u>Teaching and students at LU and other universities</u>: It is recommended to strengthen the relationship between MAX IV and LU (and ESS) regarding teaching at both the undergraduate and graduate levels.
- <u>Interaction with universities and other research units in Sweden</u>: The engagements between MAV IV, ESS and LU, and the Swedish universities in general, could grow further to the benefit of all; both within science but also regarding technical expertise.
- <u>Interaction with industry</u>: It is recommended to examine the policy of spin-offs and -outs of the many designs of components at MAX IV; these seem to be under exploited. One wonders if this is an intended policy at MAX IV.
- <u>Data:</u> A clear and sustainable data policy should be formulated and enforced, with the perspective of acquisition and storage of data together with its metadata, curation and a plan for open access.
- It is strongly recommended to exploit the coherence properties of the MAX IV beam, the sooner the better.
- Higher repetition rates at FemtoMAX should have a high priority in the facility.
- The Swedish soft x-ray laser, while expected to drive forward excellent science, should not sacrifice the present MAX IV facility in any way and should be started only when complete funding is secured for its operation.

### Introduction to MAX IV

The MAX IV laboratory is a national laboratory situated in Lund in Sweden hosted by Lund University with a mission to develop and operate accelerators, beamlines and instruments of excellence to enable external users to do world-class science with x-rays. Open access for national and international users is obtained via applications twice a year through a peer-review process. The laboratory has a great history over more than 30 years in building and operating accelerators to produce bright electromagnetic radiation from the infrared to the x-ray region. In particular the several generations of accelerators have been innovative and relatively inexpensive, permitting even a smaller laboratory in a small country to be world-leading in several areas of natural science, research and technology. The latest, and by far the largest, facility is no exception to this, with innovative accelerator technology delivering record brilliant beams of electromagnetic radiation. Being in operation for a couple of years, many laboratories worldwide are trying to follow or even exceed this brilliance. MAX IV still being in the lead leaves a window of opportunity for the facility to be exploited.

What is new compared to the old MAXLAB is the rather large scale, high cost and number of facility staff. As a result, the financial and project management situation is being pushed to its limits and even

beyond. Funding the facility is made with governmental money, but major private foundations and some foreign contributions have also secured major pieces of hardware, beamlines in particular. Construction of such a facility requires very substantial funding, but also incurs very large operational costs. One of the present challenges of the facility is to finalize the initial construction project in a reasonable time, but also to operate and in particular to service the users in their scientific endeavours to produce world-leading science to the benefit of mankind and Sweden and the Lund area in particular. In the present competitive world, the above mentioned window of opportunity should be exploited, and the facility is working hard to make this happen. The construction and bringing the facility into operation has had its bumps on the way, and several reviews have taken place in the last years to improve the project management, resources and financial situation. Fortunately, the basis is very sound, and it is "only" a matter of organisation, planning and completion of the facility to its initial stage to make it successful.

The present review, requested by the Lund University management, will try to give advice to the MAX IV project in a slightly different way than the previous reviews, as it is also requested by the RQ20 project management. In particular it will be based on a study of the preconditions for continued and new high-quality research. However, taking into consideration the mission of the MAX IV facility to facilitate research performed partially by internal BUT primarily by external users, the evaluation will differ somewhat from what was asked in general by the RQ20, and not all points requested in the guidelines are meaningful for the MAX IV research environment. The MAX IV facility is indeed a very different entity within Lund University than most of the others, which are university departments or parts thereof. This concerns both governance and mission.

#### Introduction to Accelerator Science

The MAX IV laboratory hosts an accelerator park comprising some of the finest facilities in the world. The high-energy 3 GeV storage ring has had the record brightness for several years with a 300 pm rad beam, only recently overtaken by the ESRF EBS storage ring at 6 GeV with a beam of 133 pm rad. The technologies, making this success of the MAX IV possible, are now being employed in various projects for major upgrades or for future synchrotron light sources around the world.

This success story is made possible by continuous incremental performance advances and is supported by an R&D effort in parallel, targeting future major accelerator upgrades. This philosophy has been followed at LU since many years and is being continued at the new MAX IV laboratory, keeping the traditionally close connection to LU. A lecture program in accelerator science serves to attract students to the field. Several doctoral researchers have successfully completed their theses at MAX IV, supervised by scientists from the accelerator team. Postdoctoral fellows are offered the opportunity to develop their academic profile in a multi-disciplinary environment and to take on responsibility in various very visible projects. The large number of top-class international collaborations provides a stepping stone for a career in accelerator research.

Apart from the ultra-high brightness storage ring physics and beam dynamics, the R&D efforts at MAX IV include, e.g., the development of high brightness electron sources in a dedicated gun test facility, the generation and characterisation of ultra-short bunches in the MAX IV LINAC, the development of beam diagnostics, feedback systems and controls suitable for ultra-high brightness beams as well as of dedicated novel injections schemes and of new vacuum systems. A conceptual design of a soft X-ray FEL driven by the MAX IV 3 GeV injector linac is under study.

The accelerator staff faces the difficult task of balancing research (with outstanding results!) and preparation for future upgrades to keep up the unprecedented performance and to timely provide the next high-end accelerator with the operational responsibilities of a user facility. The relatively small team, particularly considering the number of facilities and tasks, has a track record of overcoming resource limitations by identifying innovative solutions. However, this will only work up to a certain point. It would be mandatory for the continued leadership of MAX IV in the field of accelerator research, if the outstanding R&D activities are given sufficient room and priority also in the future.

#### Observations

#### Leadership

#### Strengths:

Accelerator science has been and is a very active and well-known field of research at MAX IV and the old MAXLAB. The quality of research clearly is at the highest level internationally. The accelerators designed and operated by the accelerator team are testament of a well-organised and functioning group. The technologies developed here are now being employed in various projects for major upgrades or for future synchrotron light sources around the world.

The close connection between LU and MAX IV offers a clear advantage, in particular for recruiting young scientists as doctoral researchers for the accelerator team of which the team under the leadership of Director Pedro Fernandes Tavares makes best possible use.

The highly competent staff covers a broad range of skills and follows a philosophy of versatility and flexibility rather than narrow specialisation. This seems a good choice in view of team size, but also in view of the training of junior scientists.

#### Weaknesses:

There are no obvious weaknesses in the field of accelerators, only a small concern. With the increasing number of accelerators and accelerator projects, management in the accelerator section is faced with the difficult challenge of reconciling necessary preparatory research with an increasing number of operational tasks. In order to maintain the ongoing series of successes, it is advisable to start research on new and novel accelerators at an early stage. To this end, it seems essential that this work continues to be given the priority it deserves and that the accelerator team receives the appropriate financial and personnel support, even in view of the current tense situation.

#### **Collegial culture**

#### Strengths:

The closely intertwined operational duties and philosophy of each researcher addressing a broad range of topics offers a unique opportunity for early-career researchers to develop their originality as well as independence. They have the possibility to perform their research in projects at the world leading infrastructures of MAX IV.

MAX IV accelerator researchers entertain a large number of co-operations with various inter- national research facilities. On the one hand, these collaborations are of tremendous scientific value, on the other hand they help in the recruiting of scientists. For doctoral students at MAX IV, this can be a stepping stone for a career in accelerator research.

In accelerator science, there always have been close ties between accelerator physicists at MAX IV and at LU. This successful model can easily be extended to include other departments as well, in particular in view of the multidisciplinary nature of accelerator technology.

#### Weaknesses:

Again the following points are not so much weaknesses, but rather opportunities that could be exploited more strongly in the future. A healthy number of co-operations is already in place. However, these seem to be mostly with other laboratories, not so much with universities and also not in Sweden. Increased

cooperation with the academic sector could be used to increase the number of junior scientists coming to MAX IV with external funding.

MAX IV is not a degree-granting faculty, although several accelerator staff are supervising students. A more formal (and more extensive) inclusion of the accelerator staff in the academic life might be considered.

#### Quality ecosystem

#### Strengths:

As remarked above, the quality of research in accelerator science is at the highest level internationally. Many projects for major upgrades or for future synchrotron light sources around the world now employ MAX IV technologies. The resulting collaborations again stimulate and inspire local research activities.

A lecture program in accelerator science brings this strong research field into the educational portfolio at LU. Several doctoral researchers have successfully completed their theses at MAX IV, supervised by scientists from the accelerator team.

#### Weaknesses:

The only possible weakness could result from the lack of planning security due to the currently tense financial situation. This could negatively affect the already difficult balance between the commissioning, operation, and maintenance of the facilities on the one hand and a top-class research programme on the other hand.

#### Recommendations

The panel commends the ambitious goals that have led to the success in accelerator science but advises not to overextend at the present. Clearly, greater planning certainty with regard to financial and human resources would be advantageous.

The panel fully recognises the difficulty of balancing operational duties with research. However, in order to maintain the ongoing series of successes, the panel recommends that this work continues to be given the priority it deserves and that the accelerator team receives the appropriate support and time to pursue this.

In order to mitigate temporary funding shortages for the hiring of staff and, in particular, of doctoral students, it is recommended to strengthen the exploitation of third party funding schemes, for example, EC actions for early career scientists. The international collaborations might serve as focus/entry points for getting third party funded postdocs to MAX IV, supporting the excellent research programme. Increased cooperation with other universities, including those abroad, can help to obtain funding for doctoral students who conduct their research at MAX IV and support the team.

While the connection between research at MAX IV and education at LU in accelerator science is strong, there remains the situation that MAX IV does not grant degrees. This is maybe not a problem, but it could be examined whether one can strengthen the educational integration between LU and MAX IV even further and make it even more visible; see also further remarks in the coming sections.

#### Introduction to Life Science

MAX IV has inherited historic strengths in food science and structural biology from MAXLAB and is expanding these strengths in new directions. The MAX IV team supporting life sciences identified a new user community in the environmental sciences, and the team is simultaneously educating environmental scientists about synchrotron science and developing experimental capabilities for them. Experiments in food science, environmental science and solution-based structural biology are underway on several multimodal beamlines, including the operating NanoMAX and Balder and the under-commissioning SoftiMAX and CoSAXS. The dedicated BioMAX beamline for macromolecular crystallography is in operation. Two beamlines are under construction: MicroMAX dedicated to macromolecular crystallography and ForMAX for multimodal imaging and wide-angle scattering. The multimodal beamlines require considerable staff effort to switch instruments between experiments and to support users in vastly different scientific areas. As in other scientific areas at MAX IV, administrative barriers limit the research and training opportunities for staff scientists. Nevertheless the life sciences group takes advantage of several collaborative ventures, including the Lund Institute of Advanced Neutron and X-ray Science (LINXS) and MoReLife, which fosters connections of Lund University faculty in the life sciences with the research capabilities of MAX IV and the neighboring European Spallation Source (ESS). With the notable exception of MicroMAX, which has operations funding for ten years through a grant from Novo Nordisk, all the life sciences are in danger of being jeopardized by the uncertain near-term operations-funding shortfall and by the lack of a coherent plan for support of this critical national research facility in the long term.

#### Observations

#### Collegial culture

#### Strengths

Life sciences research at MAX IV is a substantial part of the scientific environment at Lund University. MAX IV scientific staff collaborate in University-based projects such as FragMAX (fragment screening for drug development) and are active participants in University-based centers, including LINXS, MoRe-Life and the Lund Protein Production Platform (LP<sub>3</sub>). MAX IV life sciences also enrich Lund University through the recently formed EU Hanseatic League of Science (HALOS), which connects research institutes in southwest Scandinavia and the Hamburg area. In addition to MAX IV and Lund University, this includes many strong scientific partners: ESS, European XFEL, DESY, University of Copenhagen, Universität Hamburg, Technical University of Denmark, Aarhus University, Malmö University and EMBL.

The MicroMAX beamline is a noteworthy example of the successful outreach and collegiality of MAX IV scientists. The Novo Nordisk Foundation funded a proposal from an international consortium, consisting of MAX IV scientists and researchers at Lund University, the University of Gothenburg, Aarhus University, the Technical University of Denmark and the University of Copenhagen. The funding will support the construction of MicroMAX and ten years of its operations. The MicroMAX project takes full advantage of the brightness of the MAX IV source and will enable structural biology projects at the cutting edge.

Based on their activity as major users of MAX IV beamlines, Lund University life scientists derive great benefit from proximity to MAX IV. Similarly, MAX IV life scientists welcome opportunities to participate in the educational mission of Lund University through training graduate students via direct experience on beamlines and collaborative projects.

#### Weaknesses

The MAX IV team faces challenges in balancing their service in support of the Swedish national research enterprise and their contribution to scholarly endeavors at Lund University. Life sciences research is strong in many academic and other institutions in Sweden, of which Lund University is but one. This leads to tension between the dual responsibilities to provide a research resource to scientists throughout the country and to be part of the Lund University scholarly environment. In the life sciences, the scientific staff are keenly aware of the dual responsibilities and have balanced these effectively through affiliations with several Lund University, Swedish and international consortia. In general, the facility lacks opportunities for staff scientists to build scientific and training records that could lead to eventual success in academia. This is a major challenge in recruitment of scientific staff.

#### Quality ecosystem

#### Strengths

By all accounts, the life sciences environment at MAX IV is strong. The facility has a deeply embedded culture of service to the national and international research communities. Outreach to newly identified scientific communities, particularly in environmental science, is strong and suitably targeted to the Swedish situation, for example the ForMAX partnership with the Swedish wood industry.

#### Weaknesses

As in other scientific areas at MAX IV, the ecosystem is threatened by a funding shortfall that could render the outstanding light source unable to realize the promise it holds for Lund University and all of Swedish science. This is keenly felt by the dedicated staff, who work extraordinarily hard in an increasingly resource-constrained environment.

#### Introduction to Physical Science

The MAX IV laboratory's physical science environment is inherently coupled to accelerator science since a part of the physical science research and development done at MAX IV relates to the accelerator and beamlines. Thanks to this, major strengths of MAX IV in this area are the outstanding deliverables in machine physics as well as the long-standing expertise and tradition in world-leading beamlines for materials characterization, which utilize MAX IV capabilities fully, at both the 1.5 GeV and 3.0 GeV rings.

The Physical Sciences Division in the organizational chart includes the beamline group of Spectroscopy, as well as Beamline office, and the Insertion Devices group. The beamlines under the Spectroscopy group are Bloch, FinEstBeaMS, SPECIES, FlexPES, HIPPIE, and Veritas. The physical sciences Division activities reach out also to other beamlines such as MAXPEEM, NanoMAX, FemtoMAX and SoftiMAX as well as Balder, which could also very well have been included within the physical science management structure.

One strength of the traditional key scientific fields in the MAX IV physical sciences is built on electron and photon spectroscopies and microscopy techniques, which are used to study gas-phase materials as well as surfaces, interfaces and nanoscale materials. New experimental techniques are being developed and enabled by the remarkable properties of the 3.0-GeV storage ring, such as applications exploiting the low emittance and high coherence for nanofocusing. The femtosecond time resolution beamline Femto-MAX is unique in its kind, using the linear accelerator to produce ultrashort pulses for spectroscopy and scattering experiments. The further developments envisioned for the future include a possibility to include a soft-x-ray free electron laser (FEL) to further exploit the ultrafast time domain. One of the other especially noteworthy approaches that also crosses the physical science division's focus areas is the strongly industry-related ForMAX project, which has major funding from the forest industry. Most of the beamlines of MAX IV relate to physical sciences, as there are many fewer beamlines with a clear strategic role in life science. CoSAX, for example, has excellent opportunities in using scattering methods that exploit the unique coherence of the light from the 3-GeV storage ring.

The special role of MAX IV in Lund University is visible in its physical science environment as well. As the primary role is to be a user facility, MAX IV sees its role to serve Lund and other universities and research institutes in Sweden as well as international users in the physical sciences, which includes materials science and chemistry, geo- and environmental sciences, cultural heritage, etc.

#### Observations

#### Leadership

#### Strengths

The laboratory is a remarkable landmark with an international standing. Since the advent of the new accelerator technology at MAX IV, it has been widely adopted as the international flagship showcase for the worldwide development of synchrotron storage rings. Several storage rings around the world have or will be redesigned to follow the lead of the MAX IV design, some are designed from scratch to follow the path shown by MAX IV. There are several physical science aspects that benefit from the unique position of MAX IV. This gives an excellent setting for MAX IV to have breakthroughs on many physical science fronts.

The leadership culture has evolved from MAXLAB, the predecessor of MAX IV, and has inherited many aspects of their strengths and weaknesses. Recently, room for development in the leadership culture has been noted. As a result, there have been several changes to the directorate in the last 1-2 years, and the management structure and constitution are still evolving with ongoing recruitment processes. Thanks to these recent developments, the direction of the leadership is clearly improving, including realistic resource-loaded scheduling of tasks.

#### Weaknesses

The science division is split into physical and life sciences, with the physical sciences being led by an interim director; currently a recruitment process is ongoing. This division also includes the beamline groups of Spectroscopy, as well as the Beamline Office and the Insertion Devices groups. Meanwhile the life sciences section includes beamline groups of Imaging, Diffraction & Scattering, Macromolecular Crystallography, Controls & IT, User office, and Industrial Relations office. This organization is somewhat non-standard, with sections of infrastructure being included in the physical or life sciences divisions seemingly somewhat arbitrarily.

The matrix organization inherited from MAXLAB has been challenging in the large-scale international MAX IV project. While this issue is being dealt with and going in the right direction, it takes time to change the governance structure because of the very strongly rooted traditions. The roles of group leaders and the structuring of the beamline staff has not been very clear up to now, derived from the matrix organization culture. This has led to slow answers to questions regarding development priorities.

#### Collegial culture

#### Strengths

MAX IV's physical sciences draws its strengths from the strong tradition of motivated and skilled staff with a collegial culture derived from MAXLAB. Furthermore, the present staff is very international. Education and training in synchrotron radiation methods is of high priority for the MAX IV Laboratory, as shown in the outreach activities by staff as well as the education & training efforts such as hands-on workshops and summer schools. It is commendable that MAX IV dedicates a few % of its overall beam time to education and training.

The new MAX IV facility has a unique opportunity with expertise developed by MAX IV and inherited from the old MAXLAB. The MAX IV benefits from the near location of the European Spallation Source and the strong nanoscience programme of Lund University as well as the Institute of Advanced Neutron and X-ray Science (LINXS). Collaboration with the Lund Laser Center would be an obvious benefit regarding a possible upgrade of MAX IV with a soft x-ray free-electron laser.

MAX IV itself is still a young facility, which will develop its role within Lund University and with collaborations in areas such as mathematics and materials science theory.

#### Weaknesses

Most of the scientific staff have been, and still are, focused on delivering beamlines at the basic levels of operation, while they have had little time to focus on scientific research that can be accomplished by these newly developed technologies. While the research with these enabling technologies has been a major driver in delivering breakthroughs, an established in-house research programme for use of these photon beams is lacking.

The old MAX Lab did not offer the high-energy x-rays offered by MAX IV. In this respect, MAX IV is competitive with the so-called high-energy storage rings (such as the 6-GeV ESRF) for photon energies up to ~10 keV and also retains considerable flux also at higher photon energies. The scientific tradition among the Swedish university research groups to use the higher photon energies for physical science research is less than elsewhere; this can be considered as opening up new avenues for research at Lund and across Sweden regarding new science. However, the users in this field will need education in how to exploit, e.g. the capabilities offered by the low-emittance high-energy storage ring such as coherence and nanofocusing capabilities. With effectively a non-existent community in Sweden to exploit coherent high-energy x-ray photon beams, some of the benefits of the enabling technology at MAX IV are at danger of being missed without a proactive international user group that would bring the expertise to Lund.

There is at present an imbalance in gender representation, with a historically and currently predominantly male staff. This imbalance is being addressed but change is rather slow.

#### Quality ecosystem

#### Strengths

MAX IV has a role as an international flagship synchrotron facility with very high standards. It is thus a strong player in the international field. The excellent performance of the two storage rings and the world-wide unique capabilities of the 3-GeV ring give MAX IV an outstanding opportunity to be the brightest synchrotron light source in the world. The high fraction of coherent flux, especially at the high photon energies, benefits imaging and scattering experiments with high resolution, fast time scales, and lower radiation damage.

#### Weaknesses

There are several opportunities for exploitation of the unique properties of, in particular, the 3-GeV ring stemming from the low-emittance including the applications of coherence. These opportunities, being new to the MAX IV staff, have not yet been exploited fully. Certain single points of failure (e.g. one single person responsible for a critical task) have constituted and still constitute a risk.

Supported 24-hour operation has not been put in place yet, and this is an issue for a user facility of this ambition.

MAX IV is engaged in education and training at LU, but it was clear during our evaluation that the staff wishes to engage more and to be more proactive. MAX IV staff have difficulties in finding opportunities to teach and supervise students at LU. More students could be welcomed by MAX IV taking part in the Bachelor and Master programmes, which should be an asset for all parties: MAX IV, students and LU.

The physical science, and also the life science, section will produce an increasing amount of data, which needs clear data management and procurement protocols. Data management for both national and international users will be a key challenge to face in the coming decade. The new data center is a promising start, but data policies are not yet in place.

#### Recommendations

MAX IV is still rapidly evolving in aspects of management, project coordination, user outreach and technical developments at beamlines, as new beamlines and new techniques are being constantly brought to the level of user operation. *Several ongoing parallel projects create a challenge to the prioritisation and sharing of limited resources.* This is acknowledged on the larger scale of the whole MAX IV and also at the level of physical sciences beamline activities. Several different user groups should be served simultaneously, with their different wishes for sample environments, controls, detection schemes, flexibility, etc. Balancing the delivery of high quality for a given capability and the large breadth of available techniques is difficult. *Setting and communicating priorities of the different projects, even at the cost of having to postpone some deliverables, would be important for streamlining the ongoing project planning.* 

MAX IV has a mandate to be a user service facility. However, to stay in the forefront and to remain competitive to attract highly qualified and motivated scientific staff, a long-term strategy for MAX IV in-house research programmes should be developed. To develop a well defined in-house research program and to foster career developments of the scientific staff, it seems clear that the MAX IV would benefit greatly from a closer collaboration with LU regarding teaching in courses and supervising students. Also deepening and widening the collaborations with other Swedish, and perhaps other Scandinavian, universities would be of benefit. The MAX IV staff should develop a strong presence in the LU B.Sc. program "Science with Photons and Neutrons" and the M.Sc. program "Synchrotron Based Science" by participating in the teaching and governance activities and should have a stronger role in their steering groups or similar bodies. To have a viable in-house research programme, MAX IV should take a strong role and presence in the PhD programmes of LU and other universities in Sweden and abroad. This would allow PhD students to carry out research on a long-term basis at MAX IV and allow for training of the next generation of beamline scientists, and keep the young scientists excited about the unique MAX IV facility. In addition to informal personal contacts, clear processes should be developed for this task. Also on the level of postdoctoral training, a program should be developed to have a flow of postdoc positions, at and across beamlines.

The unique capabilities of the MAX IV 3-GeV storage ring should be exploited more aggressively. A materials-science in-house research programme should be generated and a set of flagship experiments that exploit the uniqueness of the 3-GeV storage ring should be identified and conducted by the scientific staff. A colloquium series of materials science using photons (and maybe also neutrons in collaboration with ESS) could be set up to increase the materials science in-house research activities at MAX IV. Collaborations with international expert teams is furthermore encouraged. An example of such a collaboration is the x-ray photon correlation spectroscopy (XPCS) initiative. That would bring needed expertise on new experimental methodologies and eventually result in a greater exploitation of XPCS.

A more hierarchical structure of staffing, indicating a "chain-of-command" and each individual staff member's duties and responsibilities (work description) should be enforced. Like the facility in general, many individual beamlines have parallel ongoing development projects and a clearer way to prioritize would help use the limited resources more efficiently.

*Collaboration with the ESS, LU and LINXS* should be strengthened. Several synergy effects would allow joint research programmes in this landscape, as well as a stronger visibility in the Swedish national strategy for research infrastructures, which is currently being developed. MAX IV should be a proactive stakeholder in the development of the national research infrastructure roadmap together with ESS to maintain the status of the *Lund Science Village* as a strategically important hub within Sweden and the Nordic countries.

The physical sciences, together with the life science environment, will produce very large data sets and the initial data policy did not allow MAX IV to store or handle the data. With the *new data center concept*,

this may now become possible. *A clear data policy* that is in accordance with the recommendations of PanDATA and with the aims of the LEAPS initiative, should be created. Data is the primary deliverable being generated by the facility, and it should be a very central item of facility activity.

It is noted that the fraction of female and minority staff members has room for improvement. The management has noticed this; the reasons relate to a typically lower number of female than male applicants for open positions. Processes that would make job vacancies more attractive to female candidates should be put in place.

#### Introduction to Infrastructure Enabling Science

This research environment includes some of the basic infrastructures needed for the construction and operation of the MAX IV facility.

- 1. <u>The technical infrastructure systems and civil construction and support labs</u> initially focused on the construction of the buildings, and later the installation of the beamlines and the construction and operation of central infrastructure service systems like liquid nitrogen, lab equipment, office supplies, fume cupboards and much more. The agreement for rental of the MAX IV buildings from the ML4 company with a 25 years contract is highly unusual. This also includes operating and maintaining several of the basic services and supplies like electricity, cooling water etc. The maintenance is presently being re-negotiated with possibilities for adjustment.
- 2. Design and construction of instrumentation and vacuum systems have focused on specifying, designing, building or procuring the numerous mechanical and electrical components, devices, systems and subsystems that comprise a facility like the MAX IV with its accelerators, beamlines and endstations. The accelerator systems were built and commissioned roughly according to schedule and have been operational for several years with high reliability. At present, many beamlines and their endstations are operational with basic instrumentation, but completion to their full capabilities will still take a couple of years. Changes and additions to, in particular, the endstations will also be required in the future, although at a reduced pace. Many innovative solutions have been invented and produced for the facility, establishing MAX IV as a unique facility, where one foresees many solutions to be used in future facilities being designed and built around the globe.
- 3. <u>Controls and IT</u> is a very large and often difficult area to establish in a green-field facility, ranging from supercomputers, data acquisition systems, controls of accelerators with beamlines and endstations, networks, data storage systems etc. The KITS group has also had its start-up difficulties and bumps along the way, but today it seems to be an overall well run and well organised group with very many capabilities and services serving a wide range of users with many SW and HW requirements. Staffing appears, however, to be a particularly difficult area.
- 4. <u>Safety including radiation safety.</u> The subject was unfortunately not presented due to illness of the person in question at the very last moment.

#### Observations

#### Leadership

#### Strengths:

Being a green field laboratory, MAX IV has had the major advantage of designing, establishing and building a modern laboratory as wanted and foreseen. This has been quite successful partly because of the knowledge of several experienced staff from the old MAXLAB.

#### Weaknesses

The technical requirements of the very large MAX IV project were numerous and challenging, and reductions in scope have been made regarding the infrastructure and services due to limited funding and recently due to lack of manpower and expertise. Hence, today several areas depend on consultants, which is far from ideal. In particular, valuable time is sometimes wasted for this reason.

The future success and impact of the MAX IV project depends on the continued availability of many resources, including the infrastructure of the MAX IV rings and beamlines and endstations with support laboratories. Some of the support laboratories are today barely finished and brought into operation, but if these are not available and up-to-date, the outcome of the facility will soon be compromised almost before it is in full operation. As resources are limited, we strongly recommend, as is already the case in some instances, to collaborate, pool resources and expertises, and work together with other laboratories at LU and nearby centers.

As more and more advanced uses of the facilities will be requested by users with special samples, upkeep of technical expertise and documentation is essential to avoid endangering the facility's operation in the long term. This also pertains to the repairs and maintenance of very many advanced components.

The numerous beamline scientists and temporary postdocs have little time to establish their own research. This runs the risk of staff departures for permanent, possibly better paid, positions elsewhere with greater opportunities for development. Hence it is recommended to allocate scientific staff and postdocs time for their own research and career development.

#### **Collegial culture**

#### Strengths:

MAX IV, being the first of its kind, has developed many close contacts and collaborations with many other light sources worldwide. This is a huge strength both in terms of exchange of designs, scientific simulations etc. but also possible exchange of personnel, expertise and future recruitment.

Building equipment at the forefront of technology is valuable for the permanent staff but also for earlycareer researchers.

Being an international research center, the diversity and ethical standard is high, which also is an important asset in recruitment processes.

#### Weaknesses:

Although MAX IV is hosted by and physically near LU with very many common technical and scientific interests, many barriers exist to optimal interaction and collaboration, which could otherwise benefit both parties. Some of these are cultural and some are more formal, organisational and structural. Change could further improve the performance of the MAX IV facility and also lead to more satisfied staff and fewer job contract terminations.

#### Quality ecosystem

#### Strengths:

The many external research collaborations and users have a big impact on the research and innovation quality of MAX IV, and hence also on LU. This asset should be recognised by LU and used as an argument for closer ties between the two.

In a few areas like accelerator physics, the strong research is directly connected to the educational portfolio at LU.

#### Weaknesses:

Recruiting and keeping KITS staff is apparently difficult partly because outside companies have very competitive offers with higher salaries and benefits.

#### Recommendations

- It is recommended to increase the relation between *MAX IV and LU* (and ESS) regarding *teaching both undergraduate and graduate students*. In a few areas, e.g. accelerator physics, strong research is directly connected to the educational portfolio at LU. This should be enlarged and in particular also expanded to other research areas like chemistry, molecular biology and others.
- The *engagements between MAV IV with LU and other Swedish universities* could grow to the benefit of all. This concerns both adjunct positions at MAX IV but also in relation to students (masters and PhD). This might require changes from the universities to permit students to stay at MAX IV for extensive periods of time. Funding of more PhD students should probably, as has already been secured in some cases, come from the universities to the benefit of all, the students in particular.
- It is recommended to allocate Beamline Scientists and postdocs well defined time for their own research as part of their *career development*.
- Collaboration between *MAX IV, LU and ESS* should increase further in the future, both within *science* but also regarding *technical expertises*. This has already happened in a few instances, but more should come as ESS matures, again to the benefit of all parties. Other research centers in Sweden should also be invited to collaborate with MAX IV. For MAX IV and ESS, this could possibly also relate to safety aspects, including radiation safety.
- *Spin-offs and -outs* of the many designs of components at MAX IV have been under-exploited. One wonders if this is an intended policy at MAX IV. The panel believes that at least LU has a broader scope to transfer technology and components to the outside world by collaboration, but maybe also by creation of spin-off and spin-out companies. It is recommended to investigate this, or to define a policy.
- The *roles of individual staff members* seem not to be clear in all cases. This also includes unclear scope of work. Furthermore *priorities of facility developments* should always be clear and possibly also publicly visible. Apparently, much improvement has been made along these lines in recent years, but the panel detected that further improvement is needed.
- *Budgets and funding* of the MAX IV facility apparently do not match the high ambitions set out years ago, and the Director recently was asked to prepare future reduced budgets. Clearly this exercise is necessary, but every possible effort must be made over the coming years to make this still unique facility as successful as possible with as high impact as its potential contains. This issue is without doubt known to LU and the funding agencies, but maybe there are still ways to increase the funding or to improve the outcome of a given budget, e.g. by more collaborations and combination of efforts.
- Most beamlines at MAX IV are already in various stages of operation, although for some only at a minimal level. Several beamlines do not exploit the exceptional properties of the MAX IV light. It

- Although being discussed at present, we strongly urge MAX IV to exploit the *coherence properties of the MAX IV beam*, the sooner the better, for example by using tomography and ptychography.
- *The accelerator is in 24-hr operation, but this* is still not fully available for most *beamlines*. This may require additional funds, which may not be available. However, less than full operation sacrifices the return of investments in MAX IV, which should be communicated to the funders.
- Could more *beamline operation and data analysis be delegated to expert users?* This is not easy to arrange, but may be necessary with the limited number of beamline scientists. At present MAX IV sits with the contradiction that more staff are needed to develop the facility fully, both in the short and long term, and at the same time staff numbers may need to be reduced for budgetary reasons.
- It is recommended to look into an even *closer collaboration with the other European light sources*: as MAX IV is a "first mover", many experiences from MAX IV are being transferred to upcoming facilities. This should go both ways, i.e. MAX IV should ask for assistance in areas where others have expertise. This relates to both technical designs and to knowledge and manpower. Such exchange already takes place but could probably grow.
- Having the MAX IV facility connected to LU and located in Lund is a huge asset, which is not used fully by LU and probably also not by other local institutions and industry. This relates to research, but also industrial exploitation. In general, there seem to be barriers, probably mostly formal, between MAX IV and LU, which however difficult, should be lowered. This regards teaching, but also use of expertises, smaller infrastructures and technical equipment. The panel is indeed aware of the fact that MAX IV is constructed as an independent unit, a National Laboratory, only governed/managed by LU. Nevertheless, there are several areas of common interest that should be expanded and fully used to the benefit of both parties. Concerning *industrial use of MAX IV*, there have been and are ongoing initiatives and structures, *also cross-border*, to exploit MAX IV in relation to the region. This needs to be further supported and exploited, probably together with ESS, to contribute to the vision of the *greater Øresund science and technology region* also involving the planned science city to be built between MAX IV and ESS.
- The panel recommends that the *central project office continues* also after the external
- consultant has left and it should in particular continue to be visible and take visible decisions and priorities.
- MAX IV should work towards a *single documentation system* to have easier access to better information.
- The *Swedish soft x-ray laser* is being studied and predesigned at present, and if built, MAX IV is certain to lead the construction of such a facility. However, this effort *should not sacrifice the present MAX IV facility* in any way and be started only when complete funding and in particular also long-term operation is secured.

# **PART III** Transversal Panel Reports



## Content Part III

1. Foreword by the RQ20 project group	. 739
2. External advisors in transversal panels	. 740
Management and Leadership	. 740
Infrastructure	. 740
Large and Interdisciplinary Research Areas (LIRA)	. 740
Recruitment	. 740
External Engagement	. 740
3. External Panel Report: Management and Leadership	. 741
Preface	. 741
Introduction	. 742
Background	. 742
Structure of the report	. 743
Composition of the panel "Management and Leadership"	. 743
Lund University's Strengths	. 744
Historically grown natural strengths	. 744
LU strengths on leadership and strategy:	
Let a thousand flowers bloom	. 745
Lund University's potential weaknesses	. 746
Pruning the garden of creativity	. 746
The RQ20 Transversal Panel's conclusions	
on Management and Leadership	. 750
"Gauge the strength and vitality of the relationship between	
collegiality and line management"	. 750
"How and who sets the University's general strategies,	
and how is progress and goal attainment assessed?"	. 751
"The relationship between the university board and	
central management in setting directions for the university"	. 751
"How are strategies set at the general level matched with those at the	
faculty and department levels? How well do strategies at the central le	vel
match conditions and ambitions within the faculties?"	. 751
"What is the remit, mandate and recruitment	
process of academic leaders?"	. 753
"Models of internal resource allocation, and	
the articulation with external funders and	
stakeholders in securing and expanding the resource base"	. 753
Recommendations	. 753
Collegiality and leadership.	. 753
Develop strategies for the future	. 754
More dynamic use of financial resources.	. 754
Reforms of structure and organization.	. 754
Academic Leadership.	. 755
International perspectives and benchmarking.	. 755
Appendix: Planning Guide Management and Leadership Panel	. 756

4. External Panel Report: Infrastructure
Introduction
Governance of infrastructures at university level
Inventory of infrastructures
Recommendation:
Coordination and knowledge exchange between infrastructures
Recommendation:
Data storage, library and computer facilities763
LUNARC
LDC
Library services
FAIR data and long-term storage764
Recommendation:
Collaborations and career opportunities765
Recommendations766
Faculty-wise short reviews from self-assessments,
subject evaluations and interviews/discussions
Faculty of Science and Faculty of Engineering766
Faculty of Science
Faculty of Engineering
Remarks concerning both faculties
Overall impression
Faculty of Medicine
Overall impression770
Main barriers, weaknesses, needs and suggestions/comments
The faculty of Social Sciences and
School of Economics and Management
Overall impression771
Main barriers, weaknesses, needs and suggestions/comments
Faculty of Fine and Performing Arts
Overall impression772
Suggestion
The Joint Faculties of Humanities and Theology
Overall impression
Main barriers, weaknesses, needs and suggestions/comments
Summary and Recommendations

xternal Panel Report: The Relationship with Large and	
erdisciplinary Research Areas (LIRA)	77
Background	77
Vision	77
Large and interdisciplinary research areas	
(LIRAs) at Lund University (LU)	77
Panel way of working and sources of evidence	77
Focus and structure of panelreport	77
Summary of main findings and key recommendations	77
Using the great strength in growing SRAs to increase LU's visibil	lity in
order to shape its international academic reputation	77
The whole of LU needs to work together to	
maximise the benefits from LU's set of SRAs	77
Possible modifications of internal LU systems which	
would significantly increase the leverage from the	
funding attracted by the SRAs	77
Strategic goal 1: Research of the highest quality and renewal	
Strengths	78
Weaknesses	
Recommendations	78
Strategic goal 2: Intertwining of research and education	78
Strengths	78
Weaknesses	
Recommendations	
Strategic goal 3: Impact on society	
Strengths	
Weaknesses	
Recommendations	
Strategic goal 4: Visibility	
Strengths	
Weaknesses	
Recommendations	
Strategic goal 5: Leadership, gender equality and diversity	
Strengths	
Weaknesses	
Recommendations	
Strategic goal 6: Recruitment and retention of staff	
Strengths	
Weaknesses	
Recommendations	
Concluding reflections	
Conclusing reneetions	

6. External Panel Report: Recruitment
Preface
Executive Summary
Recommendations
Background and introduction
Background
About this report
Mission and metrics
Terms of Reference (ToR) 793
Composition of the panel 4 "Recruitment" 794
Material provided to the panel
Procedures followed by the panel
The University's Principles and Strategy on
Recruitment and Promotion 796
Strategy and framework for the career paths 796
Recruitment of faculty and non-faculty scientists 796
General remarks
Responsibilities and attractiveness
Recruitment of non-faculty scientists
Recruitment of academic leaders 798
Flexibilisation of recruitment799
Tenure track and promotion 799
Funding and academic autonomy 800
Factors to further increase the university's competitivity and attractivity <b>802</b>
Implementation, evaluation and adjustment of
common recruitment and promotion strategies
The Faculty and Joint Faculty Perspective
Faculty of Social Science
Joint Faculties of Humanities and Theology
Faculty of Medicine
Faculty of Law
Faculty of Fine and Performing Art
School of Economics and Management
Faculty of Science
Faculty of Engineering
MAX IV
Annex

7. External Panel Report: External Engagement	
Introduction	
Managing external stakeholder engagement 811	
Observations and recommendations 812	
Industrial collaboration 813	
Observations and recommendations 815	
Lund University and innovation 816	
Lund University and the region 819	
Observations and recommendations	
Faculty and external engagement	
Observations and recommendations	
Health care engagement	
Observations and recommendations	
Showcase Helsingborg	
Observations and recommendations	
Conclusions and recommendations	
Management of External Engagement	
Innovation role of LU 823	
Complex questions from industry	
Internationalisation	
LU healthcare and the region	
Showcases	
Appendix: Information about the	
Panel Assignment and Meeting Schedule	

## 1. Foreword by the RQ20 project group

Lund University is critically dependent on the success of its constituent parts – faculties, departments, divisions, research environments and research teams. In turn, and without exception, they are also part of international research communities. A key issue for RQ20 is to identify where researchers at Lund University are located within those communities, and how they might sustain and enhance their positions. This has been done by external advisors, which have assessed and advised the research environments in each of the 32 *subject panels* with regard to their standing and future direction (for a more detailed description of the structure of the RQ20 work, please see chapter 4 in Part I and for the subject panel reports, please see Part II of this report).

However, a university is more than the sum of its parts. The research environments themselves are critically dependent on central managerial functions for their long-term development and progress. Similarly, they are dependent on a wide variety of functions and supportive mechanisms such as infrastructure, recruitment models, external engagements and a large number of centres and similar cross-disciplinary entities within the University.

The *transversal panels* cover important issues that are critical to the University in its entirety – issues that pertain to the standing and further development of the research environments, and subsequently of the University as a whole. They complement the 32 subject panels by focusing on tasks of general importance and significance for the University, as well as by gathering and analysing collective concerns from the research environments. From the start, Lund University's Research Council (RC) identified a number of overarching key areas of importance to the University as a whole. The investigation of these areas (or themes) was included in the remit of RQ20, in addition to the more research-oriented assessment. Five transversal themes, giving rise to five transversal panels, were ultimately adopted:

- Panel 1: Management and leadership
- Panel 2: Infrastructure
- Panel 3: The relationship with large and interdisciplinary research areas
- Panel 4: Recruitment
- Panel 5: External engagement

Themes 3-5 were identified as key areas already by the RC, while the first two themes were mentioned on a more tacit note. A sixth theme was discussed, namely the interaction between research and education, but this question was implicitly embedded in the instructions for the self-assessments rather than being treated as a separate theme. In order to create the background material for the transversal panels, all UoAs were instructed to answer questions regarding the above five transversal themes in their self-assessments. Hence, the base data for these transversal panels primarily constitute self-assessment extractions, made by the project group. These extractions contained relevant information for each transversal theme. In addition to this information, the transversal panels were also provided with formal documents describing each theme from a general perspective, such as policy documents or information about collaboration partners (in the case of the external relations theme). After the arrival of the subject panel reports, the RQ20 office also added adequate extractions from these to the background material for each transversal panel. Finally, a dialogue was continuously kept with the transversal panelists, and they were given the opportunity to request additional information adequate for the work in the panel. In the chapters below, the advisors in each panel are specified, followed by the panel reports from each of the transversal panels.

## 2. External advisors in transversal panels

The five transversal panels worked without formally assigned chairpersons, and below panellists are given in alphabetical order.

## Management and Leadership

Bertil Andersson Jacques Bittoun Sven Frøkjær Luc Soete Reinhilde Veugelers

## Infrastructure

Henrik Cederquist Birte Christensen-Dalsgaard Johan Fritzell Bente Klarlund Gabriel Krestin

## Large and Interdisciplinary Research Areas (LIRA)

Thomas Bjørnholm Henrik Clausen Jonathan Grant Mary O'Kane Jan Rabaey (adjunct)

## Recruitment

Jan Holmgren Anders Karlhede Claire Kilpatrick Maria Tenje Alexander Zehnder

## External Engagement

Anne Kjersti Fahlvik Anders Flodström Shannon Jackson (adjunct) Jos Lemmink Willy Sansen

## 3. External Panel Report: Management and Leadership

This advice and the recommendations are based on documents provided by Lund University and a string of video supported meetings on 2 and 3 November 2020.

Authors of this report: Prof. Dr. Bertil Andersson Prof. Dr. Jacques Bittoun Prof. Dr. Sven Frökjaer Prof. Dr. Luc Soete Prof. Dr. Reinhilde Veugelers

## Preface

Like many others, the members of this Transversal Panel "Management and leadership" had to carry out their activities in a purely virtual setting unable to meet physically in Lund. This was only made possible by the extensive and meticulous preparatory work carried out by Lund University's RQ20 support staff in the persons of Mats Benner, Malin Bredenberg and Freddy Ståhlberg. They made sure that the rich and generally constructive comments from the numerous "Units of Assessment" were delivered timely to all panel members and helped them to understand better how academic staff experienced the different levels of leadership and management of the University. They also provided answers to the many questions the panel members had about the Swedish higher education system and university rules. During the two-day virtual site visit, they made us, panel members, feel as if we were physically present in Lund and created conditions for a particularly efficient set of in-depth discussions with the university's different management levels.

We would like to express our gratitude to the various members of the leadership of Lund University, in particular: the Vice-Chancellor, the Deputy Vice-Chancellor and pro Vice-Chancellors as well as the new, incoming Vice-Chancellor elect; the chair and various members of the Board of the university; the Deans of the various Faculties; selected directors and heads of Centres and departments leaders; Professor Pam Fredman and Mats Svegfors as so-called "critical friends" of Lund University for their time and readiness to be interrogated at length by external experts not always fully informed about the peculiarities of Sweden's higher education and research system and the way this set the contours of managing Lund University. We learned a lot.

Assessing the quality of the management and leadership of a large, comprehensive university such as Lund University in a purely virtual mode is not easy, particularly in the case of a complex subject such as management and (academic) leadership involving also many personal characteristics such as empathy, moral authority and management reputation. These features are not always easy to figure out in an online communication environment. They crucially depended on the openness and transparency with which our interlocutors were prepared to discuss the questions raised by each one of us. As an international panel, the members of which also never met physically, we felt particularly lucky to be able to conduct all interviews in a particularly open, pleasant and trustworthy mind. We are therefore convinced that the report presented here provides an objective and well-balanced overall picture of the quality of Lund University's management and leadership. We also feel confident that the couple of recommendations proposed will help leaders in their future management of Lund University. The members of the Transversal Panel Management and Leadership, Professor Bertil Andersson, Professor Jacques Bittoun, Professor Sven Frökjaer, Professor Luc Soete and Professor Reinhilde Veugelers. November 2020

## Introduction

## Background

RQ20 (Research Quality 2020) is a comprehensive research quality evaluation exercise carried out at Lund University, based on self-evaluations in specific research areas (Units of Assessment) with an active involvement of members of staff. It was initiated by the current Vice-Chancellor, Professor Torbjörn von Schantz, in February 2019, as the first comprehensive research evaluation conducted at Lund University in eleven years. Such research evaluation has been carried out for 32 different subject panels, assessing and advising on the standing of Lund University's research in these different areas and how, from a bottom-up perspective, one sees the future direction of research in these subject areas.

Next to those subject panels, RQ20 includes also assessments on a number of "transversal" issues. As noted in the accompanying RQ documents from the RQ20 support office: "a university is more than the sum of its parts. The research environments themselves are critically dependent on central managerial functions for their long-term development and progress... The transversal panels cover important issues that are critical to the University in its entirety – issues that pertain to the standing and further development of the research environments, and subsequently of the University as a whole. They complement the 32 subject panels by focusing on tasks of general importance and significance for the University, as well as by gathering and analysing collective concerns from the research environments."

The present RQ20 Transversal Panel on Management and Leadership is specifically devoted to the organisation and leadership of the University: "the distribution of tasks and responsibilities, communication between the different organisational levels, the strategy work and strategy implementation, and the alignment between research and other tasks and obligations of the University (such as education and external engagement)."<sup>1</sup> Specifically, the Terms of Reference for the present transversal panel request answers to the following questions:

- Gauge the strength and vitality of the relationship between collegiality and line management
- How and by whom does the university set its general strategies, and how is progress and goal attainment assessed?
- The relationship between the university board and central management in setting directions for the university
- How are strategies set at the general level matched with those at the faculty and department levels? How well do strategies at the central level match conditions and ambitions within the faculties?
- What is the remit, mandate and recruitment processes of academic leaders?
- Models of internal resource allocation, and the articulation with external funders and stakeholders in securing and expanding the resource base

<sup>1</sup> All quotations are from https://rq20.blogg.lu.se/files/2019/10/RQ20-Transversal-Themes.pdf and subsequent

## Structure of the report

This transversal panel report presents first and foremost an external assessment of Lund University's management and leadership, a complex issue which has received insufficient attention in the management and leadership literature. It is not for our panel to assess Lund University's current strategic plan, but rather to evaluate how the leadership of the university has engaged itself in relation to the ambitions outlined in the strategic plan. And how the management structures of Lund University have contributed to realising particular strategic objectives. All this with the purpose to formulate recommendations on how this can be improved for the future.

As an international panel including four former Vice-Chancellors, we relied not only on the many documents received including the various Units of Assessments, the reports of some of the other transversal panels, in-depth discussions with current Lund University's leadership both at the level of the Rectorate, Deans and Departments/Centres but also on our own personal experience and an open discussion with the new incoming Vice Chancellor, Professor Erik Renström who informed us about his ambitions and interest in the outcome of the RQ20 exercise, including our own panel report.

The latter consist of three parts.

In the next Chapter some of the most striking strengths of Lund University are listed. These strengths are divided between what we call more historically grown, externally "given" strengths, and strengths more directly linked or associated with Lund University's typical management and leadership characteristics.

In the third Chapter we look at the other side and focus on what we call here "weaknesses", but which often seem more like the outcomes of choices made based on possibly carefully identified trade-offs. As an external panel with just one or two members well acquainted with the Swedish university system, we present these "weaknesses" less as a direct critique on current leadership of Lund University than as areas and domains the new leadership of the university should pay particular attention to.

In the fourth Chapter we then try to provide a brief answer to the six specific questions put to us in the Terms of Reference of this Transversal panel on Management and Leadership listed above.

They bring us to make a number of recommendations in the fifth Chapter which we hope will help Lund University's management and leadership to improve further the university's research performance, its leading role in the world and its societal impact both in Sweden and the world as a whole.

## Composition of the panel "Management and Leadership"

This review report was prepared by the members of the Transversal panel "Management and Leadership" consisting of five, both national and international university leaders from key peer institutions.

Professor dr. Bertil Andersson, President Emeritus Nanyang Technological University, Singapore and former Rector Linköping University, Sweden. Currently on the board of the Stockholm School of Economics, KTH Royal Institute of Technology, Stockholm and Technion University, Haifa. Member of the Royal Swedish Academy of Sciences.

Professor dr. Jacques Bittoun, former Vice-Rector for Research (2007-2012) and Rector (2012-2016) of Université Paris-Sud now merged in Université Paris-Saclay. Regular expert for the French evaluation committee of Research and Higher Education (Hcéres).

Professor dr. Sven Frökjaer, former Rector of The Danish University of Pharmaceutical Sciences and former Dean at the Faculty of Pharmaceutical Sciences, University of Copenhagen, member of the Danish Academy of Technical Sciences and vice-chair at the Lundbeck Foundation's Talent Panel.

Professor dr. Luc Soete, former Rector Magnificus of Maastricht University, member of the Supervisory Board of Technical University of Delft and member of the Royal Dutch Academy of Sciences. Professor dr. Reinhilde Veugelers. KU Leuven, specializing in the economics of science, science funding and industry science links. She served on the ERC Scientific Council from 2012-2018. She is a member of VARIO, the expert group advising the Flemish minister for Innovation. She is currently a member of the Board of Reviewing Editors of the journal *Science*.

The panel consisted in summary of four former VCs in different countries (Sweden, Denmark, Singapore, France, The Netherlands), and a leading expert on research evaluation and EU science policy with a broad range of management and leadership experience.

In preparation for the advice each panel member received extended information listed in the Appendix where also information can be found on the different meetings the panel had.

## Lund University's Strengths

## Historically grown natural strengths

As one of the oldest, comprehensive, Swedish universities, Lund University (LU)<sup>2</sup> has established over the years a particularly strong position both nationally and internationally in research. Over the years LU has systematically been ranked among the world's top one hundred universities<sup>3</sup>. Together with other famous universities in the world, LU represents one of the oldest institutions in the world having survived revolutions, wars and famines: proof of the strength and resilience of academic institutions.

The current strong reputation of LU is based on a range of strengths acquired in the past and continuously maintained and expanded. Underlying these strengths are a number of features which can be considered to some extent as "exogenous", as given. They have been instrumental in contributing to LU's current strong position.

Without pretending to be complete, let us list the following.

- LU as one of the oldest universities in Sweden is today one of the biggest and most established universities in Scandinavia and more broadly Europe, as reflected in its membership of the League of European Research Universities (LERU) network.
- LU as Swedish university benefits from the national advantage of being part of a fully subsidized higher education system (no tuition fees), a strong public and private research commitment (Sweden as only European country has a target of a 4% R&D/GDP ratio for 2020) and the presence of private foundations such as the Knut and Alice Wallenberg foundation.
- LU as the Swedish university closest to Europe's mainland and bordering on Denmark and Germany with Copenhagen University at "biking distance", has a significant locational advantage. LU is located in the Øresund Region Medicon Valley, an international strong life science region comprising both academic institutions and industries in South Sweden and the Capital region of Denmark. Combined with the old, picturesque city of Lund, LU has, as a result, a unique attractive ambiance, enabling it to attract both national and foreign students and staff.
- LU is a fully comprehensive university covering nine faculties ranging from Science, Engineering and Medicine to Law, Economics, Social Sciences, Humanities, Theology and Fine and Performing Arts. This comprehensive coverage has the potential to allow LU to address new inter-disciplinary research challenges relatively quickly.

<sup>2</sup> We use in the remaining part of this report the abbreviation LU for Lund University so as to save space.

<sup>3</sup> Recently LU seems to fall just outside the top 100 THE ranking.

- The physical presence and further construction at LU of large research infrastructure facilities such as the MAX IV national synchrotron radiation facility, the European Spallation Source (ESS) currently under construction and the Lund Institute of Advanced Neutron and X-ray Science (LINXS) provide access to world-leading facilities for research. Combined with the university plans for construction of a new campus in Brunnshög, it will give LU a set of unique research infrastructure facilities in the field of Science, Engineering and Medicine and even broader, e.g. in Archaeology.
- LU has abundant resources with over SEK 1 791 million in reserves<sup>4</sup>, enabling it to match, without too much internal financial pressures, successful competitive Swedish and European research funding.

As a result, LU appears today a highly prestigious, even iconic university in Sweden with a strong attraction to top-level national and increasingly also international talent, both in term of students and staff.

These "given" strengths have led to a strong position for LU in research as reflected in some of the subject panel research rankings, a strong position in attracting national and international research grants and talents within an overall well-funded, high quality research infrastructure environment. This creates ideal conditions for a virtuous, self-reinforcing dynamic research environment enabling LU to remain a top excellent research university with its current SEK 6 203 million (over 600 million euros) devoted annually to research.

## LU strengths on leadership and strategy: Let a thousand flowers bloom<sup>5</sup>

In addition to these, more exogenously determined strengths, LU's strong position can also be described on the basis of more endogenously created features. Again, we do not claim to be complete but would list the following:

- LU is a particularly (some would claim: the most) decentralized Swedish university enabling the university to provide space for continuous bottom-up initiatives and a variety of Faculty, Department or Center specific strategies.
- LU has a University Research Board composed of internal representatives of the university which provides the VC and the university's leadership not just with advice but also input for the university's long term strategic plan (currently 2017-2026) as well as allocating annually SEK 27 million for equipment, and approving the co-financing of recruitment. It has led to an improved alignment between the different academic areas as represented within the nine faculties from a previous situation with strong silo mentality.
- The LU's organizational structure reflects this decentralized vision with each Faculty (except the two jointly administered faculties of Humanities and Theology) having, in line with Swedish higher education rules, its own Board.
- Research Centres are created with a high degree of independence which is an ideal testbed for new cross-disciplinary research (and education) initiatives, as reflected in the recent establishment and further development of Research Centres in which interdisciplinary research can flourish.

<sup>4</sup> Including so-called Agency capital at the disposal of central management used for writing off large equipment purchases, monies accumulating during parental and sick leave, and reservations for new hires and recruitment

<sup>5 &</sup>quot;Let a thousand flowers bloom is a common misquotation of Chairman Mao Zedong's "Let a hundred flowers blossom". This slogan was used during the period of approximately six weeks in the summer of 1957 when the Chinese intelligentsia were invited to criticize the political system then obtaining in Communist China. The full quotation, taken from a speech of Mao's in Peking in February 1957, is: "Letting a hundred flowers blossom and a hundred schools of thought contend is the policy for promoting progress in the arts and the sciences and a flourishing socialist culture in our land." See https://www.phrases.org.uk/meanings/226950.html

- LU appears a university with a particular strong sense of alignment with its employees and students, an open and transparent tradition, respect for each other's scientific research field and academic contribution and strong student engagement and influence.
- Leadership and management at LU appear characterized by collegiality: respect for each other's views and focus on consensus and continuity. The university offers a large number of leadership courses, considered important for creating a joint LU-management culture. Such a collegial management structure facilitates academic freedom and responsibility throughout the university. We noticed a strong team spirit among the Deans and the central university management.
- Overall, LU provides very good support from the Research Service office.

In summary, the research environment created at LU appears characterized by a strongly decentralized organisational structure with nine faculties spanning the full spectrum of scientific disciplines including the Fine and Performing Arts and relying in an hugely different way on annual external (research) funding: from SEK 1250 million in Medicine, SEK 800 million in Engineering, SEK 500 million in Science to SEK 20 million in Law and SEK 10 million in the Fine and Performing Arts. At the same time, LU contains today some 162 research units at the origin of LU's current and past success in research impact and in raising new research funds.

This decentralized organisational set-up has undoubtedly been beneficial to the continuous research expansion characteristic of LU. It could be called the "*let thousand flowers blossom*" research strategy. Such a strategy, we believe, has been highly beneficial to LU particularly within a Swedish, funding-wise research-rich environment. Growth and research horizontal expansion have been the driving forces in response to the continuous flows of new challenges researchers and more broadly society have been confronted with.

At first sight LU's decentralized structure combined with its collegial steering appear to form core ingredients of LU.

## Lund University's potential weaknesses

## Pruning the garden of creativity

Looking more closely at the full spectrum and diversified nature of research at LU, the 162 research units, including the large scientific research laboratory MAX IV with its 40 million euros annual turnover, will have on average a limited annual research funding.

It is the problem many if not most comprehensive universities face who do not have the financial (private) reserves of a Harvard (\$40.9 billion in 2019), Cambridge (£7.1 billion in 2019) or Oxford (£6,1 billion in 2019), all with annual research turnovers which will be substantially higher than that of LU (\$850 million). In order to remain a comprehensive university, LU must assure that all finances are used in the most efficient way. This could require enforcing mutualisation of resources, ensuring economies of scale, reallocating finances according to a scientific policy, etc.

LU is in an ideal position to develop such a strategy. It will depend though on clear, more centrally developed direction and leadership quality. From this perspective, we raise here a number of features of LU that from our perspective we would consider today as "potential research weaknesses". We realize that describing those in such terms is unlikely to do justice to the complexity of issues at hand, but in the same spirit of openness and transparency simply list them here.



Some of the weaknesses simply highlight the underexploited nature of the given, "exogenous" strengths mentioned above, others are more directly related to the current management and leadership of LU.

- It is unclear what the international ambition is for LU. Which are its closest, relevant benchmarks?
- Considering LU's reputation, its level of available human capital, economic resources, locational advantages, the question can be raised whether its current international ranking is commensurate with its ambition<sup>6</sup>.
- Organisationally, the university suffers from a complex heterogeneity in its organization with respect to both size and substructures. Many small departments seem to be neither academically nor administratively optimally organized driving up overhead costs, both financially and timewise. Alongside this risk of lack of critical mass in small departments, large departments tend to become isolated from the university governance and instead form their own agenda.
- Within faculties, most Deans are aware of this fragmentation and see the need to consolidate within their own faculties' particular small groups or departments but have not been able to implement such consolidation.
- The past success in attracting funds, the ease with which academic excellence and research reputation could be maintained has created a certain degree of complacency and a strong inward-looking attitude.
- LU appears dominated by a culture that is first and foremost embracing stability but being hesitant to change. Tradition dominates over strategy.
- There is a lack of a sense of urgency in the need to develop an overall, outward-looking strategy for LU, taking into account the rapidly changing global research and higher education environment.
- Priorities and goal settings are not obvious, particularly at the various levels of the organization and its line management.
- There appears to be a lack of connection within LU between Education and Research. LU appears to have a limited Humboldtian tradition.
- Although the university is relatively rich with significant reserves, the VC has only limited centrally allocated funds. The economic resources at the discretion of the central level are too limited to allow for swift responses to rapid developments and needs. There is a "fixed formula" to allocate internal resources which limit the possibilities for the University Board, the VC, Deans and Heads of departments to allocate financial resources for strategic initiatives.
- While there are examples where cross-faculty initiatives have been taken to the benefit of the university at large, they are rather the exception than the rule. LU leadership appears confronted with internal obstacles in finding cross-faculty support if and when it were to implement new strategic initiatives (the case of university-wide investment in AI without concrete translation into research and education is an example). From this perspective, the Max IV and ESS have been exceptions initiated in an earlier period. There is, in other words, only limited ability to reallocate resources across different fields; new initiatives require rather new money.
- LU's collegial system must find better ways to mobilize its decision power. LU's central leadership appears too invisible. One may fall in the trap of trying to please everyone. LU has a leadership model that to a large degree is built on trust, which makes it vulnerable and highly dependent on personal mentalities.

<sup>6</sup> Actually, looking at the latest THE 2021 ranking, LU is ranked 103<sup>rd</sup>: 20 places lower than Copenhagen University, its nearby LERU partner, ranked 84<sup>th</sup>, and just ahead of Aarhus University, ranked 105<sup>th</sup>. The same holds for the QS university rankings with Copenhagen University ranked 76<sup>th</sup> and Lund University 97<sup>th</sup>.

- The University Board consists of a majority of "external" members but these are all, with the exception of one foreign (Danish) member, Swedish national members. Its functioning also appears hampered by being relatively large and heterogeneous thereby diluting time and energy away from "strategy". There is also little representation of the private sector which again impedes designing and advising on strategy.
- In relation to its external environment, LU is suffering from having limited autonomy with respect to the Swedish Government. This holds for all Swedish universities. Governmental interference is quite high compared to many other countries. For example, government's regulations with respect to the status of the Swedish language limits the university's ability to recruit management internationally as well as academic staff.
- Finally, and in line with the RQ20 Recruitment Panel findings, the recruitment of academic leadership has an extremely local profile. It leads to a strong bias towards internal leadership recruitment, partly as a result of an elected academic leadership structure and language restrictions.

Overall, there is awareness within the university of some of these weaknesses even though one might not refer to those as "weaknesses" but rather as issues, choices, trade-offs open for debate.

In that same spirit we would argue that the core fundamental question for LU to address anno 2021 is the extent to which its much praised collegiality leads to an inherent conservative bias and an emphasis on reputation acquired in the past<sup>7</sup>. At the same time, the question can be raised whether incentives for bottom-up initiatives in LU's collegial decentralized system generate sufficient (cross-disciplinary) collaborations and synergies. We tend to believe that the strong collegial system combined with an elected line management where taking new initiatives is not always supportive for being elected (or re-elected if radical changes have been introduced during the first term), leads ultimately to a substantial degree of conservatism in the organization. This is likely to be reinforced by the fact that line management is elected for a relatively short 3 years period with possibilities for 3 years prolongations. These short windows limit the possibility for medium to long-term initiatives and as a result line management will also not be of much interest to strong academic leaders.

Below we noted down as illustrations of some of the points made above, statements made by various LU leaders in the self-evaluation UoA reports and during our interviews which summarize well the tradeoffs which LU finds itself confronted with, although contradicting statements between groups across the university are of course also often found.

> "There is little direct interaction between Faculty or University leadership and our UoA when it comes to supporting the quality of our research" (UoA, Faculty of Medicine)

> "New Public Management and top-down command structure have found their way into the universities. However, in comparison LU has been relatively successful in keeping this development at bay and in safeguarding collegiality" (UoA, Faculties of Humanities and Theology)

> "It is as if the university asks a bit too often what we can do for it, instead of asking what it can do for us" (UoA, Faculties of Humanities and Theology).

<sup>7</sup> as exemplified e.g. in LU's much applauded membership of LERU.

"We cannot really recall when dean(s) or the vice-chancellor(s) visited the department last time to discuss core activities" (UoA, Faculty of Science)

"The management and leadership from the central university level is limited to the general strategy documents" (UoA, Faculties of Science and Engineering)

From the interview meetings with current university leadership, Deans, Department/Centre leaders and the Board:

"There is too little mandate- external and internal – to drive change. Everything is geared towards stability, not change. There is too little pressure for change".

"Decision makers at all levels should start making decisions, we are too scared to do that. We should start doing that-but we are not forced to".

*"Like to have more goal setting from the top. For change we do not receive guidance from the top".* 

"The strategic plan – we got a finished document, saying either yes or no to the document".

We are well aware that these statements, cited here, are made out of context. They pinpoint however to some of the issues raised above and described as "weaknesses". Addressing those is what should be the priority of the new LU leadership. It is to these proposals for improvement that, in the following sections, we propose answers to the specific questions we were asked in the RQ20 process and then make recommendations.

## The RQ20 Transversal Panel's conclusions on Management and Leadership

This RQ20 Transversal Panel was asked to provide Lund University with answers to a number of specific questions (see Chapter 1.1 above). In this chapter, we briefly summarize our main findings with respect to each of the Terms of Reference questions put to the panel:

# "Gauge the strength and vitality of the relationship between collegiality and line management"

Leadership and management at LU appear strongly characterized by collegiality. We noted amongst all our interlocutors a clear respect across both academic disciplines and management positions, for each other's views and a clear focus on achieving consensus. Such a collegial management structure facilitates academic freedom and responsibility throughout the university.

At the same time this collegial system will also have to find legitimate ways to mobilize the university's leadership's decision power. A first impression when reading the self-assessments of the numerous UoAs

is that each level knows almost exclusively the hierarchical level just above and, except for the Research Service and Legal Division, most researchers ignore the central management. We also observed a culture at LU that is first and foremost embracing stability and appears at best hesitant to change. A strong academic culture must be combined with an acceptance of change in response to rapid academic and societal developments. At this moment we have the impression that at LU tradition dominates over new strategy setting.

## "How and who sets the University's general strategies, and how is progress and goal attainment assessed?"

Ultimately it is the VC who sets the long-term strategy of the university in interaction with the university Board. As we understand, the latter has been involved in discussions on the process and on the main goals that created the framework for LU's current ten year strategic framework 2017-2026. However, because of the Board's composition, more structured along the lines of a university (or work) council, this process is likely to lead to a typical "consensus" strategy detailing broad general intentions and ambitions but remaining rather vague about attainment and assessment.

We recommend that LU's leadership pays more attention to develop its own, specific research strategy based upon academic analyses and leadership prioritization followed by the setting of clear targets over time; in short, a full-fledged strategic exercise. That exercise should be a clear and transparent process, communicated to all levels in the hierarchy from the LU executive team and Board to the individual researcher.

## "The relationship between the university board and central management in setting directions for the university"

The activities of LU's Board seem to be dominated by formal regulatory tasks and seems to lack from this perspective pro-activity in setting academic and educational strategic direction. The university Board, having to approve the strategy, seems in our view insufficiently involved in the design of the strategy and somewhat isolated from the rest of the university. It is essential that regular informal meetings take place between VC and the chairman of the Board, and that there is, at least once a year, a special Board Meeting dedicated only to strategic issues.

At the same time the Board has been particularly proactive and successful in the establishment of Max IV, ESS and more recently the development of Science Village. It is also commendable that LU's Board has an external, foreign academic member, even though we would encourage the Board to have more. All this being said, and while we are aware that regular informal meetings between the VC and the chairman of the Board take place at LU, we observe that the Board has been much less involved in setting the frame for internal academic priority setting.

# "How are strategies set at the general level matched with those at the faculty and department levels? How well do strategies at the central level match conditions and ambitions within the faculties?"

As a full-blown comprehensive university with, in addition having available a unique set of large, topof-the-bill research infrastructure facilities such as MAX IV and ESS, LU has an extremely differentiated portfolio of activities (*take away research*) across its different faculties and departments/centres. Large and very large departments exist alongside small departments, some subcritical in size.



We propose that LU's leadership, in dialogue with the appropriate deans, takes the initiative to start a process of departmental reform and of consolidation of activities and research groups within faculties.

In addition, one should take into account the increasing need for interdisciplinary research in finding solutions to new, emerging societal challenges. Those challenges, tough and global as they are, require input from all scientific fields including social sciences and humanities. None should be left behind.

With respect to the second question, there seems to be some disconnect between strategies set out at the general level and those at faculty or centre/department level. We were told that there is a formal, legal requirement for every faculty to have its Board. It fits of course the overall LU governance model characterized by a decentralized organisational structure. In principle such a decentralized organisational set-up could enable the university to react quickly to new external research challenges such as the global, socalled SDGs challenges. However, LU's decentralized governance structure has led to a significant degree of heterogeneity in terms of individual faculties' growth strategies with amongst other the successful creation of new, relatively autonomous and independent research centres each with their own strategy. It has remained difficult to pull together and coordinate this diversity in strategies and initiatives in an overall common university strategy. It might well explain, the relative broad and general nature of LU's Research Strategy mentioned earlier.

In short, we conclude that although LU's decentralized governance structure has been and is beneficial for continuous incremental research renewal, it makes it difficult for LU to set out a clear future research strategy.

# "What is the remit, mandate and recruitment process of academic leaders?"

As other Swedish universities, LU is embedded in a Swedish regulatory environment which restrains to a certain level access to foreign academic leadership talent, e.g. knowledge of the Swedish language being essential. This has undoubtedly contributed to a tradition within the university of local recruitment of leadership.

In line with the recommendations formulated by the RQ20 Transversal Panel on Recruitment, we also recommend that LU should try to recruit more systematically academic leaders with international experience, and more broadly that LU pays specific attention in recruitment to leadership qualities.

# "Models of internal resource allocation, and the articulation with external funders and stakeholders in securing and expanding the resource base"

As an international panel, we consider LU a well-funded university with substantial reserves. Yet the amount of agency capital at the disposal of LU's leadership to invest in new initiatives is relatively limited. For large investments, such as MAX IV, it will always require substantial amounts of external co-funding. Developing new transdisciplinary research areas across different faculties on the other hand appears difficult to implement without the active financial support of faculties and departments/research centres.

As we have put it, LU needs to find ways to reallocate existing resources, including activating its own reserves. Otherwise new research initiatives will only emerge on the basis of new, external funds by and large outside of the influence of the university's own leadership. In short, there is a need, now and then, for pruning the research garden of creativity. In the case of Lund, time is now.

## Recommendations

The recommendations put forward follow from a number of general observations which we summarize first and are then followed by a number of specific recommendations addressed first and foremost to LU's leadership.

## Collegiality and leadership.

Leadership and management at LU appear characterized by collegiality: respect for each other's views and focus on consensus and continuity. Such a collegial management structure facilitates academic freedom and responsibility throughout the university. We noticed a strong LU team spirit among the Deans and the central university management. Collegiality is a strength for LU, yet its collegial system must find legitimate ways to mobilize its decision power. A strong academic culture must be combined with an acceptance of change in response to rapid academic and societal developments.

- We recommend that a stronger emphasis be put on proactive priority setting while at the same time ensuring that effective implementation throughout the various levels of the university system is taking place.
- LU's collegial management structure should be exploited in the design of the strategy, building on bottom-up responsibility and academic freedom throughout the university.
- LU's collegiality characteristics should translate into a more frictionless and rapid implementation process enabling changes dictated by the strategy.
## Develop strategies for the future.

LU has a general research strategy that contains a number of general ambitions<sup>8</sup>, the first one under the heading of "The University shall further develop its strategic capacity". Yet, these ambitions need to be translated into a clear implementation path. A strategy includes not only the "ends" it wants to achieve, but also the "ways" and "means":

- LU needs to develop its own, specific scientific strategy based upon academic analyses and prioritization followed by the setting of clear targets over time; what we would call a full-fledged strategic exercise. That exercise should be a clear, transparent and inclusive process, communicated to all levels in the hierarchy from the LU Board and executive team to the individual researcher.
- Next to having clear targets and milestones that one can be held accountable for, the strategy needs to have clear budgetary implications.

## More dynamic use of financial resources.

Lund university is within the Swedish higher education environment a well-funded university with significant reserves. Yet, the availability of financial resources appears to be more of a limitation e.g. when requesting new funding from governmental sources, than an asset, leading as a result to an underfunding of new transdisciplinary research areas and missing out on new opportunities. The university needs to find ways to reallocate existing resources; otherwise new initiatives will purely have to depend on getting new money. In short, there is a need for pruning the research garden of creativity.

- For LU to keep its place in the rapidly changing global research environment, the university will need to take advantage of the significant reserves for strategic investments.
- The Board should ensure that the Vice-Chancellor and his/her team have a more substantial central budget for new strategic initiatives than they have now. The allocation of this central money should be in line with the university's strategy and discussed with the Research Board, in other words not in an ad hoc fashion.
- The academic leadership at VC and Deans' level should have regular meetings with major external funders, including the private sector, discussing new initiatives. Issues to be discussed in these meetings include plans and criteria on how to raise funding for new initiatives.

## Reforms of structure and organization.

Lund University has some very large departments but also many small departments possibly subcritical in size. Smaller departments typically suffer from being restrained academically as well as incurring relatively high administrative costs and overheads.

- University leadership should, in dialogue with the appropriate Deans, take the initiative to departmental reform and the consolidation of research groups within Faculties.
- Doing so special attention should be paid to lowering the existing barriers between Education and Research which appear particularly high in the case of LU.

<sup>8</sup> Seven are identified in the LU Research Strategy 2017-2021 document: "The University shall further develop its strategic capacity, The University shall create conditions for cross-disciplinary research, The University's research shall contribute to formulating and tackling society's challenges, Research at the University is to be supported by research infrastructure which is accessible and fit for purpose, The University shall make the most of the opportunities offered by the new, major research facilities in Lund, The University's research is to have high visibility, and Research and education within the University shall be mutually beneficial".

- At the same time investment into strategic interdisciplinary research centres should be encouraged including the association with Humanities and Social Sciences. One need to break down the barriers between so-called "wet" and "dry" sciences.
- The Research Board should synchronize local strategy processes of faculties and research centres within the overall LU strategy process.

## Academic Leadership.

In line with the recommendations of the RQ20 Recruitment panel, we also conclude that the university needs to move away from its tradition of local recruitment of leadership.

- LU's ambition should be to recruit more systematically internationally positions of academic leadership.
- In addition, one should include in the recruitment process of faculty, an assessment of leadership qualities. Furthermore, one should implement formal leadership packages enabling academic leaders in line management to be able to carry out research during their term of office.
- The new VC should have a major influence on the composition of the leadership team including the appointment of the Pro Vice-Chancellor.
- The initial term for deans and chairs should be prolonged from three to five years.

## International perspectives and benchmarking.

The University should further develop its intelligence ("*omvärldsanalys*") on developments within academia and best practices in leading universities all over the world, which LU identifies as relevant benchmarks. This holds for both education and research. Such taking note of best practice at top-level universities should go beyond LERU and Scandinavian practice.

- The VC should appoint a small high-level international advisory board of esteemed academics and academic leaders for annual meetings during his/her tenure (different from the current university-wide Board/Council) guiding him/her with external advice in the elaboration of the strategy.
- In addition, evaluation and accomplishments of the strategy should be done in an appropriate and regular way.
- The university should expand the introduction of English in undergraduate teaching.
- Lund University should increase its strategic collaboration with other complementary universities. Particularly the close location of neighbouring universities in the border region with Denmark and Germany should be further exploited.

# Appendix: Planning Guide Management and Leadership Panel

# Meeting Schedule

SCHEDULE FOR TRANSVERSAL PANEL MANAGEMENT AND LEADERSHIP DIGITAL MEETING November 2-3		
Digital pre-meeting between RQ20 Admin and panellists: Wednesday, O	ct 21 13.00 – 14.00	
November 2	November 3	
08.40 – 08.50 Session 1 Welcome by the RQ20 Administration Freddy Ståhlberg, Mats Benner, Malin Bredenberg		
08.50 – 09.00 Break	09.00 – 10.00 Session 7	
09.00 -09.50 Session 2	Discussion with selected representatives for the University Board	
Internal panel meeting	Moderator: Tim Djärf	
	Participants: https://www.lunduniversity.lu.se/about-lund-university/management- leadership/university-board Jonas Hafström (Chairman of the Board) Ingrid Bengtsson-Rijavec Christofer Edling Jens Oddershede	
09.50 – 10.00 Break	10.00 – 10.15 Break	
10.00 -12.00 Session 3 Interview with the LU Leadership: Vice-Chancellor, deputy Vice-chancellor and pro vice-chancellors	10.15 -11.10 Session 8 The other perspective: Discussion with two Swedish "Critical friends of the university" Participants:	
Moderator: Mats Benner	Pam Fredman https://en.wikipedia.org/wiki/Pam_Fredman	
10.00 – 10.15 Presentation: The leadership's comments on six "sritical issues":	Mats Svegtors	
riesentation. The leadership's comments on six citical issues.	11 10 11 15 Prook	
*Gauge the strength and vitality of the relationship between collegiality and line management *How and by whom does the university set its general strategies, and how is progress and goal attainment assessed? *The relationship between the university board and central management in setting directions for the university *How are strategies set at the general level matched with those at the faculty and department levels? How well do strategies at the central level match conditions and ambitions within the faculties? *What is the remit, mandate and recruitment processes of academic leaders? *Models of internal resource allocation, and the articulation with external funders and stakeholders in securing and expanding the resource base	<ul> <li>11.10 – 11.15 Break</li> <li>11.15 -12.00 Session 9</li> <li>Interview with the proposed new LU Vice-Chancellor from Jan 2021 https://www.medicine.lu.se/article/erik-renstrom-proposed-as-new-vice-chancellor</li> <li>11.15 – 11.25 Presentation (Erik Renström): Continuity Versus Change</li> <li>11.25 – 12.00 Questions from panel, discussion</li> </ul>	
10.15 – 10.20 Short Break 10.20 – 12.00 Questions from panel, discussion		
Participants: https://www.lunduniversity.lu.se/about-lund-university/management- leadership/university-management		
Torbjörn von Schantz, Vice-Chancellor Sylvia Schwaag Serger, Deputy Vice-Chancellor Stacey Ristinmaa Sörensen, Pro Vice-Chancellor Bo-Anders Jönsson, Pro Vice-Chancellor Bo Ahrén, Pro Vice-Chancellor Susanne Kristensson, University Director		
Torun Forslid, Senior Advisor		
12.00 -13.00 Lunch	12.00 -13.00 Lunch	

	1
13.00 -15.00 Session 4	13.15 Time disposable for papelists follow-up
Interview with the deans/equivalent	
Moderator: Freddy Ståhlberg	
2-minute "shotgun" presentations (no slides allowed): How is alignment with the central management performed and how is the faculty led ?	
13.00 – 13.02 Viktor Öwall, Engineering (LTH) 13.02 – 13.04 Sven Lidin, Science (N) 13.04 – 13.06 Mia Rönnmar, Law (J) 13.06 – 13.08 Christofer Edling, Social Sciences (S)	
13.10 – 13.12 Kristina Åkesson, Deputy Dean, Medicine (M) 13.12 – 13.14 Johannes Persson, Humanities and Theology (HT) 13.14 – 13.16 Fredrik Andersson, Economics&Management (EHL) 13.16 – 13.18 Anna Lyrevik, Fine and Performing Arts (K) 13.18 – 13.20 Ian McNulty, MAXIV Director	
13.20 – 13.30 Short Break	
13.30 – 15.00 Questions from panel, discussion	
15.00 – 15.15 Break	
15.15 – 17.00 Session 5	
Interview with LU Representatives for Prefects, Center leaders, SRA leaders /equivalent	
Moderator: Malin Bredenberg	
2-minute "shotgun" presentations (no slides allowed): My organisation and my view on leadership.	
15.15 – 15.17 Martin Dribe, EHL 15.17 – 15.19 Tomas Persson, HT	
15.20 – 15.22 Lars Dahlin, M 15.22 – 15.24 Marjolein Thunnissen, MAXIV 15.24 – 15.26 Emily Boyd, S 15.26 – 15.28 Karin Johansson, K	
15.30 – 15.32 Xavier Groussot, J 15.32 – 15.34 Fredrik Nilsson, LTH 15.34 – 15.36 Leif Bülow, N	
15.36 – 15.45 Short Break	
15.45 – 17.00 Questions from panel, discussion	
17.00 – 17.15 Break	
17.15 – 18.00 Session 6	
internal panel meeting	

# Background Material

ltem no	Document Specification	Contents/links
1	Relevant excerpts from the self-evaluation reports: In these documents, relevant excerpts concerning recruitment from all the self- evaluation reports generated by the LU researchers has been organised faculty-panel- and UoA (Units of Assessment)-wise.	<ul> <li>1.1 Faculty of Social Science</li> <li>1.2 The Joint Faculties of Humanities and Theology</li> <li>1.3 Faculty of Medicine</li> <li>1.4 Faculty of Law</li> <li>1.5 Faculty of Fine and Performing Arts</li> <li>1.6 School of Economics and Management</li> <li>1.7 Faculty of Science</li> <li>1.8 Faculty of engineering, LTH</li> <li>1.9 The Joint Faculties of Science and Engineering</li> <li>1.10 MAX IV</li> </ul>
2	Strategy Documents.	<ul> <li>2.1 LU Strategic Plan: https://www.staff.lu.se/sites/staff.lu.se/files/strategic_plan_2017-2026_2.pdf</li> <li>2.2 Lund University's Research Strategy 2017-2021 (Eng.)</li> </ul>
3	Answers from the University Managements to questions from panel (written answers and attachments)	3. Q&A with University Management
4	Recruitment statistics from faculties	4. Recruitment statistics from faculties
5	Excerpts from subject panel reports relating to organisation and leadership.	5. Leadership - panel reports
6	Transversal panel reports on Recruitment, Infrastructure and Large and Interdisciplinary Research Areas (LIRA) (Drafts)	6.1 Recruitment report 6.2 Infrastructure report 6.3 LIRA report
7	Memory-notes from sessions, and other materials from participants	7. Minutes and supplementary material from sessions
8	PowerPoints from sessions	8.PPT - PPT; session 3 - PPT; session 9
9	Link to Pam Fredman's report, English abstract pp. 29	9. https://www.regeringen.se/4a71f0/contentassets/ b81affc4c0754122b1f7bbb24f23832c/en-langsiktig-samordnad-och-dialogbaserad- styrning-av-hogskolan-sou-20196
10	Bibliometric data extracted for research environments	10. Bibliometry
11	Information about "myndighetskapital", development over time (in Swedish)	11.1 Information om myndighetskapital på LU 11.2 PPT; Myndighetskapital, några bilder

# 4. External Panel Report: Infrastructure

## Introduction

We the *international transversal panel on Research Infrastructures* of the RQ20, Lund University (LU) hereby deliver our report. The panel was provided with extensive written documents describing the research infrastructures at LU in a multitude of ways. We were further guided by a two-day Zoom meeting in which we got presentation of, and had intensive discussions with, key actors within many different research infrastructures at the University, as well as two separate meetings with the Pro Vice-Chancellor Stacey Sörensen. During the whole process, the project leaders of RQ20 Mats Benner, Freddy Ståhlberg and the project coordinator Malin Bredenberg were to our disposal. They were all very responsive to any and all requests for information and explanation. They also organised this two-day meeting in an exemplary fashion.

Lund University is the host of a large number of research infrastructures, larger and smaller. A number of issues that the Infrastructures Panel was supposed to address are related to the infrastructure governance, at central university level and at the level of the various faculties. Questions concerning this topic were related to definitions of infrastructure categories, to identification of central infrastructures, requirements of critical infrastructures, priorities, allocation of co-funding, and overall strategy. An additional question was also addressed to the overall balance between large and small infrastructures and the overall portfolio of infrastructures. Finally, Lund University has identified collaboration and sharing of opportunities between infrastructures as a key element of governance and the Panel was asked to give an opinion on these elements.

In the report we aim for a general discussion of a strategic kind. We report on our interpretation of the self-evaluations and other information that was provided to us by each faculty at LU as well as our interpretation of the presentations that were made during the meeting. Further, our report includes at the end recommendations mostly from a strategical governance perspective, but we also give some more specific and faculty related advices.

It is essential for us to underscore two issues that *we do not aim for* in this report. First, it is not in our mandate, or possibility, to rigorously evaluate every single infrastructure. Second, it is not in our mandate to focus on MAX IV since it is evaluated separately. However, the latter is still mentioned within the report since it has relevance and connection also to many scientific topics and other research infrastructures at LU.

The panel would like to stress that we are unanimously truly impressed by the overall quality, organisation and structure of most aspects relating to research infrastructures at Lund University.

Henrik Cederquist, Physics Department, Faculty of Science, Stockholm University

Birte Christensen-Dalsgaard, Institute of Culture and Communication, Uninversity of Aarhus

Johan Fritzell, Aging Research Center, Karolinska Institutet & Stockholm University

Bente Klarlund Pedersen, Centre for Physical Activity Research, Rigshospitalet and University of Copenhagen

Gabriel P. Krestin, Department of Radiology & Nuclear Medicine, Erasmus MC, University Medical Center Rotterdam, the Netherlands.



## Governance of infrastructures at university level

With reference to research facilities and particularly infrastructures the Lund University Research Strategy document states that research is to be supported by research infrastructure which is accessible and fit for purpose. In this context good access to research infrastructure such as research facilities, high performance instrumentation, libraries, computer clusters, extensive databases, etc. has been identified as a condition for effective individual research.

Lund University has a well-developed system for supporting infrastructures with dedicated funding for their development and maintenance. The pro vice-chancellor for research is in charge and is supported and advised by the university-wide Research Board on all strategic research matters out of which issues concerning research infrastructure including strategic investments are of paramount importance.

The structure and size of Research Infrastructures (RIs) depend on the field. In e.g. physics or medicine, there is a long tradition for large scale infrastructures whereas humanities and social sciences typically embark on smaller infrastructures. For all, independent on size, it is important to highlight that the life cycle of RIs also involves the difficult issue of closing down a RI when it has served its purpose or is out of date. The panel was not able to get exact numbers, but our impression was that more RIs were initiated than those ended. This is a well-known issue for LU; it is actually the second item mentioned about research infrastructures in the overall research strategy of LU. Still, it seems to us that this issue needs further guidelines and rules. Given the well-developed system for supporting and funding of RIs at the faculties and university level within LU we believe such guidelines and strategies for the end of life for RI should be developed further if the item in the overall research strategy is to be taken seriously.

For LU the support of new versus on-going established RIs is a difficult balancing act. The panel wants to stress that RIs must have a reasonable degree of security and sustainability. It is thus essential to secure funding for upgrading over a relatively long period of time for well- functioning infrastructures.

For those RIs aiming at wider national and international interest the Swedish Research Council (VR) is a key actor. VR has changed its national strategy for infrastructures quite dramatically over the last 5 years or so. Before that it was felt that funding was allocated on a too much ad-hoc basis without any clear national strategy. Now the process is more rigorous. VR, and its Council for Research Infrastructures, RFI, works within a needs inventory system in which universities apply. There is an RFI needs inventory every second year and the year between there are calls to become a national or international research infrastructure within the areas that got the best evaluations: In these calls VR normally expect only one application per area since it is based on the evaluations of the pre-call within the needs inventory system. For VR to co-finance a National Infrastructure, for instance, it must be shown that there is a sufficiently large national user base and a sufficiently strong scientific case. Here, it is important to mention that VR finances a maximum of 50 % of the investment and running costs for new or already existing infrastructures. The maximum funding period for a national infrastructure is currently seven years. Towards the end of an infrastructure grant period it is possible to suggest that the activities are continued within a needs inventory call.

The panel has noted that LU has developed internal systems for these steps that in our view are to be applauded. First, within most but not all faculties internal support is provided. At the university level an annual university-wide call has been developed that allocates funding (although the annual amounts are relatively modest). LU has further developed advanced and excellent processes and strategies to facilitate proposals to go further to the national level.

Here a key instrument seems to be an internal "needs inventory" instrument, mirroring to some extent the national one by VR. The latter means that internal priorities have already been worked out when a national needs inventory is announced. The strategy seems to bear fruit. In the latest needs inventory for new (and continued) national research infrastructures made by VR only ten suggestions were given the highest mark (A1); of these four were sent in from Lund University (ACTRIS, SWEHumLabs, Ultra-högfälts MR vid den nationella 7T anläggningen, and upgrading of the ALICE experiment).

## Inventory of infrastructures

The Research Board has established a *working group* for research infrastructures commissioned with a university-wide inventory of infrastructures. For this purpose, the Research Board initiated a first university-wide inventory administrated by the Lund University Current Research Information System (LU-CRIS) in 2017. LUCRIS now provides information on over 200 research infrastructures located all over the university campus, their respective resources, access policies, training opportunities and user fees.

Thus the LUCRIS portal offers a good overview of the available research infrastructures and the necessary information for their respective use. However, some basic questions have been raised by the LU-CRIS' administration with respect to infrastructure definitions, to the granularity of the provided information, to policies for data management, and to respective relationships of infrastructures to local, university-wide, and national strategies.

Moreover, discussions with some faculties and infrastructures have revealed lack of uniform policies with respect to categories of infrastructures, their sustainability and long-term funding strategies. There was also a need for a harmonized strategy of research infrastructure governance, access policies, and user fee structures. A balanced strategy with respect to the importance of the infrastructure, its use intensity and necessity, as well as policies on termination of some infrastructures were felt as necessary.

In this context the Infrastructure Panel members would strongly suggest the development of clear definitions for different categories of infrastructures that for example could be:

- **Digital data collections**, libraries, and biobanks (usually open source but also proprietary with clear access rules) representing valuable multidisciplinary resources used by large numbers of researchers. Long-term sustainability and storage as well as queries could be based on meta-data catalogues and governed by transparent principles.
- Research service platforms for general use supported at university level (examples would be data storage and computing facilities, digital research environments, freeze- frames, animal houses, etc.) would allow researchers to easily access necessary resources based on harmonized principles.
- National or university-wide research infrastructures of paramount importance for multidisciplinary research between faculties are usually large infrastructures of national importance allowing access to internal and external users. A set of principles governing such facilities should be developed and long-term sustainability should be based on national and local funding. Examples for such research infrastructures are LBIC, etc.
- Faculty based core facilities for multidisciplinary use or for specific disciplines related to research within specific faculties but used by multiple research groups based on similar principles like the university-wide infrastructures.
- Faculty based research laboratories with different types of research equipment serving a specific need and used by a smaller number of research groups (like a flow cytometry infrastructure).
- **Research equipment** of major importance for strategically significant research activities are crucial pieces of equipment used by one or more research groups for a promising research area.

Such clearly defined categories could simplify and harmonize university policies regarding prioritization of governance and management principles, (co-) funding, access rules, and user- fee strategies.

#### Recommendation:

• Work out a system of infrastructure categories and use this system in LUCRIS where the information could be harmonized to a common minimum level per Infrastructure category.

## Coordination and knowledge exchange between infrastructures

During the discussions with the different infrastructures, the participants expressed an interest in the sharing of information across the different RIs with the purpose to develop best practices. This could be:

- Content and strategies for further development
- Governance of the individual RI
- Funding and payment models
- Sustainability
- Common challenges such as data storage and FAIR (findability, accessibility, interoperability and reusability) data principles.

#### Recommendation:

Establish an instrument for knowledge exchange among the major RIs e.g. through meetings between representatives from several infrastructures (sometimes also including user representatives).

## Data storage, library and computer facilities

The need for a state-of-the-art IT platform or e-infrastructure was one of the most frequently mentioned requirements for high quality research in the self-evaluation of the various faculties, in the discussions with the Pro Vice-Chancellor for research, and with representatives of individual research infrastructures. Numerous registries, databases, but also large research infrastructures like, for examples, LBIC or CTG in Medicine or MAX IV depend heavily on well-functioning computing facilities and storage capabilities. The self- assessment forms from humanities and social sciences also pointed to the importance of IT support.

## LUNARC

The main infrastructure providing such services is LUNARC a high-performance computation center which is also part of the national high-performance computation infrastructure, SNIC (Swedish National Infrastructure for Computing). LUNARC has a large number of servers (240) a significant GPU cluster, and some 20 Petabyte storage capacity out of which 4 Petabytes are allocated for sensitive data. A limited number of system and applications specialists (6 FTE) are entrusted with providing the services to most research groups and infrastructures all over the university campus including the support for some 800 software packages. The storage of LUNARC serves as time-limited (6 months) storage in connection with computing; however, the need for long term storage was raised by several especially at the presentation. Long term storage of data, data integration and data curation are not in the scope of the facility and remain mainly to be the responsibility of the various research groups. As part of the university strategy on Open Science this need should be addressed. As pointed out below, LUNARC could play an important role in ensuring that selected data can be stored for longer periods and thus play an important role in "FAIRifying" the data.

LUNARC is funded partially from national sources and partially by Lund University. The general impression of the Infrastructure Panel members was that LUNARC is highly appreciated by its users at LU and that services are easily accessible and of high quality.

#### LDC

In the self-assessment forms, many mentioned the IT-support staff as an essential and important infrastructure. The support varies from simple computing problems to advanced application assistance.

As LDC was not presented separately, its integration with both the computing facility and the research community was difficult to judge. Here we will just stress the importance of a facilitator group between research, IT and information resources – and in category between the research methodology, data stewards and computer scientist.

#### Library services

Many of the self-assessment forms from the humanities and social sciences, mention access to the libraries' print and digital collection as an important infrastructure. Even if not mentioned explicitly in many self-assessment forms from the other disciplines, it was clear from the presentations, that the libraries, both the central and particularly the faculty libraries play an important role for the research activities in areas of impact assessment of publications and assistance in formulating and assessing data management plans.

The library is pursuing an active role within the area of open science. It is working on an overall open science strategy for LU. The panel sees such a strategy as urgently needed.

#### FAIR data and long-term storage

Together with the centralized high performance computing facility it seems that the responsibility for a coherent infrastructure to support the whole area of open science, FAIR data, and data management is presently divided among several parties such as the peer (in project) support, IT-support and library support. The result is that faculties and research groups adopt various strategies when it comes to longterm storage, to digital research environments, electronic lab journals, or research management software. GDPR is an issue mentioned by several research infrastructures but there is no centralized policy or support for data management.

To address this shortcoming, the Pro Vice-Chancellor has initiated an e-science initiative and the library has been asked to formulate a strategy.

The Infrastructure Panel members can only stress the importance of such an initiative and encourage the leadership to prioritize the initiative.

Particularly the initiative should focus on integrity, sustainability and transparency in dealing with research data. Research data management support, could rely on a multidisciplinary network of data experts (data stewards) within LU, offering its researchers and research groups the associated training, tools, infrastructure, guidance, and support.

Legal support should guarantee compliance with rules and regulations and allow access and exchange of data. Data stewardship and curation should be an integral part of this process and could be provided by the specific experts within the different faculties and research groups. A special emphasis should be given to clustering and integration of multi-dimensional data from different sources.

A storage e-infrastructure could be organized as a service platform providing wide-ranging harmonized tools for data storage, backup, query, transfer and encryption. Data management solutions should provide a digital lab journal, digital research environments for specified use, and data analysis tools. Metadata catalogues and data repository finders should enable easy search for useful data collections and should be organized along the principle of open data science. Tailored IT solutions can then be developed in collaboration with specific users in order to ensure optimal use of data. Regular training modules for users should be implemented in order to ensure quality, safety and ethical standards.

A communication plan should contribute to the transparency of the adopted policies and provided services.

#### Recommendation:

We recommend that a holistic plan for the whole complex: computing, storage, and IT- support is developed which considers the move towards stimulating FAIR data and Open Science in general. This plan will involve the libraries, LDC and LUNARC and should be coordinated with national and international activities.

## Collaborations and career opportunities

Positions at larger infrastructures are quite different from academic positions or positions in research laboratories. Infrastructures of the core facility types or larger infrastructures are often service centers for the local or national research community and their value lies in providing broad access to sophisticated and expensive equipment.

Internationally, universities are recognizing the need for appropriate, clear, and well-defined career paths in order to recruit and retain highly qualified personnel to train, manage, and direct highly specialized technology platforms. At all levels, RI positions require an interest for technology, working with people, and working on many diverse scientific questions. For scientists who do not want to leave the lab, a position at an RI may offer a more stable and less competitive alternative to the academic tenure track career path. Entry-level positions may include basic and advanced technicians that require BSc or MSc degrees and some experience in the field. Midlevel management positions require experience in the field and an MSc and/or PhD degree (management experience may be either an add-on or required).

Promotions from a position such as a basic specialist to an advanced technician specialist are more likely to occur internally within a single RI. An infrastructure director needs at least a PhD and a keen interest in the technologies that are of relevance for the RI (e.g. molecular biology for work in a sequencing core). A director of an infrastructure can be recruited within the RI. More typical is the scenario in which a scientific director is an established independent investigator at the institution, or a career scientist recruited to the institution for this position. For larger infrastructures a high-level international recruitment, typical at the professor level, may be relevant. Movement from RI management to associate dean of RIs would be a typical career path.

For larger infrastructures, it is the board or steering committee who determines what technology and equipment to buy, often inspired by suggestions from the director. On a daily basis, the director operates and maintains the RI; runs the business, including marketing, advertising and training; and keeps abreast of the research needs of his clients.

For RIs it is important that the technical development follows the international front line when it comes to instrumentation and methodologies. For some RIs, (e.g. proteomics, genomics) it is especially important that the technical development is in front. Method development is the science and technical progress may be published in the very best journals. For some RIs, it will therefore be essential to recruit top scientists, who will establish their own research group either as faculty-members at the university or within the RI. However, some RIs will mainly work as service platforms, with little or no independent research.

Career development for technical staff (who may initially be trained as scientists) does not follow the academic career path. Such personnel may be more likely to move between industry and research labs than the academic staff. Therefore, the focus should be on the development of technical competence rather than on typical academic career aspects. It will be relevant for such personnel to take courses in the mastering of new and emerging technologies and tools. Acquisition of such competencies are useful both for the individual infrastructure and the research of its users, but also for the individual employee, who becomes more competitive, also on the different job markets outside academia.

## Recommendations

- Given the very different natures of the RIs, it is impossible to suggest a "one- size-fits-all" model. It is important to reflect on which type of personnel that is required for each individual entity and to ensure career options, competence development, and promotions for these groups.
- It should be determined to which degree scientists at individual RIs should divide their time between own research and service of others.
- It should be stated how core personnel receive appropriate credit for their work on their clients' research. When a researcher is simply using the RI lab's services, it would be natural to note this in a publication's acknowledgements. If an employee in the RI provides substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data , this should obviously result in co-authorship.
- It should be determined to which degree users are expected to be trained to use equipment independently or whether the core facility operate with a full-service model.

# Faculty-wise short reviews from self-assessments, subject evaluations and interviews/discussions

In this section we report our impression from self-assessments, subject evaluation and discussions and presentations done by key actors from different faculties. In many cases we end each faculty section with a number of suggestions for further improvement.

## Faculty of Science and Faculty of Engineering

The funding of the infrastructure needed for the research at the Faculty of Science and at the Faculty of Engineering (LTH, Lunds Tekniska Högskola) may be obtained from central university funds, faculty funds, individual department budgets and through external grants and donations. Often, combinations of different funding sources are used to fulfill a given infrastructure need for researchers and research groups from these two faculties. Since 2011 there are yearly coordinated calls for research infrastructure funding from Lund University, centrally, and from the faculties of Science, Engineering, and Medicine. Collaborations across faculties are encouraged and this is also an important criterion for receiving central LU funding. In addition, two or more faculties may co-finance an infrastructure within their own budgets. There are several infrastructures that are financed jointly by the three faculties - or by two of them. For the 2020 infrastructure calls, 20 MSEK, 20 MSEK, 10 MSEK, and 11 MSEK were set aside for infrastructure investments and running costs by Lund University centrally, the Faculty of Science, the Faculty of Engineering (LTH), and the Faculty of Medicine, respectively. These four different calls cover somewhat different time-periods ranging from two to five years and also somewhat different types of costs.

## Faculty of Science

In the case of the Faculty of Science the costs may be distributed over up to five years and an eligible budget may include depreciation costs for investment in instrumentation and also costs for personnel needed to operate the infrastructure and to support its users. The call is open for medium-priced equipment for local use as well as for larger infrastructures offering services to several groups. Faculty support for infrastructure personnel costs require that users from several research groups are supported and that the infrastructure is of the platform (or core facility) type. In the self-evaluation material it is said that the Faculty of Science so far and since 2011 has invested 150 MSEK in research infrastructure was 35 MSEK out of a total of governmental funds of 450 MSEK in 2019. In this context and for comparison it should be mentioned that the Faculty of Science attracted an additional 500 MSEK for research from external funding agencies and foundations the same year (2019). A part of this external funding has been used to cover costs for research infrastructure, but from the material provided it is hard to estimate how large this part may be.



## Faculty of Engineering

In the call for infrastructure at the Faculty of Engineering, coordinated with the corresponding infrastructure calls at Lund University centrally and the faculties of Science and Medicine, it is only possible to apply for equipment – not for personnel, running costs or for premises.

However, personnel and running costs can be applied for from the Faculty of Engineering via its strategic fund for research. It is not clear from the material provided exactly how the funding via the strategic research budget and the call is coordinated but such coordination is obviously crucial, and the panel assumes that it is in place. In 2019, the Faculty of Engineering spent 18 MSEK on costs approved via its open call and 29 MSEK on research infrastructure (including personnel) via its strategic funds for research. These amounts are similar from year to year. The call text for the coordinated call emphasizes that it is important that the equipment applied for is going to be used by several departments or research groups. Altogether the Faculty of Engineering thus spent 18+29=47 MSEK on research infrastructure from its governmental funds, which should be compared to a direct governmental funding of 400 kSEK and external grants of 800 kSEK, yearly. A part of this external funding has been used to cover costs for research infrastructure, but as in the case of the Faculty of Science it is not clear how large a part of the total research infrastructure costs that are covered by external grants. The budget period for the open call ranges up to five years.

## Remarks concerning both faculties

The panel has the impression that there are important differences between the funding schemes for research infrastructures at the faculties of Science, Engineering, and Medicine. At the Faculty of Medicine, funding for equipment, personnel and running costs can be applied for through the open, coordinated, call but only for periods of up to two years. Although the coordination of the calls and evaluation of the applications is a very good step it appears that even more could be gained by further harmonizing the conditions of these three faculty calls. At the same time, the panel understands that the faculties make their individual decisions but for Lund University and its researchers it would probably be a further advantage if resources could be shared even more effectively in the future.

The research infrastructures at the Faculty of Science and at the Faculty of Engineering comes in different sizes ranging from instrumentation or equipment in the care of local research groups, to core-facilities or research platforms used by several groups, and to larger infrastructures which may be parts of national or international research infrastructures with funding from the Swedish Research Council, VR. As explained in the self-evaluation funding agencies and also private foundations have changed their policies and do no longer finance what is referred to as medium-expensive equipment – that is equipment with a price tag of, say, a few up to ten million SEK or so. Thus, such investments must now, and since quite a number of years, be covered by the universities and such funding is indeed provided via the coordinated calls for infrastructure support by the Faculty of Science and the Faculty of Engineering.

Although the synchrotron radiation facility MAX IV as such is not included in the evaluation task of our panel, it should be mentioned that MAX IV is essential for many researchers at the Faculty of Science and at the Faculty of Engineering. The European Spallation Source, ESS, is not yet in operation and there is no similar strong tradition and user community as in the case of MAX IV in Sweden. Lund University has made strong recruitments to strengthen the neutron scattering research area, which the panel welcomes as ESS will offer many opportunities for interesting research in the near future.

The Faculty of Science lists 79, while the Faculty of Engineering lists 85 infrastructures in the LUCRIS database. The building of this database, and the recent addition of research infrastructures is a very good ini-

tiative. This is certainly helpful for individual researchers and research groups but must also be most useful for university and faculty leaderships to get a good overview of the infrastructure available as well as their services.

## Overall impression

The overall impression is that needs for access to state-of-the art research infrastructure for researchers and research groups at the Faculty of Science and at the Faculty of Engineering at Lund University to large extents are handled in highly effective processes based on bottom-up procedures. These processes are arranged such that they still allow the leadership to make strategic decisions and to make priorities. As we mentioned above, the internal processes with coordinated calls and evaluations of proposals for new or continuing infrastructures serves as an excellent preparation for national need inventories by the VR and possible national infrastructure funding calls resulting from these inventories. The database, LU-CRIS, gives an excellent overview of what is already available in terms of infrastructure and the related services offered. However, there are a number of aspects which are less clear and where the situation may be improved as will be detailed below.

#### Main barriers, weaknesses, needs and suggestions/comments

- At the Faculty of Science and at the Faculty of Engineering there are many different sizes of infrastructures, but they all seem to be referred to as infrastructures and they may all be financed through the same range of coordinated infrastructure calls. The label "infrastructure" indicates that they are available to many but in some situations (according to the information at LUCRIS) they appear to be instrumentation essentially belonging to a local research group. Such mid-priced instrumentation is important and should be funded, but now it is through the same calls as for larger and much larger infrastructures which to some extent may be confusing. We recommend that distinct categories are worked out as suggested above.
- The development of the aggregated costs for infrastructure over time is unclear to us. How does the actual funding contribution from governmental funds, and the contribution from external grants, change over a longer time period? Surely the annual cost must increase as more and more infrastructures are started. It is probably a good idea for university and faculty leadership to discuss these issues as they certainly are important to maintain a good balance between infrastructure funding and the funding of user/researchers and research projects with a limited budget. As mentioned in the introduction, we recommend to define evaluation steps and procedures for determining when an infrastructure should be phased out.
- The panel recognizes that the issue of user fees is complex and difficult and that one has to take traditions within different fields into account. It appears that some infrastructures where users get extensive help and service have user fees while others do not. MAX IV is a good example this national infrastructure gives a lot of support to national and international users but there is no fee for academic users as this would deviate from the standard of this research field and for synchrotron radiation facilities internationally. There are infrastructures which in practice only can be accessed and used through collaborations with local researchers and in such cases user fees are in most cases probably not reasonable, while if services are provided by a platform or Infrastructure/core facility user fees are recommended. The implementation of user fee systems gives an automatic logging of the usage and engagement of user groups.
- The panel suggests to formulate guidelines for when an infrastructure should have: *a*, a Steering board, *b*, a Program committee evaluating proposals for access to the infrastructure, *c*, a Scientific

Advisory board consisting of external experts advising on the technical and instrumental development of the infrastructure that is best suited to drive the scientific fields forward. We could not find any systematics on these issues in the material at hand. Related to this there is a need to define criteria for infrastructure access. How are situations where the demand is higher than the infrastructure resources that are available, handled? The oversubscription is often (e.g. by VR and other funding agencies) used as one measure of quality as it gauges how attractive it is for user communities.

- Data storage. This is a pressing issue. The panel is lacking clear plans from the faculties of science and engineering, and as mentioned above university-wide data handling plan. As mentioned above we recommend a university wide data handling plan.
- Coordination of the call conditions between the faculties of science, engineering and medicine would help to further strengthen a coordinated and cost-effective development of new infrastructure.

## Faculty of Medicine

The faculty supports a large number of crucial, high-quality RIs with ~40 MSEK in intramural grants for 2020 and another ~62 MSEK dedicated to biomedical services. In addition, the faculty has an open call for infrastructure funding. In 2020, 11 MSEK are made available for researchers to apply for according to the bottom-up principle. A total of at least 113 MSEK are dedicated to infrastructures and RIs in 2020. In addition, 20 MSEK in infrastructure funds can be applied for by scientists at all faculties from the Pro Vice-Chancellor's office. Finally, further support for clinical research is provided by R&D funds from the region's university healthcare. Some infrastructures are organized as core- facilities/platforms, whereas other infrastructures are established via a bottom-up-funding from the Faculty or from the Lund University, and finally other infrastructures are established by external funding, raised by one researcher or a research group.

## Overall impression

The overall impression is that the individual units are very much aware that Lund University offers infrastructure of an exceptional high quality and service, e.g. regarding LBIC: "incredible high level regarding the competence of the staff and the swiftness of their expert help with administration and scientific consultation"

The overall impression is also that most research groups and departments are critically dependent on the various RIs such as the SFO Stem Therapy and Multipark; Center for Translational Genomics (CTG) sequencing; Lund University Bioimaging Center (LBIC); Animal research facilities; LP3, Mass spectrometry BioMS. In general collaboration between researchers and personnel at the infrastructure RIs work well. There is no doubt that the infrastructure at the faculty forms a backbone of LU's successful research.

## Main barriers, weaknesses, needs and suggestions/comments

In the following we put forward some examples of concerns raised by more than one department. For some infrastructures (e.g. the mass spectrometry center CEBMMS, Lund), it is said that availability depends on personal and individual contacts and collaboration.

- It is important to emphasize that all researchers should benefit from infrastructures funded by the Faculty

Several groups find that there is a lack of a readily accessible state-of-the-art flow cytometry core facility at the Medical Faculty.

- The faculty will have to decide if the current infrastructure could be replaced and unified as a modern flow cytometry/microscopy platform. This is obviously a matter of priority.

Several groups are dependent on the animal research facility, which is currently being reconstructed and reorganized. Currently, a state-of-the-art RI for generation of transgenic mouse is lacking and the facility in Copenhagen is used. Infrastructures for systems neuroscience applied for rodent models are warranted.

- The new animal facility will for sure solve problems for some researchers. However, the costs for animal experiments are presently said to be very high and there is a worry that a new facility will increase the costs further.

The clinical research entities demand infrastructure in terms of research nurses, data managers and statistics support.

- Such clinical facilities might be located at different parts of the hospital area in proximity with the clinical departments, e.g. oncology.

## The faculty of Social Sciences and School of Economics and Management

The faculty of Social Sciences and the School of Economics and Management (LUSEM) do not have any dedicated funding allocated to support research infrastructure and they do not have a strategy for developing this according to the material sent to us.

#### **Overall** impression

Our overall impression is two-folded. We notice two larger databases within these faculties, one from each faculty/school, V-dem and SEAD which both seems to be well-functioning, both have a large multidisciplinary user base, both are nodes in two recent national RIs supported by the Swedish Research Council (DEMSCORE and SWEDPOP). They also report good support from LU in terms of co-financing. A second research infrastructure within LUSEM is an extensive total population registry-database with data from many different administrative sources. This is very good, but apart from that there is little. For sure, the library and IT-support are regarded as essential, and some units of assessment also mention infrastructures of importance from other faculties (e.g. Humlab and neuroimaging).

Within both Humanities and Social Sciences, including Economics, we find both nationally and internationally a strongly growing interest for large-scale databases and increasing need for big data and handling of complex data structures. Within Social Sciences, as well as in life sciences, the possibility to use and link different administrative registry data covering the total population is a great competitive advantage for Swedish research. Leaving aside the above- mentioned infrastructures, we are somewhat surprised to note that this growing interest at present seems to be lacking in Social Sciences at such a big university as LU. Instead self- evaluations had comments like "we are not depending on RI" and "we have no strategy for funding RI".

## Main barriers, weaknesses, needs and suggestions/comments

A barrier, or what perhaps better should be regarded as a reason, for this lack of interests in RI within the Faculty of Social Sciences is, we were told in discussions, that the research is qualitative and not quantitative. At the level of research groups or smaller units that is a perfectly relevant note, but at the higher level of the whole faculty we see that as a strategic weakness.

We therefore suggest that the leadership of the faculty and the central level of the university together discuss various instruments that can be developed to foster more interest in developing research infrastructure. If there is, or will be in the future, an interest in advanced quantitative methods within Social Sciences there is certainly a need of developing research infrastructure.

## Faculty of Fine and Performing Arts

The faculty points to only one infrastructure, The Inter Arts Center. The cost is given as SEK 5 mio/year.

## Overall impression

The Inter Arts Center (IAC) describe themselves as "a platform for artistic research and experimentation, and part of the Faculty of Fine and Performing Arts at Lund University".

The center has undergone an expert evaluation in 2016-17, which, according to the self-assessment, described IAC as an important platform for interdisciplinary activities but it also points to shortcomings such as inaccessibility due to location and security.

The review pointed to a change of IACs mission, a change, which could be combined with the faculty's plans to bring its institutions closer together.

The self-assessment points to a timing problem (co-location lies at least five years ahead)

## Suggestion

The ambition and timeline for the future role of IAC should be decided and a clear timeline negotiated with the institutes involved.

## The Joint Faculties of Humanities and Theology

In contrast to STEM (Science, technology, engineering, mathematics), the university has no dedicated funding, with faculty open calls, allocated to support Infrastructures for Arts and Humanities. Humanistic infrastructure projects must therefore be big and ambitious enough to compete for the general Infra-LU funding as is the case of HumLab, or they must seek funding externally.

## Overall impression

The self-evaluations reflect the increased importance of new scientific experimental methods as well as methods resulting from the digitalization. As always with the advance of new technologies, one notices the whole spectrum from innovators to late adapters. As a result, the front-runners not only have to build the infrastructures but also provide support and training.

E.g. Ethnology has a comment about the digital humanities lab: "We are particularly in need of their competences rather than the technical equipment". The support from the IT-research is mentioned by many.

From the self-evaluation two labs stand out: DARKLab (*Laboratoriet för Digital Arkeologi*) for archeology, and HumLab for the rest.

Digital archeology is a growing academic field that generates large data. The self-evaluations stress the importance of further support and long-term storage space. It seems at present to be mainly funded by different private foundations. The self-evaluation also highlights the future possibility to use synchrotrons and neutron sources so there seems to be future opportunities for cross-faculty collaborations.

Humanities Lab (under many different names) is often mentioned as a driver for new research. In general, the description is positive. E.g. phrases like "The infrastructure end competence associate with it is essential for current and future research" from Studies of English, German and French is seen more often than "Humanities Lab, which potentially could be a valuable resource for our research". However, Nordic Languages and rhetoric mentions restrictions on the use of the lab and that financing is required. Most praise the support, other ask for more support. In a consortium application led from Humanities Lab it has also got the highest mark in the national needs inventory evaluation from the Swedish Research Council.

Another important infrastructure are archives, created either by cultural institutions or by research institutions. Most of the archives are specialized and well suited to serve its customers.

The library service (both central and faculty) is an especially important infrastructure for the faculties of Humanities and Theology, both in its role as national deposit library, a library with books, and as a digital library. Selection issues were raised, e.g. for purchase of foreign books and acquisitions methods (subject librarian driven (long term collection) versus patron driven (here and now interest))

#### Main barriers, weaknesses, needs and suggestions/comments

Traditionally the arts and humanities had libraries and archives as their main infrastructures. However, as these disciplines become digitized, the needs for and requirements to experimental- and digital infrastructures changes. The library has changed its profile towards digital products and - assistance, however as the self-evaluations indicate, there is also a growing need for computer assistance, computer facilities, experimental lab facilities and specialized databases.

The challenge that meets the digitalization of humanities broadly is triple:

- 1. There is no tradition for funding of infrastructures within arts and humanities- other than for libraries and archives and therefore they do not have their own RI allocation.
- 2. These infrastructures often require little money compared to the STEM disciplines and therefore often do not meet the budget criteria and ambition level for RI calls.
- 3. The users of the infrastructures often need extended support; i.e. the running cost is high compared to the initial investment in building the infrastructure

To stimulate the digital evolution, it is suggested to create focused RI call for Arts and Humanities to support initial small-scale RI projects. They could come under the governance of HumLab if they fall within the areas covered by HumLab.

## Summary and Recommendations

The panel would again, without going into details, stress that we are unanimously truly impressed by the quality, organisation and structure of most aspects relating to research infrastructures at Lund University. We have understood our mission as not only given this appraisal but to, first and foremost, try to come up with constructive criticism and suggestions for improvement. We therefore end this report with the following recommendations:

- We recommend to develop and implement generally accepted criteria for the different categories of infrastructure based on their size, user communities, and functionality of the RI. The categories could be: national research infrastructure, university-wide research infrastructure), faculty-based research infrastructure, research service platform, data- and bio-repositories and collections, research laboratories and research equipment.
- We recommend to develop guidelines for access policies and user fees for the different infrastructure categories.
- We recommend to develop guidelines for models of governance of the different categories of infrastructure with definition of such entities like: infrastructure steering boards, program committees and scientific advisory boards.
- We encourage the leadership to guarantee sustainability and security for essential RIs (funding for maintenance, upgrades and replacement) if it cannot be covered by external funding, access fees, or other income.
- We recommend to develop clear and transparent criteria (guidelines or rules) for terminating RIs that have reached their "end of life" (are out of date or not needed at the same extent as when started).
- We recommend that LU pursues the already started e-infrastructure strategy development and suggest to focus on the integrity, transparency and sustainability for handling research data. Here it is also important to be in congruence with e- infrastructures at the national level.
- We recommend that a holistic plan for the whole complex: computing, storage, and support is developed which takes into account the move towards stimulating FAIR data and Open Science in general. This plan will involve the libraries, LDC and LUNARC and should be coordinated with national and international activities.
- We recommend that career- and competence-development support are provided for employees in research infrastructures
- We recommend to establish a forum for infrastructures to exchange experience, share policies such as use- and payment policies and establish commitment to use, and possibly co-financing, common facilities such as storage.
- We recommend to make further efforts to harmonize the infrastructure calls, and their conditions in terms of what is possible to apply for, between LU centrally and the faculties of science, engineering, and medicine and if possible also with the other faculties. This would further strengthen LUs possibilities to file well-formulated and thought-through suggestions for new or continued infrastructures in the VR needs inventories. Further it would strengthen LU infrastructure initiatives and attractiveness as a partner or leader for international and EU-based infrastructure calls.

# 5. External Panel Report: The Relationship with Large and Interdisciplinary Research Areas (LIRA)

## Background

- On the 5<sup>th</sup> and 6<sup>th</sup> of October an international panel reviewed Lund Universities 'Large and interdisciplinary research areas' (LIRAs) as part of a wider review of research activity conducted at Lund, known asRQ20.
- RQ20 was initiated by the vice-chancellor in February 2019, as the first comprehensive research evaluation conducted in 11 years.
- The aim of RQ20 was to "gauge the international standing of research at Lund University", with a remit "oriented towards assessing (and giving advice on) the preconditions for high-quality research as they are expressed in procedures, strategies, resource allocation and networks." https://rq20.blogg. lu.se/files/2019/05/190508-RQ20-PROJEKTPLAN-FINAL-ENGLISH.pdf
- In addition to 161 reviews of disciplinary areas, five "transversal" panels were appointed to "highlight how university-wide task and responsibilities are managed and might be improved":
  - Panel 1: Infrastructure
  - Panel 2: Recruitment
  - Panel 3: Large and interdisciplinary research areas
  - Panel 4: External Engagement
  - Panel 5: Management and Leadership
- The focus of this report is the findings of Panel 3, as determined by the four panelists:
  - Thomas Björnholm, Villum Foundation, formerly Copenhagen University
  - Henrik Clausen, Faculty of Medicine, Copenhagen University
  - Jonathan Grant, Policy Institute, King's College London
  - Mary O'Kane, O'Kane Associates

## Vision

The strategic research areas are key for Lund University to realise its vision to understand, explain and improve our world and the human condition so that scientific and artistic knowledge gain significance in the ambition to achieve sustainable development.

# Large and interdisciplinary research areas (LIRAs) at Lund University (LU)

- LIRAs generally involve large-scale investments at University level with a strong research profile and supporting centres, e.g. LUDC, NanoLund, LLC.
- There are about 30 such research areas at LU since 2000.
- Examples of investments via competitive government funding include:
  - Strategic Research Areas, SRAs or in Swedish SFOs (earmarked block-funding from government, continuous long-term investments). 2010-present
  - Linnaeus environments (Swedish Research Council and Formas, 5-10 MSEK/year, 10 years, completed). 2006-2018 & 2008-2018.
  - Forte Centres of Excellence (Forte, 5 MSEK/year,10 years, completed). 2008
  - VINN Excellence Centres (Vinnova, 10 years, completed).
- We were informed that SRAs excel in scientific output (e.g. SRAs engage 20% of LU staff, about 22% of LU professors, and produce more than 30% of LU publications), but we did not identify appropriate monitoring and evaluation (M&E) procedures in place that enables LU to assess the relative performance of their many research environments including SRAs.
- LU recently released a new 'Strategy for Lund University's Strategic Research Areas 2020–2030', with a new Vision as to the right. The SRAs are the most common form of LIRA at LU with current funding.
- There was some ambiguity in the language used to describe SRAs, LIRAs and other related environments. Throughout this report we refer to SRAs as a generic term to cover all large and interdisciplinary environments that were the focus of our review, although the conclusions are particularly valid for current and future SRAs funded through government block grants (SFOs in Swedish).

# Panel way of working and sources of evidence

- Prior to the Panel meeting on the 5th and 6th October, background material was provided on the SRAs (as listed in Annex A), and this was read and reviewed by the Panel members.
- The Panel met via zoom prior to the  $5^{th}$  and  $6^{th}$  to review the material and be briefed on the process by the LU team.
- The Panel met via zoom over eight session on the  $5^{th}$  and  $6^{th}$  Annex B for agenda and participants.
- Some additional material was provided during and after the panel meeting Annex A.
- The panel worked remotely to identify the key themes that had arisen from evidence gathering, synthesizing its findings through a series of calls after the panel meeting and writing them up collectively in this report.
- The views presented in this report are shared by all the panel members with no dissenting voices.

## Focus and structure of panel report

- Given the abbreviated and online nature of the LIRA review, in the context of the global COVID pandemic, the panel did not feel they had gained sufficient knowledge of the SRAs at LU to provide a detailed evaluation. However, in a general sense, based on the interviews and our collective experience we believe we are able to comment on the "preconditions for high-quality research as they are expressed in procedures, strategies, resource allocation and networks." It should be stressed that our remit was not to assess the individual quality of the SRAs.
- The 'Strategy for Lund University's Strategic Research Areas 2020–2030' was approved by the Vice Chancellor shortly before the panel met, it was felt a useful exercise would be to use that as a framework to provide a more formative assessment of the SRAs structured around the six goals set out in that strategy:
  - Research of the highest quality and renewal
  - Intertwining of research and education
  - Impact on society
  - Visibility
  - Leadership, gender equality and diversity
  - Recruitment and retention of staff
- For each of these six strategic goals, informed by the materials provided to the panel along with the meetings held over the 5th and 6<sup>th</sup> of October, the panel presents a series of strengths and weaknesses followed by some specific recommendations that the panel feels will help in delivering on those aspirations. These recommendations are synthesized in our main findings, along with some overarching observations. We have aimed to provide recommendations that can be operationalized by the LU over its planning cycle in years to come
- The remainder of this report is structured around these strategic goals, with the sources of our evidence documented in the annex.

## Summary of main findings and key recommendations

Our main findings and recommendations have to do with:

- 1. using the great strength in growing SRAs to increase LU's visibility in order to shape its international academic reputation
- 2. the whole of LU needing to work together to maximise the benefits from LU's set of SRAs
- 3. some important modifications of internal LU systems which would significantly increase the leverage from the funding attracted by the SRAs

#### Using the great strength in growing SRAs to increase LU's visibility in order to shape its international academic reputation

LU clearly has an innate strength in growing and developing strategic research areas (SRAs) – something universities across the world aspire to. LU should celebrate and leverage this success more widely internally as well as externally for the greater good of the University.

Although LU is arguably the most successful of all Swedish universities for SRAs, this is not widely known within the University or more widely nationally as well as internationally. So LU should make it



a priority to be explicit about this success in its narrative and its public presentations of its culture (website, communications with government; communications with university ranking schemes, etc.). This will enhance LU's reputation as a highly attractive university for top quality faculty and students. Attracting more great scholars will lead in turn to a virtuous cycle.

- LU could improve its visibility still further by the following:
- Establish a strategy for international visibility of impact
- Develop a monitoring and evaluation/assessment framework for research including the SRAs, in line with the 10-yr strategy plan
- Build on partnerships to increase visibility, perhaps with a focus on geographically close universities.

# The whole of LU needs to work together to maximise the benefits from LU's set of SRAs

We noted that senior leadership of the University was not strongly using LU's combined SRA strength as a major factor in shaping the wider understanding of LU's research strengths and impact, while many of those involved in leading SRAs felt that the University leadership should be more responsible for shaping the future of individual SRAs (through special funding, etc.). Evolving existing SRAs and growing new ones needs to be embraced as a shared responsibility across the University if LU is to retain its preeminence in growing and hosting a large number of SRAs simultaneously.

# Possible modifications of internal LU systems which would significantly increase the leverage from the funding attracted by the SRAs

A repeated theme we heard was that it was not possible in most parts of LU to combine SRA funding with other University funding to broaden the impact of the research strengths associated with SRAs on other vital University activities such as teaching; growth of new research areas; and development of infrastructure for research andlearning/teaching.

LU could significantly increase the leverage from the funding attracted by the SRAs by the following:

- Formalize, strengthen and embed the emerging multi-dimensional matrix between the vertical faculty line organization with the horizontal SRAs (various axes faculty vs SRAs, research vs teaching, etc.). Use this formalization as the basis for more flexible recruitment schemes (by lowering barriers for joint recruitment across organizational boundaries); for including more leading-edge research into undergraduate teaching (by inviting/promoting new/modified teaching courses); for building yet more major research infrastructure; etc. In other words think of the faculties and the SRAs as a deeply embedded network which allows the various parts of the University to leverage off all its strengths without administrative impediments
- Develop support mechanisms to secure impact (e.g. specific outward facing units, training programmes, aligned incentives etc.)
- Consider using the excellent Pufendorf system to solicit/create/shape new interdisciplinary teaching/ training courses e.g. one opening per year

## Strategic goal 1: Research of the highest quality and renewal

"The strategic research areas are to continuously develop their environments so that they strive to achieve a world-leading position at the forefront of international research and are ready to respond to changing societal needs and new challenges."

#### Strengths

- LU has a strong record for SRAs. LU hosts several world leading SRAs (e.g. NanoLund, ELLIIT, EXODIAB), often achieved with very long funding support over different schemes (e.g. LUDC then Diabetes SRA; NanoQE (Linneaus) then NanoLund (SRA) is a long-term run in nanoscience; LCCC then ELLIIT.
- LU is successful in attracting research funding for SRAs. LU hosted 14 of 40 of the Linneaus awards and currently hosts 8 of 41 SRAs and further participates in 3 SRAs. LU is also Sweden's most competitive comprehensive University in attracting EU grants including prestigious individual ERCs.
- LU has a clear and comprehensive strategic 10-yr plan for SRAs. LU has just (Sept. 2020) developed its strategic plan for SRAs with strong ambitions for continuation of these large programs.
- The SRA collegium provides a powerful instrument for coordination and interaction with the LU line organisation.
- LU has a tradition for building and maintaining strong research infrastructures.
- The Pufendorp Institute is a unique and great mechanism for stimulating new research ideas & promoting interdisciplinary research. Pufendorf is highly successful in drawing top researchers at LU from multiple disciplines, and Pufendorf projects are forming new research and SRA environments.

#### Weaknesses

- The LUCRIS instrument collects and monitors SRA and all LU research metrics without clear data processing practices. Unclear how SRA activities and output are assigned and monitored relative to general LU activities does LU have fair data to demonstrate and promote that SRAs do better?
- Unclear how LU monitors performance of SRAs and uses information including LUCRIS data for planning and priorities. The panel did not get clear insights into the relative performance of SRAs compared to other research environments at LU. The panel noted lack of an agreed evaluation methodology before the start of SRAs, and note that careful evaluation criteria are most often best established before start of larger programs.
- The size and spread of some SRAs may limit quality and output. The strategic plan points to continuous development, flexibility and rejuvenation, however, goals, specific plans and implementation were apparently left to the SRAs and the Collegium. It was unclear how inclusion/exclusion of members of SRAs and priorities were handled with LU to optimize output, and we learned that researchers were unclear of memberships.
- There was in general a lack of cohesion between the strong verticals (faculties) and horizontals (SRAs). Further, the medical oriented SRAs (LUCC, EXODIAB, MultiPark, EpiHealth, Stem Therapy) were largely contained within the Medical Faculty with less interdisciplinary interactions compared to other SRAs while perhaps natural there may be unused opportunities.

- There was **no clear 'exit strategy'** to manage the transition out of Linnaeus centres to maximise their impact after the funding finished and ensure collegiality, which may be an important lesson for how to optimize the next round of continuations.
- Uncertainty with next funding scheme for SRAs. The strong ambitions and commitment for support of SRAs by LU should materialize soon.

#### Recommendations

- Develop a monitoring and evaluation/assessment framework for the SRAs aligned with the 10-yr strategy plan 2020-30 that underpins a transparent LU-financial support to the SRAs (see below).
- Strengthen and formalize the coupling between the vertical faculty organizational line with the horizontals SRAs, and build on a mutual understanding that both dimensions are equally important. Ensure transparent financial flows and structures across the SRAs and Faculties and consider a formal representation of the SRA leadership team at the rectorate/dean level (perhaps a "Dean of SRAs")
- Choose benchmark universities to get inspiration (e.g. KU Leuven has experience with a financial structure that couples verticals and horizontals that could be inspirational).
- Make tangible targets for improving research quality (e.g. become the best in Scandinavia competing for EU funding, set ambitious targets for high impact publications, etc).
- Provide a strong narrative for SRAs that is shared across the entire university and firmly rooted in the rectorate.
- Lower barriers for joint recruitments across organizational boundaries allowing the SRAs to boost proactive recruitments by the faculties.
- Impose trimming/reshaping measures of SRAs to keep them dynamic, active and attractive. This could be done as part of the annual review and update of SRAs scientific mission to determine which should be strengthened, refocused or 'sunset' over a period of time.

## Strategic goal 2: Intertwining of research and education

"The strategic research areas constitute an excellent resource for contributing to the renewal and development of teaching and education at all levels to train the next generation of academics and professionals."

## Strengths

- LU has a strong tradition and culture for research-based teaching with a commitment from the University to leverage SRAs in training and education with requirement of teaching for all staff (possibility for buy-out. SRAs have developed/run new teaching courses (e.g. NanoLUND initiated engineering nanoscience; MultiPark run Lund Neuroscience; MERGE/BECC initiated climBEco).
- The SRAs provide unique interdisciplinary environments for postdoctoral training including access for postgraduate students to large and high-quality research infrastructures. The panel concur with the *Final evaluation of Linneaus Grant* observation that (p63): *"All of the Linnaeus Centres have lifted training of the next generation of researchers to centre stage of their activities by recruiting PhD candidates, postdocs and young principal investigators openly and internationally, and by providing them training in*

research schools, workshops, seminars and retreats, mentoring and support for career development. This is an invaluable legacy of the Linnaeus program, an investment for the future of Swedish science".

#### Weaknesses

- There was **limited evidence that LU used the SRAs to revitalise its undergraduate programs** and attract students from round the world. Several SRAs noted that influencing undergraduate teaching courses, including new initiatives, was difficult suggesting unused potential. This was an observation made by the *Evaluation of the SRA Initiative 2010-14* p.19: *"The role of SRA funding in promoting new educational initiatives and reforms was very mixed and disappointing overall. ... the Panel felt that the problems surrounding the use of SRA-funded research strategically at the BSc and MSc levels are partially due to strong traditions and cultures of ownership of the education by the departments and that renewal/input from SRA-driven research into these educational programmes is inevitably difficult when the SRAs are operating outside of the traditional organisational structures."*
- Unclear recruitment and retainment strategy of SRA staff in relation to teaching program at University. There was no clear monitoring/summary of involvement/efforts of SRA staff to research and education making it difficult for the University to evaluate this parameter.
- There was no specific evidence offered for how LU positioned itself to be a great place to do a PhD given all the research environments it has. This is a missed opportunity.

- Promote and profile new (interdisciplinary) teaching courses initiated among SRAs and eliminate barriers that hamper SRA contributions into existing courses.
- Research and teaching are segregated in the management structure resulting in barriers between verticals (often teaching dominated) and horizontals (often research dominated). We therefore suggest exploring alternative management structures that would integrate and strengthen these two core academic missions, thereby maximising the value of the SRAs.
- Promote teaching as a metrics included in the monitoring and assessment process of SRAs with the SRA Collegium.
- Analyze barriers and establish more seamless economic structure. Take a careful look at the financial incentives that may encourage faculties to "safeguard" its teaching economy at the expense of contributions from the SRAs.
- Consider to use the excellent Pufendorf system to solicit/create/shape new interdisciplinary teaching/ training courses e.g. with one opening per year?

## Strategic goal 3: Impact on society

"The strategic research areas, with their diverse external contacts, offer an opportunity for challenge-focused dialogue between researchers and wider society."

#### Strengths

- LU's very long-term commitment to SRAs promotes societal impact, as expressed in the LU strategy 2019, evident in the panel's conversations with research staff, and supported by the 2020 evaluation of the Linneaus grants (p33): "Societal relevance was not included in the original goals of the environments, but according to the management, all Centres have contributed to this as an obvious part of their activity, though varying from a basic research profile to more diverse environments, e.g. including patients."
- The multidisciplinary nature of the SRAs support opportunities for creating societal impact. For example, the Middle East centre (PolregLU) rates well in a politically important area, but includes a wider range of disciplines than might be expected such as water science.

#### Weaknesses

- There is a lack of (international) visibility of the societal impact of SRAs at LU. It was notable that the self-evaluation of SRAs apparently did not specifically address societal impact, and there was no evidence of a coherent impact communication plan.
- The university lacks a central support mechanism to support the creation of societal impact. The new 10-yr strategy plan for Lund University does provide strong verbal support for the impact on society, but delegates responsibility to the SRAs and other research environments without clearly defined support from the University or other central initiatives including evaluation metrics. Several SRAs report difficulties in reaching out to local and national communities in their self-evaluation. This was also a finding of the *Evaluation of the SRA Initiative 2010-14* (p20): "There was surprisingly little evidence of the creation of systematic processes to promote innovation in the SRAs", and it is disappointing to note that this remains an issue.
- The panel notes that it was not put in touch with representatives from society who as stakeholders have benefitted from impact of the SRAs at Lund, perhaps indicating the impact on society is not fully embedded in the university's culture.

- Include measurable metrics for impact on society in monitoring and evaluation.
- Strengthen interactions and network with local stakeholders (e.g. industry startups etc.) with central coordination and support perhaps through LU Research Services.
- Build on partnerships with other universities to increase visibility.
- Establish a clear strategy and specific goals for international visibility of impact.
- Develop support mechanisms to secure impact (e.g. specific outward facing units, training programmes, aligned incentives etc.).

## Strategic goal 4: Visibility

"High national and international visibility is crucial in order to fulfil the University's vision for its strategic research areas."

#### Strengths

- Several SRAs have strong visibility nationally and internationally (e.g. EXODIAB, NanoLund, ELLIIT) with LU known for its innovative infrastructure e.g. ESS (which undoubtedly came to Lund partlybecause of relevant research concentrations)
- Strong competitive record in national and international funding, including EU funding.
- The 10-yr strategy plan calls for a communication strategy to be drawn up by the University and SRA collegium.

#### Weaknesses

- LU has not used its success in attracting SRA support (compared to other Swedish universities) to increase its international visibility and differentiate itself in marketing. For example there seems to be little impact on Lund's international rankings, whilst the 2014 SRA evaluation noted that (p19): "LU talked about improving regional impact but did not seem to have a clear strategic vision for this area." Similarly the 2014 SRA evaluation (p19) observed that: "It was a disappointment to the Panel that the SRA mechanism did not appear to be widely used to develop international collaborations"
- There is a need for central communication of the LU's achievements in general and the SRAs specifically, which needs to include some comparable metrics, including the need for collection, evaluation and communication of the LU's comparative standing among Swedish, Scandinavian and European Universities.

- International visibility is key to international recruitment. Create a narrative that displays and highlight why LU is an attractive place to start or establish your career and communicate it widely.
- Use the new digital platforms to increase LUs international visibility. Be proactive in seeking new opportunities on the SoMe stage.
- Opportunities for wider interactions with Universities in the geographic regional area should be monitored and explored.
- Use LERU more proactively.

## Strategic goal 5: Leadership, gender equality and diversity

"Well-developed leadership distinguished by gender equality, equal opportunities and diversity is a key success factor for the strategic research areas."

## Strengths

- LU has shown leadership in Sweden in developing so many LIRAs, as evidenced by winning 14 of the 40 Linneaus grants, and 8 out of 41 SRAs (being involved in 3 others).
- The SRA Collegium is a welcome innovation that can share best practice and provide a link between university management and the SRAs.
- LU has strong values on gender and diversity with high awareness that gender equality is an issue to strive for being noted in most of the SRAs self evaluations.

#### Weaknesses

- LU central leadership did not show strong commitment and interest in the SRAs. This was something that the panel noted when it met the leadership team, and this concern was also expressed in the SRA self-evaluations and subsequent conversations. This in part may reflect the relative low levels of funding and size of the SRAs.
- The focus on diversity and inclusion was limited to gender, and did not specifically cover other protected characteristics such as race, ethnicity, sexuality, disability etc.

- The rectorate should spearhead a strong SRA-narrative that explains why intertwining SRAs and faculty rooted activities is a golden opportunity to increase the international standing of LU.
- The leadership has a responsibility to secure ownership for this agenda across the whole university though appropriate consultative and governance structures. Leadership obligations apply to the entire faculty from rector to professor. It is not limited to rectors office.
- Leadership needs to ensure that appropriate M&E happens so that comparative performance can be measured to inform decision making.
- Broaden the diversity concept beyond gender.

## Strategic goal 6: Recruitment and retention of staff

"Recruitment of teaching staff and early-career researchers is crucial to ensure rejuvenation and long-term excellence."

## Strengths

- LU is an attractive campus university with a strong academic tradition and good working conditions.
- LU has much going for itself academic culture, history, facilities, campus, and a local societal environment that has fewer of the typical obstacles (e.g. access/cost of housing etc) for international mobility both at faculty and at studentlevel.

#### Weaknesses

- Common to many universities, concerns were expressed about **slow HR bureaucracy and joint appointments** across organisational boundaries. The panel heard that when staff were recruited for SRAs, the needs of the related Faculties were hard to take into account because SRAs and Faculties are administratively separate (although Economics seems to have got around this).
- LU has no clear recruitment ambition or strategy to use SRAs (including Pufendorf) for proactive international recruitments. For example, there was no strong formal mechanisms for leveraging of the long-term nature of the research support from SRAs for helping reinvigorate teaching.

#### Recommendations

- LU should lower barriers for joint SRA/Faculty recruitment
- Reduce/simplify the HR procedures associated with recruitment
- Establish a strategy for recruitment that is shared by SRAs and faculty underpinned by seamless management and administrative structures.
- Establish attractive faculty career positions that are competitive for top international talent

# Concluding reflections

Overall we were impressed by the strength of the SRAs at LU. We believe that the aforementioned observations, findings and recommendations provide a framework to further enhance their position over the coming years. Based on our review our concluding reflections are:

- SRAs are valuable and effective instruments for LU keep the SRAs vibrant, dynamic and relevant
- Leadership should better embrace the SRAs facilitate and integrate SRAs
- LU should improve its overview of academic output collect data and make informed strategic decisions
- LU should better leverage its SRA success raise LUs international standing

## Annexes

## Annex A: Background material

Item no	Document Specification	Contents/Links
1	Relevant excerpts from the self-evaluation reports: In these documents, relevant excerpts concerning recruitment from all the self- evaluation reports generated by the LU researchers has been organised faculty-panel- and UoA (Units of Assessment)-wise.	Faculty of Social Science The Joint Faculties of Humanities and Theolog Faculty of Medicine Faculty of Law Faculty of Fine and Performing Arts School of Economics and Management Faculty of Science Faculty of science Faculty of engineering, LTH The Joint Faculties of Science and Engineering
2	Self-Evaluation from the SFOs	2.1 Self-assessment _SFO Kollegium and SFO individual
3	VR document on Linnaeus environments	https://www.vr.se/download/18.6c61a64c170f610eefc1ff/158523 8685362/ The%20Final%20Evaluation%20of%20the%20Linnaeus%2 0Grant_VR2020.pdf
4	VR report Evaluation of the strategic research area initiative 2010–2014	https://www.vr.se/download/18.2412c5311624176023d254da/15 55426905002/ Evaluation-Strategic-Research-Area-Initiative-2010- 14_VR_2015.pdf
5	Draft and Cover Letter of LU SRA strategy	<ul> <li>5.1 Strategy for Lund University's profile areas 2020-2030</li> <li>5.2 For consultation: Strategy for Lund University's profile areas 2020-2030</li> <li>5.3 SRA Strategy 2020-2030 ENG v</li> <li>5.4 Decision SRA Strategy 2020-2030 ENG v</li> <li>5.5 SRA funding</li> <li>5.6 econ_annual_report_2019</li> </ul>
6	Brief description of SRA and Linnaeus environments	https://www.lunduniversity.lu.se/research-innovation/research-excellence-areas
7	Excerpts from panel reports on issues concerning Large and Interdisciplinary Research Areas	7. LIRA - panel report excerpts
8	Short description of Linnaeus environments	<ul> <li>8.1 Centre for Economic Demography RQ20</li> <li>8.2 LCCC_RQ20</li> <li>8.3 LUDC-short summary RQ20</li> <li>8.4 RQ20_CAnMove</li> <li>8.5 The Lund Laser Centre</li> <li>8.6 The Neuronano Research Center – abstract</li> <li>8.7 Thinking in Time</li> <li>8.8_LUCID_RQ20</li> </ul>
9	PowerPoints from meetings with LU representatives	9.1 LU leadership 9.2 SFO collegiate 9.3 Link from Pufendorf: https://www.youtube.com/watch?v=xXrSbq3X_2 k&feature=emb_logo 9.4 Research Services
10	Requested information from Research Services, from Tina Trollås	<ul> <li>10.1 Examples of instructions societal impact case studies</li> <li>10.2 SFO-Guide</li> <li>10.3 Statistik – LU</li> <li>10.4 Supplementary material from LU RS to LIRA panel</li> <li>10.5 Funding paths to excellence</li> </ul>

## Annex B: Agenda (Monday 5<sup>th</sup>)

Monday, Oct 5
08.40 - 08.55 Session 1
Welcome by the RQ20 Administration
Freddy Stâhlberg, Mats Benner, Malin Bredenberg
09.00 – 09.45 Session 2
Overview of Lus strategy regarding large and interdisciplinary research areas: Discussion with representatives for LU leadership. ProvVice Chancellor Strategy Strenson Vice-Chancellor Torking Von Schantz
09.00 – 09.15 The relation between Strong Research Areas (SRAs), Linnaeus environments and other research excellence areas (Pro Vice-
Chancellor Stacey Sörensen)
09.15 – 09.45 Questions from panel, discussion
09.45 – 10.00 Break
10.00 - 11.45 Session 3
Discussion with "The SRA Collegium"
Henrik Smith Maria Gomez Fredrik Tufvesson Heiner Linke
Moderator: Per Persson 10.00 – 10.15
The SRA Collegium: Short description of how the collegium works - how do SRAs cooperate and learn from each other?
10.15 – 11.45 Questions from panel, discussion
13.00 -15.45 Session 4 (Including break)
Interview with selected representatives from ERC consolidators. KAW Scholars, VR Professors and other recruited seniors with a role to create
strong research environments
Moderator: Fredrik Sjöholm
2 minute "shotsun" presentations (as slides allowed): My position at UL and my group's relation to research eventions areas
2-minute shotgun presentations (no sides anowed). My position at to and my group's relation to research extenence areas.
13.00 – 13.02 Joakim Westerlund, Economy
13.02 – 13.04 Filipe Pereira, Medicine
13.04 – 13.06 Sara Linse, Science
13.06 – 13.08 Kimberiey Dick, Science
13.10 – 13.12 Andreas Ehn Technical Univ/ITH
13.12 – 13.14 Karin Aggestam, Social Sciences
13.14 – 13.16 Marianne Gullberg, Humanities
13.20 – 14.15 Questions from panel, discussion
14.15 – 14.30 Break
15.45 - 10.00 Diedk
Internal Panel Meeting
internal raner meeting

# Annex B: Agenda (Tuesday 6<sup>th</sup>)

Tuesday, Oct 6
08.45 -10.00 Session 6
Discussion with Linnaeus environment representatives Moderator: Sven Mattisson
Each participant is asked to give a ½ page summary in writing of their environment, to be sent to malin.bredenberg@fs.lu.se not later than
September 28
2-minute "shotgun" presentations (no slides allowed) of the environments
08.45 – 08.47 Clas-Góran Wahlström, Laser Centre LLC
08.47 – 08.49 Lefta Eidssoft, Diddetes Ceffule LODC
08.51 – 08.53 Martin Dibe Economic Demography
08.55 – 08.57 Anders Rantzer,
Complex Engineering Syst LCCC
08.57 – 08.59 Susanne Åkesson,
Animal Movement CAnMove
09.00 – 09.02 Birgitta Sahén, Cognition, communication, Learning - CCL
09.02 – 09.04 Lennart Olsson, Sustainability – LUCID
09.10 – 10.00 Questions from panel, discussion
10.00 – 10.15 Break
10.15 -11.00 Session 7
Inter- and transdisciplinary environments generated inside our organisation – Discussion with Pufendorf Representatives Ann-Katrin Bäcklund and
Melvyn Davies
10.15 10.75 Presentation: What is the Bufenderf Institute? App Katrin Bäcklund Director
10.15 - 10.25 Presentation: What is the Fuerbooh instructer Amin-backlining Director
Melvyn Davies
10.30 – 11.00 Questions from panel, discussion
11.00 – 11.15 Break
11.15 – 12.00 Session 8
The role of Research Services at LU
information from and questions to research services representatives
11 15 – 11 20 Brief Overview
Brita Larsson, Head of Research Services Tina Trollås
11.20 – 12.00 Questions from panel, discussion
12.00 -12.30 Session 9
Internal Panel Meeting
12.30 – 13.30 Lunch
13.30

Time disposable for panellists follow-up
# 6. External Panel Report: Recruitment

This advice and the recommendations are based on documents provided by Lund University and a string of video supported meetings on 28 and 29 September 2020.

Authors of this report: Prof. Dr. Jan Holmgren Prof. Dr. Anders Karlhede Prof. Dr. Claire Kilpatrick Prof. Dr. Maria Tenje Prof. Dr. Alexander J.B. Zehnder, Chair

# Preface

The members of the Panel 4 "Recruitment" gratefully acknowledge the preparatory work for this advice in the context of RQ20 by Lund University, the members of the different organisations of the university, the members of the faculties and departments. Despite the complications caused by Covid-19, a very constructive visitation programme was possible through a virtual visit spread over two days and aided by video supported meetings. Most necessary reports were provided ahead of time, and the virtual visit was well organised.

We are also grateful to all persons with whom we were able to engage for an open and highly informative dialogue. As Panel we had two intensive, instructive and very interesting days. We recognised the clearly positive spirit at Lund University and felt an abundance of enthusiasm for the university and its societal mission.

The panel trusts that its observations, comments, advices and recommendations will help to further build a university with an even stronger and further reaching impact.

For the members of Panel 4 Prof. Alexander J.B. Zehnder, Chair October 2020

# **Executive Summary**

In this report five experts, three from Sweden and two from other European Universities have analysed and critically assessed the policies and practices of recruitment and promotion at Lund University in relation to the ambitious goals of Lund University. The panel was given a mandate together with terms of reference (ToR).

Our advice is based on the documentation provided by Lund University and the virtual meetings with the different levels of LU leadership, individual faculties, central HR and WCMM on September 28 and 29, 2020. The report is composed of three chapters. The first chapter summarises the background material and describes the procedures followed by the panel. In the second chapter the policy of the university in recruitment and promotion is evaluated, as well as how faculties and departments are implementing

these policies from a university perspective. In the third chapter a critical look is given on how individual faculties implement the university policies in recruitment and promotion.

A number of recommendations for ameliorating recruitment and recruitment processes, career opportunities, and promotion are formulated at the end of the executive summary. The more specific recommendations for the individual faculties are given at the end of each faculty related text in chapter 3.

The panel concludes that Lund University somehow still suffers from the longstanding problem of in-breeding or academic cronyism at Swedish universities. However, the panel is also pleased to note that Lund University has a clear policy on ending this practice and has introduced a policy that supports the announcement of faculty positions openly, broadly and internationally. These policies are very important but need yet to be fully implemented.

The panel was concerned that the early career of scientists in academia is too strictly regulated, particularly with regard to the time limits between the end of the PhD and applying for a Postdoc and then a tenure track position. Increased flexibility in this early stage – ideally no limiting regulation – would allow young academics to build up a more thorough international experience as researchers. The panel saw indications that careers at the early stage are less driven by competition than at many top universities around the world. A more competing environment in hiring and promotion would help Lund University to do an even better job in educating and forming the future scientists, professionals and leaders of Sweden.

The panel looked at the recruitment process of each Faculty. For this purpose, a discussion was held with the deans or/and chairs of the recruitment/promotion boards. The panel also consulted the relevant part of the self-assessment of the faculties and the reaction of the individual faculty review committees. Some of the shortcomings seen at the university level are more or less pronounced at the faculty level, as well.

#### Recommendations

- 1. The university should strive to
  - A. develop a leadership path for the recruitment of strong and active scientists as academic leaders (department heads, deans) with the necessary incentives.
  - B. implement the welcome scheme of WCMM (Wallenberg Centre for Molecular Medicine) in the entire university. This includes development of a strategy for partner employment opportunities.
  - C. develop a strategy for gender equality and diversity that goes significantly beyond the Swedish gender targets for recruitment of new professors. Ensure the proper implementation and realisation at all levels of the university.
  - D. consider setting goals and/or review processes for evaluating recruitment achievements. Identify obstacles to achievement (e.g. institutional culture tending to make tenure- track quasi-automatically result in a subsequent awarding of tenure) and mitigation strategies.
  - E. develop clear paths for transmission and circulation of new promising ambitions and strategic initiatives at Faculty or Departmental level relevant to University goals such as for recruitment and promotion or the use of bias observers in recruitment processes in the Faculty of Medicine.
- 2. The Vice-Chancellor should act for
  - A. liberalizing or at least increasing the five-year limit for applying for the tenure track position.
  - B. a three-year postdoctoral position that can be applied for at least within four years after a PhD.
  - C. a career track for highly skilled technicians and staff scientists crucial for some research fields and infrastructures.

- 3. The Faculty Boards and Deans should (Faculty specific recommendations are given in chapter 3 after the analysis of each individual Faculty)
  - A. have dedicated funding that the deans can decide about, in particular in connection to recruitment of faculty.
  - B. flexibilise the recruitment process for more joint hires (between departments and faculties), allow for a dynamic bottom-up/top-down approach, and the creation of matching opportunities.
  - C. utilize associate senior lectures as the main recruitment pathway, complemented by recruitments of senior lecturers and professors.
  - D. instruct the appointment boards to propose only the top candidate for the position.
  - E. sharpen the criteria for promotion to senior lecturer to ensure excellency.
  - F. improve the process for identification of areas for recruitment by means of closer collaboration between dean and department heads.
  - G. secure mechanisms for relocation of funding between and within departments, which should not be small and should be based on both collegial strategic considerations and evaluations of accomplishments.
  - A. provide support and exit-strategies for university teachers and researchers having their positions terminated or not meeting the promotion criteria.
- 4. The Departments should
  - A. ensure a quick, efficient and welcoming integration of new staff members, following e.g. the good example set by WCMM.

# Background and introduction

#### Background

RQ20 (Research Quality 2020) is the new major research quality evaluation at Lund University, based on self-evaluations and involvement of around 5,000 members of staff. RQ20 is tasked with providing a picture of how competitive the research of Lund University is in an international context. Above all, the evaluation is to look to the future by identifying strengths, weaknesses and development potential in all of the University's different research environments and to produce advisory documentation for the future.

RQ20 was initiated by the vice-chancellor in February 2019, as the first comprehensive research evaluation conducted in 11 years. RQ20 has the ambition to gauge the international standing of research at Lund University and is primarily oriented towards assessing (and giving advice on) the preconditions for high-quality research as they are expressed in procedures, strategies, resource allocation and networks.

The University is organised into eight faculties (areas), namely economics and management, engineering, humanities and theology, law, medicine, science, performing arts, and social sciences – and special areas, including MAX IV, directly under the vice-chancellor. Considering turnover, Lund University is the largest in Sweden and second largest in the Nordic countries. It is a national leader in obtaining funding from the European Union, and in national competition for large-scale and interdisciplinary programmes (Linnaeus, Strategic Research Areas). Lund encourages interdisciplinary work and capitalises on the unique breadth of its research profile, as well as its international attractiveness.

RQ20 is intended to support the different units of the university (162 in total, including the synchrotron radiation facility MAX IV) in their aim to develop procedures for high quality and renewal in research, hiring the best scientists and engineers to fully realise its potential through its breadth and interdisciplinary collaboration. A key issue for a university of global standing is to ensure that it recruits and promotes faculty at different stages of their career. Lund University, as any other research-intensive, internationally oriented university is confronted with several challenges within the area of recruitment. They are (i) managing generational shift and renewal, (ii) ensuring the diversity of its faculty, and (iii) finding a balance between recruitment and retainment.

### About this report

This report presents an analysis and critical assessment of recruitment and promotion at Lund University by the panel 4 "Recruitment". It gauges university policies and practices to the ambitious goals of the University and examines the readiness of the institution to ensure rigorous and demanding standards for recruitment. The report also assesses how recruitment policies and practices are aligned with task planning and allocation in the daily activities of the university. Mandate and terms are given to the panel 4 in the "Planning Guide for the Recruitment Panel". Some key parts are taken over from that document in this chapter to make the report a stand-alone document.

#### Mission and metrics

Lund University's mission is to be a world-class university that works to understand, explain and improve our world and the human condition.

To semi-quantify its achievements in recruitment the panel took the overall international standing of the University (ranking), compared it with its international peers, and the alignment of the recruitment with the University's national task and its own planning.

## Terms of Reference (ToR)

The panel is asked to survey policies and practices, and provide advice on three different levels:

- 1. what university management does and what it can do to ensure that such demanding standards are set and met, including programmes to support career development, diversity and renewal.
- 2. practices among the different faculties of the universities and how they reflect university-wide standards and expectations as well as specificities in their respective areas.
- 3. how recruitment policies and practices align with funding schemes that target recruitment (for instance, the European Research Council and the Knut and Alice Wallenberg Foundation).

Having these three levels in mind and where appropriate, specific comments are expected from the panel on:

- A. The quality/content of the self-assessments, and the parts therein that concerned recruitment. Do they show patterns for the university as a whole, and for the different faculties and departments therein? Are standards, expectations and procedures conducive to high quality in research?
- B. Assessment of current patterns and potential improvements for the future in diversity of faculty (gender, age, ethnicity) as a key element in the rejuvenation of research environments.
- C. External funders increasingly target internal recruitment processes (e.g. the Wallenberg Foundation, The European Research Council). How well does the university and its constituent faculties respond to those calls?
- D. In an increasingly international academic labour market, career guidance and support forms are pivotal to ensure that recruited faculty have a productive work environment. Are current support forms adequate? Can they be enhanced?

E. One part of recruitment concerns formal leadership in the university. Please comment upon the procedures of identifying and promoting academic leaders and indicate if there is room for improvement.

### Composition of the panel 4 "Recruitment"

This review was prepared by the panel 4 "Recruitment" during RQ20, consisting of five, both of national and international university leaders from key peer institutions.

Prof. Dr. Jan Holmgren, University of Gothenburg, Sweden

Prof. Dr. Anders Karlhede, Stockholm University, Sweden

Prof. Dr. Claire Kilpatrick, European University Institute, Florence, Italy

Prof. Dr. Maria Tenje, Uppsala University, Sweden

Prof. Dr. Alexander Zehnder (emeritus), ETH Zurich and former president of the ETH Domain, Switzerland, acted as chair

The panel consisted of three members working in Swedish universities and two externals with a range of disciplinary and leadership experience. This proved to be a good mix and, in particular, the need for the "insiders" to explain the Swedish system to the "externals" was productive and insightful as recruitment at Lund University is also affected by the boundary conditions of the national laws and regulations combined with the "academic culture" present at many Swedish universities.

# Material provided to the panel

In preparation for the advice the panel members received extended information, here the key documents:

- RQ20 Overview
- RQ20 Transversal Themes
- Planning Guide Recruitment Panel
- Excerpts from the self-assessments dealing with recruitment from the different Faculties
- LU employment regulations
- Rules on the allocation of decision-making powers at Lund University
- Recruitment statistics for the different faculties
- 5.1 Policy on employment
- 5.2 Good and Clear Career Paths at Lund University
- 6.1 Endorsement of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers (Charter and Code)
- 6.2 Gap analysis interviews Charter and Code
- 6.3 HR Template Charter and Code
- 6.4 HR Strategy and action plan
- 7. Link to WCMM (Wallenberg Center for Molecular Medicine)
- 8. Excerpts on recruitment of the various panel reports
- Slides presented during the review sessions.

The documentation included most information required for the review by the panel. The panel missed Faculty level statistics on recruitment which were obtained shortly before the review on the panels request. Missing as well were the criteria and processes of the recruitment of internal leaders. The question about the recruitment of the internal leaders became apparent only during the discussions with the members of Lund University. The relevant points are discussed in chapter 2.3.

The excerpts on recruitment written by the Faculties had only little value. The panel would have preferred to receive a two-page strategy summary from each Dean explaining how their ambitious goals will be achieved with the existing faculty and new hires. The panel thought that it got too many papers which had only marginally to do with its task. A better targeted selection would have been extremely helpful. Despite this critical remark, the papers provided by the University and its entities were well documented and highly transparent. The documents in combination with the discussions with leaders and researchers allowed nevertheless – though with some opaque spots – for an objective insight into the recruitment and promotion process of the University and how the University plans its future. One of the unexpected advantages of the delayed schedule created by the COVID-19 pandemic was the availability of the reflections of the RQ20 subject panels which, on the original schedule, would not have been available.

## Procedures followed by the panel

This advice is based on the documentation provided by the University and the virtual meetings with the different levels of Lund University leadership, individual faculties, central HR and WCMM on September 28 and 29, 2020 (programme in Annex). The meetings scheduled as part of the review consisted of:

- Central university meetings: with the Vice-Chancellor and other central leadership administration roles as well as sessions with Human Resources, the Vice-Dean tasked with HR strategies on Equality and Diversity and the author of the policy document on Good and Clear Career Paths (around 4 hours);
- Faculty-leadership meetings: these were split into an individual meeting with the Dean of the Science Faculty (45 minutes) and a larger group meeting of those chairing Faculty Academic Appointment Boards (1 hour 45 minutes);
- Insights into recruitment: from recently appointed Faculty and a presentation of a recent special recruitment drive in WCMM (1 hour 45 minutes).

In addition, the panel met on multiple occasions before, during and after the review to discuss how to conduct the meetings, to share knowledge and to discuss the key recommendations and other aspects of the panel's report. Due to the COVID-19 pandemic all meetings took place via video conferences. This had the advantage of making it easy for the panel to meet before and after the review. The main and consequential disadvantage was that it eliminated valuable opportunities for informal exchange with members of Lund University. While the panelfound every session insightful, it would have liked to have more of the overall time allocated to meeting the Faculty leaderships, including further meetings in smaller groups. A meeting with a group of department heads would also have been beneficial, as a complement to the self- assessments.

The report was finalised through email exchanges and virtual meetings. The final draft was then submitted to the University Management for a factual check before the final report was submitted to the University Leadership on 3 November 2020.

# The University's Principles and Strategy on Recruitment and Promotion

# Strategy and framework for the career paths

The university shared and discussed with us an impressive range of policies setting on recruitment strategies and frameworks. The panel entirely endorses the overall thrust. These include the policy document Good and Clear Career Paths (2018) prepared by the Dean of the Faculty of Law; the gender recruitment process set out in a 2016 Decision of the Vice- Chancellor by which in professorial recruitments Faculties must comply with a requirement of shortlist both genders or explain their failure to do so with further work proceeding on a broader gender and diversity strategy to report in early 2021 and Lund University's engagement with the implementation of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers. While the gender process is backed by the target of at least 40 % recruitment for female professors in 2016-2020, there are no targets or review processes for the good and clear career paths policy. In discussions with others during the review, it obliquely became clear that the gender target for new professors was a national requirement initiated by the government rather than an initiative of the university. At the same time, it was clear from the entire review that this target was well-known and taken seriously across the university and had resulted in 47 % of new professors being women over the relevant period.

# Recruitment of faculty and non-faculty scientists

### General remarks

A longstanding problem at Swedish universities is in-breeding or academic cronyism. Rather than openly announcing academic positions and recruiting from the international "market", local candidates have often been recruited in more or less obscure processes. Many would argue that over time this has been the main problem in Swedish research and we in the panel tend to agree with this view. There is however now a growing focus on this problem and hopefully tides are changing. At least there is a growing awareness, concern and discussion about the problem as reflected for example in the RQ20 material.

It has been common practice at Swedish universities to hire people as researchers who get external funding and, in fields with a high teaching load, to hire people based on these teaching needs, in both cases often on temporary contracts. Both of these practices lead to people being hired outside of the regular academic line of positions and favor local candidates or candidates that have personal connections to the recruiting department. In turn, it leads to a large pool of people with temporary and unsecure positions and especially in the case of researchers their continued employment often depends entirely on external funding for their whole career. We are pleased to note that Lund University has a clear policy on ending this practice. Likewise, we are pleased to note that the policy supports the announcement of faculty positions openly, broadly and internationally. These are important policies that should be fully implemented.

An additional aspect of predominantly internal hiring of young researchers is reflected in the faculty recruitment statistics. Professors ("secure" recruitments, well-established people) are recruited externally to a higher degree whereas the associate senior lecturers ("risky" recruitments) are recruited externally to only a low degree. There may be a link to the high dependence on external funding. However, it was not clear to the panel why the majority of these individuals had to be internal candidates. Leaning too much on internal candidates may lower the bars for promotion and as a consequence result in the said academic

cronyism. Increasingly hiring externals as associate senior lectures and promoting strictly competitively, could be one of the keys for injecting young and ambitious faculty.

#### Responsibilities and attractiveness

Recruitment is a joint responsibility of the department and the faculty. The necessary knowledge of the field normally exists within the department and the collegially based decisions there are what normally initiates a recruitment and they are crucial throughout the whole process. However, it is the faculty's responsibility to counteract the inward-looking risks that exist in a group of peers and ensure renewal. How departments are organized, and in particular how funding is allocated to and within them, determines within which group of peers the decisive discussions take place and is therefore very important to the process of identifying the areas to recruit in. It is important that this group is big enough to involve different perspectives and fields of interests, and it should, in our opinion preferably include the full department, which then also needs to be sufficiently large. Funding should also not be too compartmentalized within a department as it must allow for redistribution between research fields in relation to new recruitments. This is important as recruitments require substantial funding to be allocated to the positions, hence making renewal impossible if the internal money is fragmented.

To attract strong applicants, the academic reputation of the university and in particular its standing in the field of research at hand are important. To be successful in actually recruiting the selected candidate, if being of high international caliber, the working conditions offered, including a start-up package, are also crucial. The departments should have a plan for this when they recruit and the extent to which the faculty level should be involved may vary for different positions. The faculty has a particular responsibility when it comes to renewal of research directions not least in interdisciplinary fields. An often-neglected component of the recruitment is the reception and introduction of the recruited person at the university. Here the university should learn from the excellent example supplied by WCMM (see also 802).

An important aspect for all recruitments, of primary importance of course for the appointment of professors but also for associate and full senior lecturer appointments, is that the recruitment process is terminated if the targeted top candidates are not applying or the identified best candidates withdraw from the competition. Too many times in Sweden second-rate applicants have been appointed also to full professorships because of the reluctance of universities to terminate the process: Good enough should never be accepted. We suggest that the appointment committee proposes only a single candidate for the position rather than a ranked list of candidates. If the proposed candidate cannot be recruited the recruitment process is automatically cancelled unless the faculty decides to continue it in which case the appointment committee makes a new proposal.

# Recruitment of non-faculty scientists

As Swedish universities are largely dependent on grants from external funding agencies a need is created for a good system of short-term positions, in which PhD students and postdocs together with technical support staff form the basis.

*Research leaders:* In a situation where external funding agencies give project grants to principal investigators without faculty positions there is also a need for longer-term solutions. This is today handled by employing people to project-defined research positions, which are not time-limited. At the end of the grant the employment is either ended because of lack of funding within the project or the person is kept on through funding in some other way. This contributes to the large number of researchers at the universities and in turn, the large number of staff on unsecure positions as discussed above. The researcher position is needed but the university should avoid continuing them to new funding, thus avoiding creating a pool of long-term scientists outside of the academic career system. Without knowing in detail the situation at Lund University we suggest that over time reducing the number of senior scientists in this category should be the goal, as it should be in general in Sweden, and instead increasing the number of graduate students and postdocs to avoid turning parts of Swedish universities into research-only institutes.

*Technical support staff:* When, as often is the case, the long-term externally financed researcher is a needed technically important member of a larger research group and paid by primary grants to other scientists of the larger project it would be more appropriate, and increase the job security for the person, if an alternative career path, e.g. a staff scientist track, could be implemented for such key persons. Those positions should only be used on a very selective basis to avoid other "sedimentation" risks for the department. This is a question on the national level, and we encourage the Vice-Chancellor to work with colleagues towards the establishment of a complementary research career for staff scientists.

*Postdocs:* Another aspect where we would like to encourage the Vice-Chancellor to make an effort is in changing the Swedish system regarding postdoc positions. The current postdoctoral position in Sweden is not up to international standards as it is only for two years and can only be applied for within three years after the PhD. In an increasing number of fields of research three-year postdoctoral positions are becoming the norm. The current situation is now manageable, but only barely so, by making use of the general labor market possibility (ALVA) to hire someone for an additional two years after completing the postdoctoral position, or for two years after the three year limit. However, ALVA is now under threat. If ALVA is cancelled it would, as we understand it, only be possible to hire postdocs within three years of their PhD and only for two years. Sweden needs a three-year postdoctoral position that can be applied for within at least four years after the PhD. We urge the university to work, in unison with the other universities, to make this happen together with the needed extension of the time limit between PhD and application for associate senior lectureship discussed below. Both of these changes are crucial for Sweden to remain internationally competitive in research.

#### Recruitment of academic leaders

The overall management of the university is on a more general level crucial for the recruitment processes, as it determines the culture and sets the standards for the working procedures. The governance of the university should be based on trust where the collegially based decision processes are crucial. However, at the same time collegiality comes with its problems, as it often prevents needed renewal of existing department structures and research directions as discussed above. A solution to these problems is an influence from the higher levels in the university in both recruitments and promotions and here we see the relation between the Deans and the Heads of Departments as particularly important, not the least in the final stages of negotiations with a candidate one tries to recruit. We recommend that the Deans have access to funding that can be used in such cases, instead of all money being distributed on department level (see also 799).

The recruitment of competent Heads of Departments and Deans is crucial. We were not provided with sufficient information on these processes to make a clear statement on the situation at Lund University. As a consequence, the panel could not satisfactorily answer the specific question e) of the ToRs. However, we still would like to give our views on some general aspects of management of a university as the academic leaders have a profound impact on recruitments. The university should make sure that it is able to attract competent candidates to leadership roles within the university also among those who would not actively seek such a task. As one wants strong and active scientists to consider leadership positions

it is important to provide strong administrative support, well-functioning routines and more targeted incentives. The administrative demands within the university in general and on the leaders in particular should be kept as limited and simple as possible, efficiency should be the goal. The governance within the university should be based on trust rather than on control and detailed follow-ups. Limited formal reporting does not remove the responsibility of Deans to take action if issues arise on department levels. However, we recommend attention is brought to these via other means, including an open culture and active leadership, rather than via bureaucratic procedures. Efficient and non-bureaucratic support from the university administration is crucial, for example when dealing with recruitments, other personal issues, premises or various reports. The demand on academic leadership is huge and the workload on those who aim at staying scientifically truly active is a grave concern.

# Flexibilisation of recruitment

Hiring key faculty requires finances and the availability of positions. At Lund University the finances and academic positions are allocated primarily to the Departments and only little are in the hands of Faculties and the University Leadership. Some funds in the hands of the Faculty and central leadership would flexibilise and contribute to the quality of the hiring through matching funds or allocation of positions. In some of the top global universities<sup>91</sup>, faculty positions freed by retirement or a faculty departure, fall automatically back to the central leadership. These positions are given back to the Faculty or Departments according to the strategic plan, a convincing new research and educational initiative or to strengthen promising new fields. University-wide new opportunities are created in this way. If done reasonably, the disciplinary education is not compromised. To implement such a big step at Lund University may be going too far for the moment but we recommend that the central leadership and Faculty use their existing powers to allocate funding for matching to support new initiatives, this is a necessity to strengthen recruitment possibilities.

There are two requirements to make such a change successful: *First*, departments need to have a decent size with a solid breadth allowing for enough financial and position flexibility. Funding should not be too compartmentalized within a department. It should allow for redistribution between research fields as a result of the chosen field to recruit in. *Second*, filling the leadership positions (Departments and Faculty) with personalities with a strong focus on institutional quality at international level. How these leaders are recruited currently at Lund University remained opaque to the panel.

# Tenure track and promotion

An important vehicle to achieve change in the recruitment procedures is the tenure track position and we are satisfied to note that these so-called associate senior lecturers are being recruited to such a large extent at Lund University. However, there are still several points of concern.

- The *first* is that a surprisingly large number of the filled positions had very few applicants, which may indicate that the field was narrowly defined, perhaps even targeting a certain individual.
- The *second* is that the later tenure decision may not be of international standard. Our worry here is based on our general knowledge about the Swedish practice to date of only very exceptionally denying promotion to a permanent senior lecturer position and some worrisome comments in the interviews

<sup>9</sup> Just a few examples, sort of best-of-class, are: ETH-Zurich, EPFL Lausanne in Switzerland; Imperial College in UK, Stanford and MIT. In the US the positions go to the provost. For Asia, we can name NTU and NUS in Singapore. Within 10 years (between 2000 and 2010) EPFL Lausanne became one of the global top Universities after implementing a coupled bottom-up/top-down approach as mentioned here. NTU Singapore did the same between 2008 and 2018 and became a world-renowned university. Both EPFL and NTU were starting from a very low global level. The experiment EPFL has been repeated by NTU successfully.

confirming that promotion has so far only been denied in very few, exceptional cases. It should be noted that we are lacking specific information on how promotions are handled at Lund University to make a clear statement that there are faulty procedures. However, we still want to raise our concerns and suggest that this should be followed up carefully. It is of paramount importance that tenure can be denied based not only on general formal criteria but also on a careful review establishing that the quality of research, or teaching or services to the university, has not been high enough – and the bar should be high and be made clear already at the appointment for the tenure track position.

- A *third* problem which Lund University shares with all Swedish universities is the five- year limit from the PhD exam within which one can apply for the tenure track position – this is not of international standard and inevitably results in Swedish universities missing out on excellent recruitments. The previous seven-year limit period was significantly better, and we encourage the Vice-Chancellor to take every opportunity to work towards changing the legislation on this matter. The panel would welcome here a fully flexibilisation, this means no time limits.

An aspect that is also important if high bars for promotion are set is to provide fallback options and exit strategies for those who are not promoted. This will serve as a safety net, reducing personal stress and strengthening the Swedish general academic system. Thoughts on suitable procedures and their benefits exist at Lund University. However, we identify a lack of their implementation. We recommend the university leadership ensures that central HR institutions provide efficient support to departments and individuals in exit situations.

For research intensive areas, recruitment via associate senior lectureships may be the main route to hire faculty in the future. For areas with large teaching loads recruitment to senior lectureships will perhaps continue to dominate. We were encouraged to hear the Dean of the Faculty of Social Science, a Faculty being heavy on teaching, reporting a wide use of recruitment to associate senior lectureships.

These lectureship positions should be complemented by recruitments to full professorships in areas chosen after careful consideration. Professorships must be openly and internationally announced. For successful implementation of these recruitments, the identification of field to recruit in and allocation of resources are crucial. In this respect we were impressed by the strategic thinking behind, and the implementation of, the Professor Program in the Joint Faculties of Humanities and Theology.

## Funding and academic autonomy

The in-breeding at Swedish universities, also noted by the panel to be present at Lund University, is often discussed in connection to, or even blamed on, the fact that Swedish universities are crucially dependent on external funding for their research. At Lund University it can be noted that close to all faculty budgets rely heavily on external funding, where the Medical Faculty, Engineering Faculty and Science Faculty are especially vulnerable to changes in funding success rates, having between 50-65% of the total budget from external sources. This is however not necessarily bad, how it works out depends on the policy the university applies towards this funding. This is particularly clear when it comes to recruitments, where a crucial question is what influence funding agencies should have on the recruitments at the universities. The problem may not be the funding itself but rather who takes the initiative and decides on the recruitments. Do the funding agencies in practice decide who, and in which field, the university hires or is it the university that decides?

Most funding agencies today have prestigious programs targeting young scientists, such as the WAF and WCMM programs from the Knut and Alice Wallenberg Foundation, the FFL programs from the Strategic Research Council and Starting Grants from both the Swedish Research Council and the Eu-



ropean Research Council. Some, like WAF and WCMM, are specifically aimed at primarily recruiting people to the universities whereas others, such as ERC SG are not, although they are often used in this way by the universities. It should be stressed that people who get these grants are in general excellent and it is good that the universities recruit people of this caliber to academic positions. Still, we want to repeat the importance of setting sufficiently high bars for promotion to ensure that a single grant at a young academic age does not directly result in a permanent faculty position at the university. We believe that it is close to impossible to make a fair and correct evaluation of a person's research qualities at this stage. Letting external agencies effectively determine research directions also opens the way for a non-orchestrated development of the research profile of the university, in turn leading to risks of dilution of resources and lack of cohesion among the faculty. These aspects are for the university to seriously consider. We strongly recommend that Lund University as a rule primarily recruits its associate senior lecturers via openly announced positions targeting the international pool of potential applicants and later let these persons compete for the larger grants. In this way it is the university that owns the process of defining areas to recruit in – which arguably are the most important strategic decisions at a university. The experience at Lund University and elsewhere shows that such positions attract very strong candidates from the international market with the potential to successfully establish new, or expand existing, research directions in areas relevant to the university. Needless to say, when the university recruits the process has to be of high quality, for example it is essential that the external expert reviewers take part in the interviews of the top candidates and in the following discussions with the appointment committee. We do not know what the situation is in this respect at the various faculties at Lund University, but we know it varies in Sweden.

## Factors to further increase the university's competitivity and attractivity

The lack of possibilities for partners to obtain employment and scattered opacity in the decision-making processes, was felt by most (newly) hired faculties as important shortcomings. Newly hired faculty missed a personal introduction into the Department and the key personalities at the University, when they started with their work. An event to feel welcomed at Lund University, tailored and focused information packages (in English for foreigners), some introductory guidance concerning forms and administrative processes and regulatory frameworks, etc. was also felt to be missing for newcomers. In its last interview, the panel was positively surprised by a scheme of WCMM at Lund University which actually successfully took care of almost all the shortcomings and missing (soft) factors indicated by the young faculty. The scheme was perfectly tailored to Lund University needs and we recommend it to be implanted university-wide.

# Implementation, evaluation and adjustment of common recruitment and promotion strategies

Plans concerning the university's recruitment and promotion strategy have been presented to the panel. The merit's aspects, milestones and processes proposed were right for a more competitive hiring and promotion. The panel got the impression that not only these plans but also others developed more centrally have not or not yet found their way into the university community, indicating a disconnect between the central administration and the faculties and departments. For new, university-wide policies to be implemented, the Deans and Department Heads, supported by the central administration, should be the strategic engines. This provides greater ownership and legitimacy, enabling and supporting cross-Faculty co-ordination on strategic agenda-setting. The panel suggest a regular evaluation in the area of recruitment and promotion to assure highest, and university wide, comparable standards.

# The Faculty and Joint Faculty Perspective

Below follow short summaries of the reflections of the panel made for the respective Faculties. Please note that the Joint Faculties of Science and Engineering is not addressed separately. In fact, the structure of this joint Faculty is unclear to the panel. To the best of our understanding it has no Faculty board or Dean but consists of a number of joint departments belonging, in some way, to the two Faculties. Related to this, the panel would like to raise a concern on the possible ambiguity that may arise related to recruitments for departments spanning more than one Faculty. For example, use of Faculty funding is often handled differently between the Faculties thus making recruitment possibilities and procedures unnecessarily uneven within communities that interact very closely.

# Faculty of Social Science

The recruitment figures show a sharp change of direction over the last five years from mainly internal recruitment towards mainly external recruitment with, in the main, healthy numbers of applicants. The Faculty is still not at a 50-50 gender balances at professorial level. However, it continues to focus on improving further in this regard.

The main reflection of the panel is the pressing need to appropriately empower and support the Faculty-level to resolve a number of challenges faced by the Departments. A significant challenge faced by a number of Departments within the Faculty was the teaching-led nature of recruitment leading to less focus on research leadership and strategy and the integration of younger stage researchers. It would be important to develop institutional support and a strategy for focusing recruitment on all-rounder candidates at all levels: strong in teaching, research and academic citizenship. Professorial career paths and prospects were blocked in a number of Departments for financial reasons, a matter that should also be addressed as part of an overall Faculty recruitment strategy. Further institutional discussions on balancing researching and teaching on Swedish issues and being outward-facing and international would also be beneficial. Finding ways to facilitate speedier and more agile recruitment was pointed to as a means of successfully recruiting top quality candidates and increasing internationalization and diversity.

**Recommendation:** Develop and facilitate a Faculty recruitment strategy to open up balanced career paths up to and including professorial level for candidates excelling in research, teaching and academic citizenship across all departments.

## Joint Faculties of Humanities and Theology

These faculties, with a single dean and academic appointments board, have a total staff of 565 full time equivalents including as faculty 60 full professors, 130 senior lecturers, 14 career development positions and 75 researchers distributed over 8 departments (Archaeology and Ancient History, Arts and Cultural Sciences, Educational Sciences, History, Languages and Literature, Theology and Religious Studies, Communication and Media, and Philosophy).

Economic constraints have during the last several years caused a stop for both internal promotions and recruitments to senior positions. At the same time this situation has led to a systematic reassessment of which academic positions, especially professorships, that are of vital importance and which may not be. This in turn has resulted in a decrease from 80 to 60 professor and, most importantly, now allowed the faculties to launch a programme for the recruitment of four new professors in identified priority areas this year and another five professors next year. This has reduced discontent and frustration among younger faculty about previous lack of career paths.

The panel commends the joint faculties for having undertaken this reassessment and thereby shaped room for needed renewals in subjects and research areas. That there remain different opinions among senior faculty as to whether the new professors' recruitment program is strategically well balanced or too defensive or offensive is not surprising.

**Recommendation:** Systematic and continuous reassessment of needs and resources should be a vital part of the renewal, recruitment and promotion policy strategic work of all faculties and universities in order to safe-guard against the risk of more or less automatic re-installment of freed professorships and for identifying and releasing resources for vital strategic recruitments at both professor and tenure track positions levels. It is important that the joint faculties continue with the process they have started.

#### Faculty of Medicine

This is by far the largest faculty of Lund University. It spans over six large departments (Clinical Sciences, Lund; Clinical Sciences, Malmö; Experimental Medical Science; Health Sciences; Laboratory Medicine; and Translational Medicine), each with several divisions and research centres. Among its about 2,000 employees in Lund, Malmö, and Helsingborg there are 364 professors and lecturers, 1,004 other teachers/researchers and doctoral students, and 609 technical and administrative staff. The faculty's turnover amounts to SEK 2.8 billion, of which about 80% go to research and 20% to education.

With regard to recruitment and promotion policies there seems to be a disconnection, at least in communication, between the faculty level and especially the divisions and research groups levels. In the excerpts of the interviews at the latter levels there are many complaints that recruitments and promotions paths within departments and faculty lack strategy and transparency.

Still, at the faculty level a significant number of recruitments to both senior lecturers (10 positions) and tenure track associate senior lecturers (19 positions) have been financed fully or largely (70-80%) on faculty budget in the period 2014-2018/19. These positions were broadly advertised as positions in "medical research" without any further specification and attracted on average 30-35 applicants per position. The panel commends the Faculty for advertising these positions so broadly with regard to subject. This clearly met the set goal of getting maximal open competition for each position. At the same time, the panel is concerned about the extremely low number of external candidates finally appointed to the associate senior lecturer (18% average) and senior lecturer (6% average) positions during the same time period.

At the faculty levels also comes the recruitment of another 10 tenure tract associate professors to the WCMM program funded by the Knut and Alice Wallenberg Foundation. These positions were advertised for specific but rather broad research subjects within regenerative medicine that had been selected on a competitive basis after a faculty-wide invitation for strong research areas. The process resulted in mostly broad international competition for the advertised positions with their highly attractive financing package and in the recruitment of very strong young international researchers to this program. It is evident that the WCMM recruitments are the ones increasing the average level of external candidates hired to the faculty in this time period.

Although we were not presented with exact numbers, most recruitments over the last 5-year period have no doubt taken place outside these broad recruitment schemes, and based on proposals first from divisions or research groups to their departments and prioritization at the department level decided upon by the faculty. Often the initiation of a recruitment to tenure track position as associate senior lecturer is based on the receipt of a project research grant to a younger scientist, but for professorships and senior lectureships it is usually instead the upcoming retirement of an existing professor that triggers the proposal for a new senior position in the same subject. It is especially with regard to these positions that the self-assessment excerpts display complaints and frustration from the divisions and research area levels over what is perceived as both a lack of faculty and department policies and a lack of transparency and local influence on the decision-making.

The panel lacks enough information to assess how motivated these complaints are. We think though that significant frustration could be avoided by clear communication from faculty and departments of existing policies for successions, recruitments and promotions and by invited discussions on these issues with faculty researchers on a departmental basis.

**Recommendation:** The faculty leadership should initiate continuous discussions with not only department heads but also broader department faculty on the important strategic issues of succession and the creation of new positions to ensure broader participation in and understanding of strategies and implementation processes.

#### Faculty of Law

The Faculty of Law, as in many other universities, is distinctive in covering only a single discipline. Like certain other (mainly scientific) disciplines it faces the challenge of a strong competing career path outside academia, as a practising lawyer. Another challenge faced by Law is the need to teach Swedish law which can act as a brake on international recruitment. The strongly collegial and supportive environment within the faculty is an important factor for recruitment and retention goals at all stages including leadership roles within the Faculty and the university.

Recruitment figures for recent years show that many positions attract very low numbers of applicants (below 5) and this should be addressed through wider advertising and search strategies. Recruitments show a roughly equal number of internal and external candidates being hired whereas a greater number of external candidates could be expected.

The Faculty has internalised in its processes the main central university policies on gender balanced recruitment and Good and Clear Career Paths in its processes. It has the smallest professorial gender imbalance of the Faculties in Lund. It has placed the tenure-track system at the core of its recruitment strategy. An important test of this strategy will be assessment of the suitability of those recruited on tenure-track to be awarded tenure or not and careful stock- taking and reflection should take place in this regard.

**Recommendation:** Consider the recruitment disadvantages of being a small, single discipline Faculty and how these might be mitigated by creating processes and funding for cross-Faculty appointments in identified fields.

**Recommendation:** Organise stock-taking and reflection of processes and outcomes for those appointed to tenure-track positions when it comes to decisions on the awarding of tenure.

## Faculty of Fine and Performing Art

The panel understands that hiring in the art area can and should differ from Science and Engineering. In addition, its professorships are time-limited to four years. The argument that in UoA Theater education is primarily for the local market and thus hiring is mainly restricted to locals has not convinced the panel. The panel understands that this faculty is a recent addition to the university and needs some time to transfer into academic traditions of a university. It should be the ambition of this Faculty to internationalise the performing art education. The panel is convinced that through an internationalisation the locally focused part would win considerably in quality, as well. The Fine Art section exemplifies were internationalisation can lead to. PhD graduates became faculty in different parts of the world, a strong sign of the quality of the recruits and the education in this field at Lund University.

Overall, it seems that with one exception for a senior lecturer, most other recruitments were made from a few (4) to a single applicant. The Faculty often has a specific candidate in mind. Together with the time limitation of the positions, the pool of possible recruits is very small. The panel is convinced that there is quite some room for improvement here and suggests that in the future the Faculty of Fine and Performing Arts balances better the national and international aspects of its recruitment. The specific panel looking at this Faculty has made a number of very helpful comments in this respect.

**Recommendation:** The Faculty of Fine and Performing Arts needs to augment its international profile, visibility and attractivity. For new recruitments the special attention must be given to better balance internal and external, incl. international hires. This will increase and accentuate the cultural diversity and employability of the graduates educated at Lund University.

#### School of Economics and Management

By looking at the recruitments of the last five years two professor openings were advertised in Business Administration. One position was filled with a person from outside of Lund University. The number of applicants was low to decent. The second position was not filled.

The panel noted for Business Administration that the majority of the recruits on the Senior Lecturer and Associate Senior Lecturer level were internal candidates or those who had previous relations with Lund University. Such a situation is acceptable if the Senior Lecturers were promotions of Associate Senior Lecturers (10 of 14). However, recruiting primarily internally on the Associate Senior Lecturer level (12 of 18) is not ideal on the long run.

The Department of Economics, the second largest department of Lund University does avoid hires internally (by policy). It is indeed an outlier within the Faculty.

Hiring on the (Associate) Senior Lecturer level is an excellent opportunity for rejuvenating a department and bringing in internationally promising young people from a more diverse pool of applicants than the home market can offer. Putting special efforts in recruiting nationally and internationally the top young Associate Senior Lecturer will pay off in the future. It will raise the profile of the school as a whole, increase its international visibility, attract competitive funds, and make the Lund University's economic and management education increasingly attractive, even beyond Sweden.

**Recommendation:** The Department of Business Administration hires too many local talents. Leaning too much on the home market may lead to a narrower view of the scientific field, a decrease in diversity of thinking and less innovation. The Department needs to put a strong and special effort in recruiting from a broad international pool of top young talents and exceptionally successful professors.

## Faculty of Science

The Faculty of Science recruited five professors, 24 senior lecturers and 21 associate senior lecturers during 2014-18. The professor positions all had more than ten applicants, two of the recruited were internal candidates and none had a PhD from Lund University. Of the 24 senior lecturers recruited, 18 were internal, 11 had a PhD from Lund University and six of the positions had at most two applicants. Of the 21 associate senior lecturers, 10 were internal, 11 had a PhD from Lund University. Generally, a top candidate was recruited in each case.

Of the recruited associate senior lecturers 35% were reported to be women – a strong indication on a healthy development towards a substantially more gender balanced future faculty.

Regarding the high number of positions with few applicants we note that this seems to be a problem of the past, almost all of them are during the first two years. Thus, the faculty seems to have changed its policy, which we acknowledge and salute. We find though that the number of externally recruited continue to be on the low side and recommend the faculty to look into this.

We were pleased to hear that the external reviewers now take part in the interviews of the candidates and, we assume, in the following critical discussions in the appointment committee. Our conclusion is that the appointment committee works very well. Our main concerns are thus with the processes prior to the announcements of positions, most importantly the identification of fields to recruit in. Based on our general experience of the Swedish system, on the excerpts from the panel reports and on the interviews, we suggest that the Dean, with the support of the Board of the Faculty, increases his efforts to engage with the departments in this work. This is particularly important when it comes to ensuring that the faculty has a balanced research base and in identifying new and upcoming areas – as well as not recruiting in those that have past their prime. The Faculty Board should be prepared to contribute financially to initiate strategic recruitment initiatives in areas where the departments lack the incentive. Furthermore, the Dean should have easy access to funding that can be used in critical recruitment negotiations with candidates.

When it comes to promotions, we refer to the general concerns in the report, we lack specific information to be able to comment on how it works in the Faculty of Science.

**Recommendation:** The Faculty Board should support the Dean in his efforts to address the issues raised above.

#### Faculty of Engineering

Like many of the faculties at Lund University, also the Faculty of Engineering (LTH) suffers from a low degree of recruitments being filled by external candidates, especially for positions targeting younger scientists. From the recruitments in 2018 and 2019, on average less than 20% of the associate senior lecturers and senior lecturers were recruited externally whereas the number for professors was more than 60%, which is encouraging. There is thus a disharmony with the newly established university policy on announcing associate senior lecturer positions broadly, internationally and in open competition.

The issue of low influx of international recruitments to LTH is also addressed in the self- assessments, showing that there is both awareness and a healthy worry within the faculty regarding this fact.

One of the explanations brought forward in the self-assessments is the heavy dependence at LTH on external funding (66% of total budget). This is clearly portrayed as a challenge to the UoA's making open recruitments difficult. Several UoA's wishes to be able to provide "free PhD positions" and provide open announcements for young researchers but are unable due to lack of faculty funding.

Other challenges put forward as explanations is the strong competition with industry that can offer substantially higher salaries and the inability of the university to provide attractive start- up packages for new faculty. The panel agrees with the hampering effect of lack of start-up funding and we recommend a larger amount of internal funding to be maintained on faculty level so that it can be pooled into strategic recruitments instead of being diluted across many departments. The industrial competition is however a worldwide challenge for engineering faculties and not unique to Lund University.

An issue addressed by almost all UoA's in the self-assessments is the homogenous staff profile at LTH and skewed gender balance. It is encouraging to see that most UoA's report this as problematic but at the same time, the lack of ideas and initiatives on how to counteract the problem is disheartening to note. We encourage LTH to work more actively in this area, e.g. by introducing mandatory workshops on unconscious biases and effective recruitment strategies.

LTH has two different faculty appointment boards, one handling new recruitments and the other handling promotion of employed teachers (Career board). The panel agrees that this can make the processes more efficient as it allows for specialisation and we encourage the other faculties to consider this option of dividing the responsibilities, if applicable and possible in their respective situations. Still, there was a general feeling noted in the self-assessments that recruitments processes in general were too lengthy. Another observation during the interviews was that promotions seemed to be declined only in very few cases, to which the panel raises concern.

**Recommendation:** Shorten the recruitment process time to ensure the interesting candidates are secured to Lund University.

**Recommendation:** Ensure full implementation of the main central university policies on gender balanced recruitment and Good and Clear Career Paths, both supporting excellence.

#### MAX IV

MAX IV is a national research infrastructure with ground-breaking qualities of great importance to Sweden and beyond. It depends crucially on having a highly skilled work force of staff scientists and technicians. These are subject to competitive offers from companies. The career development for such people working on research infrastructure is being discussed in Sweden and Prof. Stefan Nordlund, former Dean of the Faculty of Science at Stockholm University, has recently presented a case study, commissioned by the University Reference Group on Infrastructure (URFI), of MAX IV and SciLifeLab covering this aspect. He identifies three groups of people, where one is the pure technicians that are not involved in research and one is a group that perform research themselves, perhaps as PI with funding, and the third group is in between the two others, consisting of people typically with a PhD that do a technician's tasks but also participate in research, for example method development, and typically also are involved with external users of the facility. This latter group is large and is critical to the functioning and development of the facility. It is for this group of individuals for whom a new career track is desirable. According to the law regulating public employments in Sweden it is however not possible, except for academic positions, to promote a person to a new position - all positions must be announced and open for competition. Prof. Nordlund believes that it may still be possible to introduce a two-level system, staff scientist and senior staff scientist say, where the two levels are not different positions, meaning that the second level does not involve new tasks.

# Meeting Plan:

SCHEDULE FOR TRANSVERSAL PANEL RECRUITMENT DIGITAL MEETING SEPTEMBER 28-29				
Digital pre-meetings between RQ20 Admin and panellists: September 8,	13.00			
Digital pre-meeting between panellists: September 22, 10-11				
Zoom-link to meetings 28-29 September:				
September 28	September 29			
08.45 – 09.30 Session 1 Internal panel meeting	08.15 – 09.00 Session 9 Internal panel meeting			
09.30 – 09.45 Session 2 Welcome by the RQ20 Administration Freddy Ståhlberg, Mats Benner, Malin Bredenberg	09.00 – 09.45 Session 10 Discussion with HR/Research Services 09.00 – 09.15 Presentation (Gunilla Thylander Anneli Wiklander, Åsa Thormählen): Recruitment in a HR perspective – our role in the recruitment process 09.15 - 09.45 Questions from panel, discussion			
09.45 – 10.00 Break	09.45 – 10.00 Break			
10.00-11.00 Session 3 Recruitment discussion with representatives for LU leadership: Vice-Chancellor Torbjörn von Schantz Pro Vice-Chancellor Stacey Sörensen University Director Susanne Kristensson HR Project Manager Gunilla Thylander	10.00 – 10.30 Session 11 Discussion with Pro-Dean Jimmie Kristensson, Medical Faculty 10.00 – 10.10 Presentation (Jimmie Kristensson): HR strategies regarding Equality and Diversity 10.10 – 10.30 Questions from panel, discussion			
Moderator: Mats Benner 10.00 – 10.10 Key aspects on recruitment at Lund University (Vice- Chancellor Torbjörn von Schantz) 10.15 – 11.00 Questions from panel, discussion				
11.00 – 11.15 Break	11.00 – 11.15 Break			
<ul> <li>11.15 – 12.00 Session 4</li> <li>Discussion with Sven Lidin, Dean (Science Faculty)</li> <li>11.15 – 11.25 Presentation (Sven Lidin): The faculty perspective on recruitment, international and national recruitment, support possibilities</li> </ul>	<ul> <li>11.15-12.00 Session 13</li> <li>Example of recruitment in practice - "Showcase WCMM"</li> <li>11.15 – 11.25 Presentation (Gunilla Westergren- Thorsson, Ulrica Englund- Johansson):</li> </ul>			
11.20 12.00 Questions from papel discussion	What is unique with the WCMM recruitment process?			
12.00, 12.00 Questions from parier, discussion	12.00, 12.15 Lunch			
13.00 -14.45 Session 5 Round Table: Meeting with Chairs of the Academic Appointment Boards at LU's faculties	13.15 Session 14 Internal Panel meeting – follow-up RQ20 Administration available on request			
Moderator: Titti Mattsson				
Faculty-wise short overview of recruitment process. Instructions for presenters: Please note the very short presentation time. If you want to show one (maximum) powerpoint slide, send this to titti. mattsson@jur.lu.se not later than Thursday, September 24.				
13.05-13.10 Måns Magnusson, Medicine 13.10-13.15 Anders Tunlid, Science 13.15-13.20 Patrick van Hees and Johan Revstedt, LTH 13.25-13.30 Christofer Edling, Social Science 13.30-13.35 Birgitta Nyström, Law 13.35-13.40 Andreas Inghammar, Economy 13.45-13.50 Anna Lyrevik, Art 13.50-13.55 Johannes Persson, Humanities 14.00 – 14.45 Questions from panel, discussion 14.45 – 15.00 Break				

15.00 – 16.00 Session 6	
Meeting with representatives for recruited researchers.	
Moderator: Gunilla Westergren-Thorsson	
2-minute "shotgun" presentations (no slides allowed): My position at	
LU and how I was recruited.	
15 00-15 02 Appa Lyrevik Art	
15.02-15.04 Deniz Duru. Social Science	
15.04-15.06 Margaret Mcnamee, LTH	
15.06-15.08 Ester Barinaga, Economy	
15.08-15.10 Ana Nordberg, Law	
15.10-15.12 Natascha Kljun, Science	
15.14-15.16 Victoria Johansson, Humanities	
15.16-15.18 João Duarte, Medicine	
15.20 – 16.00 Questions from panel, discussion	
16.00 – 16.15 Break	
16.15-17.00 Session 7	
Discussion with Mia Rönnmar, Dean, Faculty of Law	
16.15 – 16.25 Presentation (Mia Rönnmar): Career Paths at LU	
16.30 – 17.00 Questions from panel, discussion	
17.00 – 18.00 Session 8 Internal panel meeting	

# 7. External Panel Report: External Engagement

Final Report, 18 December 2020. Anne Kjersti Fahlvik Willy Sansen Anders Flodström Jos Lemmink

# Introduction

University-society collaboration has for long been pinpointed as a key area for universities. This panel is devoted to how collaboration is (and can be) mobilized to elevate the quality of research and education. The panel assessed different collaboration practices as evidenced in a series self-evaluation reports, in reports and documents concerning the leadership and management of collaboration, including the connection between central plans and policies on the one hand and local practices on the other. Finally, the panel was concerned with the design, execution and impact of innovation support.

The panel will base their conclusions and recommendations on self-evaluation reports and relevant documents as well as on interviews held during digital meetings on 27 and 28 October 2020 with different internal and external stakeholders. Interviews with representatives of university management, faculties, departments and specific external stakeholders and collaborative business and public partners. For an overview of the meeting schedules, interviewees, sources we refer to the Appendix.

*External engagement* ("Samverkan") was instituted in Swedish University Law in 1977 as one of the Swedish universities' three foundation tasks, the other two -original ones- are research and education. External engagement has shown its importance as an integrated part of research and higher education. It adds to and improves productivity, quality and impact of research and education. External Engagement does not infer with disciplinary productivity. On the contrary, according to the EU More3 report (<u>https://www.more3.eu</u>) external engagement enriches and increase overall scientific production.

# Managing external stakeholder engagement

*Governance issues.* In 2016, Lund University (LU) decided to establish an *External Engagement Council (the Council, EEC).* The Council advises the vice-chancellor on external engagement and related initiatives and actions. The role of the Council is to promote and co- finance activities leading to increased intersectoral research collaboration. External engagement within education, mainly commissioned (professional) education for public and private sector employees has not been within the mandate for the Council.

The Council is allotted a yearly budget of 20 MSEK for support of the activities, roughly1% of the LU direct research funding from the Swedish Government (*fakultetsanslaget*).

The Council is led by the provice-chancellor for external engagement and comprises of members from each and all faculties, also includes representatives from specialized centres as USV and MAX IV and from students' and employee organizations. The Council members are appointed by the vice-chancellor on proposals from the Council members. The administrative manager of LU *Research, External Engagement and Innovation* participates in the council to provide an overall perspective. The term of office for the Council members is 3 years, bar the student representatives, for whom the term is 1 year. In 2017 the Campus Helsingborg was added as a member. Explicitly, the Council does not cover higher education.

The Council is intended to be a forum for jointly identifying, prioritizing and developing external engagement and cross-faculty collaboration matters, and also to provide a basis for optimizing support functions within the area of external engagement. The aim is to simplify supportive and prioritization processes and to increase the possibilities for synergy effects between the faculties' areas. The Council is to have an advisory role in matters concerning external engagement, for example prior to the allocation of funds intended for external engagement initiatives. External engagement here refers to an interactive process that creates mutual benefit, both for the higher education institution and external engagement partners. This term is often differentiated from the term collaboration which is often used for cooperation between or within higher education institutions.

The external engagement at Swedish universities is pushed by intersectoral applied and clinical research collaborations within healthcare, science and engineering. Clinical research within healthcare rests on a shared responsibility between the university hospitals and the medical faculties. This extends to the education of nurses and medical doctors. Lund is a very positive example of this, and it is evident that clinical research and education of new professionals is a common responsibility shared by the University and the regional healthcare authorities. The collaboration is supported by the Agreement on Medical Education and Research (ALF) funding.

Engineering research and higher education used to be similar to healthcare, the reason being that engineering R&D collaborations had a focus on Swedish engineering companies and unicorns. It was unanticipated when the evaluators met the representatives from Ericsson, Tetra Pak, Alfa Laval and Novo Nordic and learned that they felt a distance with respect to LU research. We had expected positive or possibly negative opinions concerning the interactions but not estrangement. The companies still saw LU as a provider of new engineers and employees. In the long term it is not sustainable if LU as an HR provider, does not collaborate with these companies on R&D. Novo Nordic, a large Danish pharmaceutical firm turned out to take a different stance. The MAX IV collaboration was seen as a key asset to their R&D.

On an individual level student and researcher exchange as internships, industrial PhD candidates and adjunct professorships contribute strongly to external engagement. It needs support and to be strengthened. The Swedish success in export relies upon optimal utilization of a talented and educated workforce. For instance, abstain from industrial internships as part of external engagement would hurt both the university and industry. Projects do, by purpose, not include *start-ups*.

#### Observations and recommendations

- The Council members should be appointed on 3 years term, not prolongable. Any continuation beyond 3 years will just hinder the formation of an external exchange culture. External collaborators work on shorter timescale.
- Has the External Engagement Council a wider role, than selecting specific external engagement activities when it comes to policy? Or is the role limited to the selection? If the role is wider:
- How broad is the role of the Council and is there the overlap with other RQ20 panel domains?
- Where is educational impact/engagement, intellectual impact/engagement, societal impact/ engagement and impact/ engagement within the regional ecosystem? The engagement will go hand in hand with impact of LU. How is this impact quantified and monitored?
- Is there a proposal process for selection and support of external engagement activities?
- Is there a reporting and follow up of the selected external engagement activities?
- The Council promotes both external intersectoral and internal cross-faculty collaborations?
- Academic staff need to learn the complexity involved in the external engagement collaborations. For companies the academic research and research-based innovation should result in new or

improved products and services. For public organizations, the added value is often related to a better understanding and quality of the operations not necessarily resulting in revenues and profits. The collaborators mutual understanding of and trust in each other is important. This will bridge the needs in society and companies to the academic community. On an individual level the evaluators saw a number of successful collaborations. In the future these individual successes should be turned into being part of the academic culture.

- What is the percentage of faculty involved in external engagement projects? Is it similar to the percentage of faculty engaged in start-ups?
- The allocation of funding has been organized in a way that senior researchers and research groups are incentivized and via seed more external engagement activities have been stimulated. In the end, young and talented employees got involved and in such a way the connection to industry and society has been encouraged bottom up. We suggest an alternative way of encouraging research by directly stimulate young researchers to cope with the requirements that are needed for an academic career. Seed money can be used then to free up time for external engagement activities by, for instance, reduce temporarily teaching load.
- Lund has acted fast on the "Big Data" and AI challenges and accelerated the actions even faster.
- There is 20 MSEK available for seed money, roughly 1 MSEK per activity. Challenge is the continuity of the initiatives selected to receive the seed money.
- In the formal career paths (tenure tracks) external engagement plays increasingly an important role, and is now in all cases at least part of the set of criteria.

# Industrial collaboration

*Swedish Context.* Swedish economy is driven by a number of large companies. These companies were established quite some time ago: Volvo Cars, Volvo Group, Tetra Pak, ABB, Ericsson, SKF, SCA, Getinge, Alfa Laval, Astra Zeneca and more. They function as the backbone for the Swedish export industry. Numerous SMEs live on delivering components and subsystems to the system-oriented enterprises. They still stay in the forefront in their business fields. Historically, they are well-connected to the Swedish technical universities and faculties. These have attracted top talent to the graduate engineering education. High quality graduates are recruited by these companies and form a unique human resource for innovation, development, operations and management. The inflow also guarantees renewal. Programme committees include industrialists. All students have industrial internships as demand for the degree. The educational programmes have stayed technically well connected and have followed and pushed the technology progress in the companies. Nowadays driven by digitalization, sustainability and other societal challenges drive up the innovation pace and "customers" demand of newness increases. The educational programmes -not only in engineering- must foster creativity, innovation and entrepreneurship in quite another way. Unfortunately, external stakeholders are more aware of this than the Universities. Universities are usually stuck in a meritocracy that prioritize and foster research and researchers.

These companies are geographically distributed over Sweden and for many of us, Tetra Pak and Ericsson are associated with Lund and Lund University, Volvo and SKF with Gothenburg, and Ericsson and ABB with Stockholm. There was thus not a surprise to meet with the companies listed below. The outlier was Novo Nordic, a Danish bio and pharmaceutical unicorn that has recently strengthened their ties to LU and MAX IV, through a major grant to MAX IV instrumentation for increased bio-structural forefront research. Lunicore is a student consulting company. Students serve as consultants to many companies. Often, SMEs are more comfortable with expert students, it is simply less prestigious. Students competence when it comes to e.g., digitalization is often very high. Miljöbron connect students and companies to make internships a win-win mechanism. Often public and private organizations need help in establishing this. Students and companies need the expertise that Miljöbron offers. See for company stakeholder representatives in session 3 in the Appendix.

Companies are the most important intersectoral research collaborators for technical universities and faculties. The collaborations have different formats, often determined by the need or importance for short- or long-term product development. Companies can fund or co-fund directly academic research. Companies can co-sign and endorse research applications to regional, national and European funds (private or public)

- They may support the invention, construction and use of scientific instrumentation platforms. MAX IV is such an example where Novo Nordic and Swedish forest industry finance expensive instrumentation and give access to other users. Similar co-financing of supercomputers is quite common. Many of the upcoming quantum computers and networks are co-financed by companies.
- Companies provide adjunct professors for teaching. Some companies allow staff members to teach single courses, often to keep in touch with the students. Companies sometimes finance chairs for experts, to build up an academic research environment they can benefit from. Sometimes just to solve an internal personnel issue.
- Experts from companies do inspire students and staff at universities. It is a way to put academic studies and work into a societal and industrial context. Today, it is quite common that a company collaboration leads to financing of industrial PhDs where the research theme chosen has been agreed upon with industry.

Four major companies, Tetra Pak, Alfa Laval, Novo Nordic, Ericsson were present at the meeting. All had collaborations with LU and also other universities and are used to collaborate with universities in research and higher education. All of them are experienced in recruiting master and PhD graduates in high numbers and to collaborate with universities in R&D. It felt like LU played a more important role earlier in R&D. Now the role of LU was more to educate high level professionals to be recruited by them. Still all companies are world leading in their fields and the fields are really quite dynamic and they do advanced R&D. There seems to be a mismatch between what LU can supply and what is needed for new products and services. The exception was Novo Nordic where MAX IV was considered to be a critical resource in R&D.

*Novo Nordic* supports and collaborates in 5 research projects. Novo Nordic has recently through Novo Nordic foundation granted 250 MDK to MAX IV to instrumentation for bio- and pharma structural studies. The instrumentation platform will give Novo Nordic a decisive advantage in R&D.

*Tetra Pak* supports 3 part-time professors and 5 PhD candidates. The priority is to have access to the "best" people at Lund. Tetra Pak was asking for better communication with Lund. Communication should focus on product innovations. It was suggested to create an innovation network of researchers focussing on new creative products and services.

*Alfa Laval* would like to see an increase in collaboration with Lund. The company commented on the absence of *start-ups* and SMEs in the meeting; "There must be at least 50 of them in Lund".

*Ericsson* made it clear that Ericsson is a systems company not a component company. This is the reason why it is hard to grab the attention of university researchers in Ericsson R&D. Advances of communication systems involves understanding hardware and software and the way they interact, and therefore appeals less to researchers specialized in a subset of such systems. Not only it is hard to interest Lund

researchers it is also hard to interest faculty in communication systems education. There seems to exist a mismatch between what LU offers and Ericsson's needs. Nevertheless, Ericsson maintains relationships with over 45 universities worldwide. Also, Ericsson in Lund supports more than 5 professors and 12 researchers at LU. Among this group there are highly recognised academics, Sven Mattison, David Sjöland, Pietro Andreani, well known in the field of solid-state circuits. Ericsson works with middle school to stimulate STEM education for pupils from an early age on.

*Lunicore* offer university students as experts. Often with SMEs the need for digital or sustainability expertise key, but the existing consulting services are not easy to collaborate with. SMEs expect a certain level of knowledge and background to be effective. Students experts are much easier to communicate with and students appreciate to make a difference.

*Miljöbron.* It was mentioned that they group over 180 students and 50 supervisors. It is clearly an interface between industry and LU. This is not only to promote research but also to provide education on innovation.

Conclusions can be drawn towards how innovation is handled. Lunicore and Miljöbron could both be asked to take up a more active role towards innovation, to provide a network encompassing both LU and the industry with a network of new ideas. Another remark is that most companies focussed on the Lund area. The link with Europe and the rest of the world seems to be weak. Provokingly, the question arises whether LU is a top university in Lund, in Europe or the rest of the world.

#### Observations and recommendations

- The trust in LU was high and LU is seen as the primary source for recruiting new graduates in different fields of company operations.
- LU education as such was pretty much a black box.
- Ericsson, Tetra Pak and Alfa Laval stressed the role of LU as the source for high level HR where knowledge and skills living up to the companies needs in product development, production and marketing, due to new innovations and business models.
- The companies felt some alienation due to lack of interaction of LU in R&D, where the development of new innovative products, including production, marketing and distribution is handled in increasingly new ways.
- As for education, evaluators found hardly evidence that the companies were involved in education program design, set up and management. These collaborations probably exist but is handled elsewhere in the organization(s).
- Novo Nordic was different. LU or rather MAX IV was seen as a unique tool for content and structure determination in the search for new pharmaceuticals and that further development would make MAX IV even more important. The Novo Nordic foundation support of MAX IV is substantial, and the Novo Nordic activities will contribute to MAX IV's reputation.
- Researchers at Novo Nordic form a very mixed cohort when it comes to university origin.
- The two students' companies do play an important role in LU's external engagement. So, we do think that student companies are important and LU should care about them.

# Lund University and innovation

The Role of Universities in Innovation and Entrepreneurship. In the 1990ties innovation was recognized as the main driver of economic growth. Nobel laureate Robert Solow's theory on economic growth and the role of new technology and new technology-based business models had become mainstream. The role of "open" innovation stressing the role of the user and customers created the first digitalization blast. Universities, their faculties and students were considered a hub for new knowledge-based innovation and entrepreneurship. Already in 1994/95 the first university Holding companies started operations. They were fully government owned but operated by universities. The Holding companies should early recognize new idea and innovations and invest in them. The equity in them was not much and commercial equity should take care of the expansion phase, the A, B and C rounds to bring them to profit. In 2009, the government strengthened the role of universities in innovation by partially funding "Innovation offices" at 8 universities. The idea was basically that the Innovation offices should do the ground in tapping of the faculties and students' innovative power. If this work led to a need for investment the Holding companies should *take over*.

LU Innovation, as a department of LU *Research, External Engagement and Innovation*, supports both researchers as well as students. LU Innovation thus acts as a major force to promote external engagement, based on faculties' and students' achievements and ideas through *start-ups* and intersectoral collaborations. LU Holding serves this purpose, when needed, as a financial investor.

Administrative aspects on research, collaboration and innovation. These topics are closely related, still they differ in the way they are handled. It is in some way remarkable that all three focus on administration without bothering too much on how external research, collaborations and innovations, creating added value to LU, are generated. They are thus in a kind-of wait- and-see mode trusting that other operational parts of the university are providing challenging opportunities. More initiative would thus be expected. The result is that as little as 1 out of 10 professors and 1 out of 100 students generate a possible LU Hold-ing *start-up*. The Swedish IPR (Intellectual Property Rights) law for university employees with the IPR ownership resting with the individual, probably leaves out some unrecorded *start-up* companies.

It was explained that Commissioned (professional) courses are paid by external public and private customers. It was rather unclear what actions were taken to find customers. Evaluators missed a LU professional education marketing strategy. In practise, the marketing is probably left to LU's individual course providers. Today and in the future even more so, higher education will go online and there will be a global supply of high-quality higher education courses, not seen or even anticipated before by the classic universities. These courses already cover many topics with anytime access, anywhere and in any format. A huge market is emerging. Publicly financed universities struggle to find course production and viable business models for this new market. Evaluators' impression was that the department LU Commissioned Education (LUCE) doesn't distinguish itself sufficiently from LU, which is fine if customers know about it, and the quality and accessibility is high.

One of the problems was to find teachers for such professional courses. Most international courses find (international) lecturers from other universities and provide a speaker's honorarium. Only such model is likely to lead to success in this competitive and international educational market.

A similar conclusion is reached on collaboration and external research in general. The LU has the advantage that major companies are present nearby. This is an advantage and a disadvantage. It is easy to reach and talk to these companies, trying to convince them to start projects. The disadvantage is that there is no urge to develop a strategic plan to reach companies internationally and in a wider context.

The urge to act is present in the innovation realm as well. As has been explained, there are a large number (more than 200) projects, including about 30 start-ups, which are supported by the office towards more investment. It is not clear whether the same office sees it as a priority to promote and generate innovation at LU.

LU Holding is the investment arm of LU Innovation. LU Holding is a different juridical body compared to LU. It is owned by Swedish government and managed by LU. LU Holding provides early start-up funding and also has networks of external investors that can finance further investments in and beyond the *start-up* phase. LU Holding is commercially viable. Investments have resulted in the creation of over 4000 jobs and a profit of 1,4 billion SEK. It puts LU Holding at the top of commercial success in the league of University Holding companies. The real added value LU Holding investments have enabled and created is significantly higher.

*Interviewees* confirm that indeed most money acquired by companies flows into the faculties but that most of it is generated in the region around Lund.

One interviewee in the session had to admit that in social sciences it is not clear at all which projects can be identified with sufficient financial back-up. This is a result of the fact that technical industries spend much more on research than socially oriented companies, if at all they can be defined.

It can be concluded that LU Innovation and LU Holding are well organized to provide support. They do not generate new activities by themselves and for themselves and others. In Sweden and Europe, there is a fear that *start-ups* which do not quickly attract sizeable external investments are costly and cannibalize on University resources.



On average every 1 out of 10 professors get involved in the LU Holding. On average every 1 out 100 students consider to propose *IPR or start-ups* to the LU Holding. The numbers have been fairly stable over time. If you compare to Stanford University faculty, almost all professors are involved in proposals on start-ups, on new projects in existing companies or work part time for external partners. In a way this comparison is biased by the Stanford University (infra-) structure but could serve as a point of reference in paving the journey to more external engagement. It is clear that in order to make external engagement through faculty involvement at LU part of the LU culture there is a way to go.

MAX IV. The production and use of synchrotron radiation rests on a heritage from the Nobel laureates Hannes Alfven and Kai Siegbahn. The use of synchrotron radiation from electron accelerators for spectroscopic and structural research goes back the 1960ties. Early use of this technology was pioneered at DESY (Hamburg) and SLAC (Stanford), only on dedicated accelerator at NBS for metrology was in operation. A Swedish collaboration between accelerator physicists at Lund and electron spectroscopists at Chalmers and LU resulted in an early Swedish entry into synchrotron radiation science through a shared use with nuclear physicists of the MAX I accelerator. MAX IV is, due to a design innovation, one of the world's brightest synchrotron radiation sources. A continuous spectrum of radiation from IR to hard xray is delivered in sub femtosecond ( $10^{-15}$  s time) pulses. MAX IV is a dedicated source of radiation for mainly electronic and spatial structure studies of materials, including molecules, clusters and nanostructures. The pulsed structure enables dynamic studies of biological and chemical processes. MAX predecessors have established synchrotron radiation as an experimental tool for life, bio and material sciences. MAX IV is in operation and first scientific results appear. One thousand users, mainly from countries around the Baltic Sea makes up the user base. A facility like MAX IV enables and thrives cross-country, cross-disciplinary and cross sector collaborations. That is why ForMax, DanMax and FinEstBeAMS are so important. To fuel the collaborations and to keep a healthy number of users and to get external co-funding, a portfolio of educational and public activities is essential. MAX IV does a good job, but financing of summer schools, courses and user conferences demands professional people. Such financing is often not considered by the owners. Typically, financial stakeholders do usually not prioritize these costs. Science paradigms change, user and user communities come and go. At present biomaterials and new pharmaceuticals are hot bound with commercial potential. A facility as MAX IV will keep to have the unique tools but also need the unique users. The LINXS enterprise is extremely important. It recognizes new science in an early stage and are aware of the possibilities LU and MAX IV can offer. They will become MAX' research engine that goes beyond being a unique tool. MAX IV at LU have a K&W grants for instrumentation, Novo Nordic grants for pharmaceutical structure studies, SFS grants for neutron studies at ESS and a Crawford grant for setting up a MAX IV user community.

- MAX IV is an international facility when it comes to scientific use. There will be a competition with other similar facilities (Hamburg and Aarhus) about the best local university and industrial users. Companies with easy access will in many fields gain a decisive product development advantage.
- MAX IV cares for its present user community and also works on exposing the experimental possibilities to new users. We consider the financial resources for this soft work too low. For instance, a structured organizational and financial plan for communication to and education of new users should be presented.
- The LINXS initiative is an excellent one. It also serves the purpose to make MAX IV related science a LU priority when it comes to future research.
- The yearly direct research funding to universities mirrors the preceding year's grant.

# Lund University and the region

In general, regional development and innovation are increasingly important goals for *public policy*. Innovation is an important driving force for a region's ability to develop and go through any needed transitions. Universities have an important role to promote innovation and business development in their regions, in education and in knowledge development and dissemination, and as an arena to connect to networks nationally and abroad. Universities become more central to models for regional innovation policy such as smart specialization, regional innovation systems, etc. And the region is becoming more important for the universities due to policies for entrepreneurship, citizen engagement, universities in society etc.

The *impacts* of the university on the region are multi-faceted:

- Students and staff contribute to economic demand for regional goods and services.
- Getting more young people in the region to take higher education.
- Business and public sector have access to competence, providing better regional services.
- The university attracts businesses and public institutions that need the connection and access to candidates and researchers.
- The region is thriving by university based new ventures.
- Researchers and students create contacts and networks.
- The university contributes to architecture, arts and cultural life, nightlife and voluntary association efforts.
- Research and participation in the public discourse contributes to improved public policy.
- Adds to the region's higher status and prestige image.

The panel interviewed a number of representatives of LU and regional organisations. For a list of interviewees, we refer the participants of session 7 (see Appendix). Region Skåne helds responsibility for public healthcare, public transportation, regional development and for promoting research and development in Skåne to strengthen the region's growth. The region's GDP and its growth are lowering the ambitions and the unemployment level is high. There is a focus on how the region's R&D can help. Instruments for this – besides the university itself - are the clusters, infrastructure, commercialization of research results, VC, a R&D-intensive business community and collaboration across Øresund.

#### Observations and recommendations

- The Region has a systematic approach, focusing on structures such as smart specialization and clusters including six focus areas and nine clusters. When it comes to physical infrastructure the panel asks for a strategy or a road map. The panel will also highlight the importance of soft factors as culture and people, especially in the ongoing regional and global transitions where engineers and MDs are still needed, together with a broad base of talents, various disciplines and new partnerships and co-creation.
- The need for more private R&D in the region to trigger activity was highlighted. MAX IV is a key investment also for local activity, however it's too early to expect results here (e.g. new companies). The regional riffle effect of MAX IV will be interesting to follow as it was presented to the panel as a big-science, big-companies, big-international initiative.
- Lund municipality highlight the importance of entrepreneurship and the LU contribution therein.
- Medical Valley sees ESS/MAX 4 as huge assets, also for local companies and RISE and also now in the building phase. However, more information is needed to mobilize and to address business opportunities on a short as well as a longer term.

- LU Holding is the investment function at LU, owned by the state and managed by LU. The aim is to "create new companies and licenses based on knowledge from LU and thereby contribute to growth and job creation in Sweden." The holding company can support newly founded companies both operationally and financially, help with agreement templates and provide representatives to the board. The results are good; however, the incoming ideas are decreasing. The push-pull balance was discussed as well as the LU Holding as an actor for demand driven innovations.
- The cluster Mobile Heights expressed satisfaction with the regional RD&I system and its arenas. They have a formal agreement with LU. A lifelong learning ICT competence council, involving LU, labor organizations and companies as well as the digital innovation hub are important for growing digital skills in the region.
- The regional importance of LU increased when e.g. AZ left the region. LU is the bridge to international partners and lager projects from EU, and also to national funding.
- "LU is involved in almost everything, and bottom-up initiated". The panel discussed how and if LU should take top-down initiatives and the role as a regional orchestrator. Traditions and personal relationship often give successful bottom-up cooperation, but provides usually less direction and seldom disruption. The strong LU tradition of working closely with (individuals in) large companies in the medical sector and engineering is an asset. But as international companies move their R&D abroad and management changes to non-Swedes, these links tend to get weaker.
- LU has a lot to offer as a knowledge platform and with its multiple disciplines, networks and talents to the region under its transitions, under crisis and for the business sector. Are old models up for discussion and is change needed to be a proactive regional driver, LU as orchestrator?
- LU should be used and be an active motor to grow infrastructure, engaging in larger initiatives and strengthen international collaboration through both bottom-up and top-down initiatives, and by established and new partnerships.

# Faculty and external engagement

*Meetings with Faculty engaged in External Engagement.* The evaluators had the chance to discuss with ten of the EEC selected researchers from different intersectoral activities supported by EEC. These were working with external stakeholders, mostly on an individual level. See the Appendix for an overview of the participants of session 8. Meeting the researchers involved in external exchange was a rewarding and challenging experience. We met a group of high-quality academics, clearly proving the breadth and multi-disciplinary nature of LU collaborative research activities. The evaluators were not completely sure if these researchers represented a sample or if it was an exhaustive line-up of EEC funded researchers. Our first impression was that the initiative as a whole (selection and funding) should be scaled up and financed.

# Observations and recommendations

- Intersectoral research, innovation and education activities are becoming an important part of Universities' undertakings. Challenge based (strategic) and curiosity driven research are both vital when universities built their research portfolios. Added value of research is not only measured by number of scientific articles (published in prestigious journals) and the number of related citations. Artefacts that display industrial and societal added values from intersectoral research increase its importance.
- This was clearly shown by a majority of the ten researchers interviewed. Activities where the added

value are external partners' recognition and benefits, and the other way around, university research and education gain traction will be more common. Better schoolteachers. Better artists. Better public laws.

- The EEC projects should be reported and reviewed on a yearly basis. Reviews should be based on structured narratives including references to any resulting artefacts. The structured narratives should be compared and will help to promote a high-quality external engagement portfolio.
- The collaborative technical and clinical research is an important industrial and healthcare knowledge base. LU displays an impressive intersectoral healthcare and biomedical research portfolio.
- LU wisely used ALF, regional healthcare funding and faculty resources to create external engagement with clinics, healthcare and pharmaceutical companies.

Roundtable external engagement wrap up. The roundtable represented a sample of the LU academic community. Is there an overview of typical profiles of LU researchers and how strong is the external engagement profile represented in the LU community? How are these researchers connected to the LU academic community and the roles within this community related to education of undergraduate and graduate students?

# Health care engagement

The panel interviewed the pro-dean of the Medical Faculty, and representatives of the Region Skåne and Skåne University Hospital (see session 11 in the Appendix). ALF - Agreement on Medical Education and Research - is a national agreement between the government and the regions, and since 2015 there has been an agreement between LU and Region Skåne. The parties agree to jointly promote the development of health care through enhanced and expanded cooperation in research, education, development and care. Allocation of ALF funds (approx. 500 mill SEK) takes place after open calls and the funds are intended for clinical research. There are career grants (3x3 years) that are attractive for candidates within LU, and from the region and outside of the region.

# Observations and recommendations

- The regional ALF has been evaluated and is ranked as the number two nationally. The links between clinical research and implantation as well as the infrastructure for clinical research are strong areas (biobanks, radiology, etc.)
- There is an innovation structure in place comprising entrepreneurial courses, incubators and collaboration with DK. Also, MAX IV was mentioned as an innovation asset.
- The pandemic has influenced significantly education (but all exams were held) and clinical work force (MD and nurse students part time or full-time duty during the spring and the summer).
- The strong and long-term collaboration between education and patient care has been a crucial during the pandemic, and new ways of operating have timely and easily been implemented.

# Showcase Helsingborg

Campus Helsingborg is making use of synergies between the academic communities in Lund and Helsingborg. Campus Helsingborg focusses on education; the early education of engineers and social worker have been complemented with professional masters in new topics like logistics, retail, tourism, service management, fashion studies and strategic communication. The education blend makes Campus Helsingborg very attractive as HR supplier of professionals for existing and new areas. Research is facilitated by cross-disciplinary initiatives, using the criteria set up for funding from the LU strategic initiatives and from the City of Helsingborg. The yearly budget is about 12 MSEK. The *Campus Helsingborg's Strategic Council* is used to secure input from all perspectives, departments, and faculties. For larger initiatives, the *Campus Board* is involved in evaluating initiatives and decision making. The advantage of a relatively small community is that stakeholders are *close* and share a Campus culture. The organizational structures further allow for investments that benefits the whole Campus by cross-faculty collaboration.

The Campus Helsingborg rector participates in the *vice-Chancellors Council* and a member of LU management chairs the *Campus Helsingborg Board*.

The Campus Helsingborg is set up as a triple helix collaboration; Next to LU, *Helsingborg Trade Council*, a number of SMEs, and the City of Helsingborg are participating in the initiative. The recent education focus has been on developing new professional master and bachelors' programs as *service management*, *tourism*, *fashion and logistics*, also implementing alongside new innovative learning methodologies.

Faculties represented at the campus are *Social Sciences, Humanities, Law and Engineering*. Given the characteristics of the *Campus*, the disciplines taught and the innovative approach, the *School of Economics and Business* should be involved as well. The entrepreneurial, financial and managerial knowledge fits well with the existing portfolio of programs. Surely, LU's objective is to have all LU faculties represented at Campus Helsingborg in the near future.

The H22 City expo is an international event focusing on sustainable solutions to improve quality of life for Helsingborg citizens while living in a smarter city. Another project is SOPACT, an innovation promoting initiative at LU that catalyses social innovations. It is a multi-helix stakeholder framework with representatives from public, private, academic and social entrepreneurs driving innovation and entrepreneurship.

*Campus Helsingborg* looks into more ways to connect to City of Helsingborg by establishing living labs and co-locations and facilities in and with the city.

At the moment the campus hosts 150 faculty involved in teaching, research and external engagement activities. Since 2013, logistics research has been commenced with 3 senior faculty and 5 PhD students nowadays.

#### Observations and recommendations

- A lot of newness, enthusiasm and high esteem of LU as a partner.
- An education core of professional bachelors in engineering and social work.
- New areas for education and research are topical and interesting.
- City of Helsingborg and LU should invest more.
- High local and regional external engagement impact.
- Is Helsingborg Campus a camp, or how many full-time faculty resides on Campus?

# Conclusions and recommendations

We, as the RQ20 Transversal Panel External Engagement, studied external engagement self- evaluation reports of Lund University and the materials provided alongside the assignment and the interviews. Besides, in digital interview meetings on 27-28 October 2020, we were able to discuss external engagement with selected groups of people within Lund University as well as external stakeholders. The panel arrived at a number of conclusions and recommendations. The conclusions are centred around six themes: (1) management of external engagement, (2) innovation role of LU, (3) complex questions from industry, (4) internationalisation, (5) LU healthcare and the region, (6) showcases.

#### Management of External Engagement

We applaud the fact that LU has goals, aims and strategies in place for external engagement. The External Engagement Council is a timely initiative that oversees and encourages endeavours related to LU's external engagement. Incentives are adequately overseen by the external engagement council, and external engagement already plays an increasing role in career assessments. The administrative support function is in place and seems adequate. More specifically, we come to the following observations and conclusions.

The External Engagement Council is an appropriate vehicle to stimulate external engagement of LU. We advise changing participation after three years. The pace of the demands of external stakeholders is rapidly increasing, and the Council could stay in tune by changing the Council membership at least every three years. An additional advantage is that the penetration of external engagement within LU potentially will be boosted by getting in touch with new groups and departments and as a result will create new networks.

Engagement with external stakeholders will go hand in hand with LU's impact. This impact can have different appearances. For instance, intellectual impact, impact on the labour market, the regional ecosystem, and societal impact. Therefore, we recommend the External Engagement Council to move to a broader perspective for future incentive programs that take these different impact areas into account. This needs to go hand in hand with an inclusive external engagement & impact monitoring system.

Trust building is crucial for developing external engagement. The council stimulated seasoned researchers to explore the connections and convey trust. On top of that ways should be explored to build these relationships beyond the individual level and develop relationships by institutionalizing promising initiatives.

Don't forget the young talented researchers at LU. The External Engagement Council could e.g. encourage young researchers by an engagement rewarding equivalent of the individual European ERC grants. Therefore, flanking policies could be developed to encourage external engagement performance as an increasing part of the appraisal of young talented researchers next to research and education.

## Innovation role of LU

Companies need to innovate constantly to keep abreast of the new technological developments. They are therefore constantly looking for collaborations with universities and LU in particular. There is too much "we buy what we need" and "we buy innovation". Several companies among which Ericsson Tetra Pac and Alfa Laval clearly stressed the role of LU as the source for high level research initiative and human resources. LU seems to be well organized to provide support but its staff members fail to create innovation by themselves. New initiatives are expected with this respect.

## Complex questions from industry

The combination of different disciplines to provide solutions is a clear necessity to be able to cope with complex systems. Examples are the present day communications systems (G5) and most of the biomedical therapeutic systems. LU should be able to deal with such complex questions originating from industry. This means that LU members from different disciplines have to sit together to listen to industry and to compose multidisciplinary research groups to be able to respond.

# Internationalisation

Lund EE has become international through the international industry around Lund. LU must see it as one of its own tasks however, to foster international relations and cross-coupling. They focus too exclusively on Lund rather than to be engaged in collaboration with the world outside Lund, Sweden, and Europe.

# LU healthcare and the region

The panel suggests that LU takes the role as a *regional orchestrator*. LU should grow infrastructure, engaging in larger initiatives and strengthen collaboration with key actors. LU has a strong position and trust among various regional partners. The region's economic transitions, the restructuring of the business sector and crises like the pandemic need LU as a proactive regional driver for education, research and innovation. Furthermore, the panel suggests that LU is seeking opportunities in more *top-down initiatives*. Traditions and personal relationship have been the sources to valuable bottom-up initiatives. However, broad strategic initiatives with international perspectives are needed to position the university in the region as well nationally and internationally.

#### Showcases

*Campus Helsingborg:* The Helsingborg campus addresses complex societal problems with help of a triple helix approach in collaboration with the municipality of Helsingborg and the private sector. The focus lies on research and new educational programs in service management, tourism, fashion and logistics. Concentrating further on these focus areas can be used as a crowbar for multi-disciplinary collaboration and to attract more LU faculties to play a role in Helsingborg Campus. The triple helix approach should not be restricted to the university lead. Given the themes and the importance for business and regional society the municipality and the regional business could take up their part of the challenge by investments in the eco-system.

*MAX IV:* MAX IV was seen as a unique tool for content and structure determination in the search for new pharmaceuticals and that further development would make MAX IV even more important. The Novo Nordic foundation support of MAX IV is substantial, and the Novo Nordic activities will contribute to MAX IV's reputation. It is not completely clear what is expected from LU to make MAX IV a success and a major driver of external engagement. As a national facility, LU should be able to play a decisive role. LU will be assisted by ESS, which will become an ERIC, as a European facility, and should make clear to itself which leadership and or managerial role LU should play. There are definitely attractive opportunities for the future.

# Appendix: Information about the Panel Assignment and Meeting Schedule

# Panel members transversal panel external engagement (panel 5)

	Name	Email, weblink	Affiliation
Reviewer 1	Anne Kjersti Fahlvik	https://no.linkedin.com/in/anne-kjersti-fahlvik- 8269325 akf@forskningsradet.no	The Research Council of Norway
Reviewer 2	Shannon Jackson	https://tdps.berkeley.edu/people/faculty/jackson shjacks@berkeley.edu	UC Berkeley, USA
Reviewer 3	Willy Sansen	https://www.esat.kuleuven.be/micas/index.php/will y-sansen willy.sansen@esat.kuleuven.be	KU Leuven,Belgium
Reviewer 4	Jos Lemmink	https://www.maastrichtuniversity.nl/j.lemmink j.lemmink@maastrichtuniversity.nl	Maastricht University, The Netherlands
Reviewer 5	Anders Flodström	https://en.wikipedia.org/wiki/Anders_Flodstr%C3%B 6m flodsan@gmail.com	Royal Institute of Technology, Stockholm
## Meeting schedule

SCHEDULE FOR TRANSVERSAL PANEL EXTERNAL ENGAGEMENT DIGITAL MEETING 27-28 OCTOBER 2020		
Digital pre-meeting between RQ20 Admin and panellists: 15/10		
Digital pre-meeting between panellists: 21/10		
ZOOM-link to meetings 27-28/10: https://lu-se.zoom.us/j/64083432081?pwd=cW5lVlpYZU9qQmRNaVJ0T1QzTzZxQT09		
Oct 27	Oct 28	
08.30 – 08.40 Session 1 Welcome by the RQ20 Administration Freddy Ståhlberg, Mats Benner, Malin Bredenberg		
08.40-08.45 Break		
08.45 – 09.25 Session 2 Interview with pro vice-chancellor Bo Ahrén	09.00 – 09.45 Session 10 Internal panel meeting	
08.45 – 08.55 Presentation (Bo Ahrén): The role of the external engagement council at Lund University; The council's work and its boundaries 08.55 – 09.25 Questions from panel, discussion		
09.25 – 09.35 Break	09.45 – 10.00 Break	
<b>09.35 – 10.30 Session 3</b> Discussion regarding LU's external engagement with external representatives from companies and organisations	<b>10.00-11.00 Session 11</b> Collaboration between LU and the Healthcare organisation/Region Skåne	
Moderator: Ylva Hofvander Trulsson	Moderator: Freddy Ståhlberg	
Each participant is asked to send a brief digital information about their organisation/company in English to malin.bredenberg@fs.lu.se not later than October 20	10.00 – 10.10 Presentation: Key elements in the cooperation between the Medical Faculty and Region Skåne Kristina Åkesson, Pro-dean, Medical Faculty	
09.35 – 10.30 Questions from panel, discussion with the participants:	10.10 - 11.00 Questions from panel, discussion with the participants:	
Tetra Pak – Jerry Bengtsson Alfa Laval – Mats R Nilsson Novo Nordisk – Christina Östberg Lloyd Ericsson – Björn Ekelund Lunicore – Freja Davidsson Bermborg Miljöbron – Malin Palander	Hannie Lundgren, Region Skåne Ingemar Petersson, Skåne University Hospital Kristina Åkesson, Pro-dean, Medical Faculty	
10.30 – 10.45 Break	11.00 – 11.15 Break	
10.45 -11.30 Session 4 Internal panel meeting	11.15 -12.15	
11.30 -12.00 Session 5 Discussion on external engagement with Sylvia Schwaag Serger, Deputy Vice-Chancellor	<ul> <li>"Showcase Helsingborg"</li> <li>11.15 – 11.30 Presentation of Campus Helsingborg and its connections to the city of Helsingborg</li> <li>Annika Olsson (Vice-chancellor campus Hbg)</li> <li>Stand-in Magnus Adenskog (Coordinator Hbg);</li> <li>Anette Melander-Berg</li> <li>M Knutagård</li> <li>11.30 – 12.15 Questions from the panel, discussion</li> </ul>	
12.00-13.00 Lunch	12.15 -13.15 Lunch	
13.00 -13.50 Session 6 Research, Collaboration and Innovation – an administrative part of Lund University	13.15 Time disposable for panellists follow-up	
13.00 – 13.10 Presentation: Brief Overview of the Section Jesper Falkheimer (Section Head) Lisa Thelin, Linus Wiebe, Lars Palm, Charlotte Simonsson		
13.10 – 13.50 Questions from panel, discussion		

13.50 – 14.00 Break	
<b>14.00 - 15.00 Session 7</b> Discussion with representatives from LU partner organisations – why is collaboration with important?	
Moderator: Mats Benner	
14.00 – 15.00 Questions from panel, discussion with the participants:	
Lunds Kommun – Per Persson Region Skåne – Ulrika Geeraedts FIRS – Jens Sörvik MVA – Petter Hartmann LU Holding – Ber Nordberg Mobile Heights – Ola Svedin	
15.00 – 15.15 Break	
<b>15.15 - 17.00 Session 8</b> Round Table discussion with researchers at LU with an external engagement profile, participants selected by the external engagement council	
Moderator: Anna Meeuwisse	
2-minute "shotgun" presentations: Which role has external engagement in my research?	
If you want to show one (maximum) powerpoint slide, send this to anna.meeuwisse@soch.lu.se not later than Monday, October 26.	
15.15 – 15.17 Susanne Iwarsson, Medicine 15.17 – 15.19 Gudbjörg Erlingsdottir, Technical Univ/LTH 15.20 – 15.22 Agneta Gultz, Humanities 15.22 – 15.24 Eva Nordberg Karlsson, Technical Univ/LTH 15.24 – 15.26 Kalle Åström, Technical Univ/LTH	
15.30 – 15.32 Anna Lyrevik, Art 15.32 – 15.34 Per Mickwitz, LU Special branches/USV 15.34 – 15.36 Patrik Lindskoug, Law 15.36 – 15.38 Jacob Tyrberg, Student Representative 15.38 – 15.40 Johan Eker, LU/Ericsson	
15.40 – 15.50 Break	
15.50 - 17.00 Questions from panel, discussion	
17.00 – 17.15 Break	
17.15 – 18.00 Session 9 Internal panel meeting	

## Background material

ltem no	Document Specification	Name of document
1	Relevant excerpts from the self- evaluation reports In these documents, relevant excerpts concerning recruitment from all the self-evaluation reports generated by the LU researchers has been organised faculty-panel- and UoA (Units of Assessment)- wise.	<ol> <li>1.1 Faculty of Social Science</li> <li>1.2 The Joint Faculties of Humanities and Theology</li> <li>1.3 Faculty of Medicine</li> <li>1.4 Faculty of Law</li> <li>1.5 Faculty of Fine and Performing Arts</li> <li>1.6 School of Economics and Management</li> <li>1.7 Faculty of Science</li> <li>1.8 Faculty of engineering, LTH</li> <li>1.9 The Joint Faculties of Science and Engineering</li> <li>1.10 MAX IV</li> </ol>
2	Excerpt from LU Strategic Plan	No 2 Collaboration within the strategic plan 2017-2026
3	Overview of external engagement structure at LU - organisation overview Description of support system external engagement/innovation/ education	No 3-1 Division for Research Collaboration and Innovation No 3-2 Overview of external engagement structure at LU
4	Description of the External Engagement Council's ("samverkansrådets") task in vice/chancellor decision	No 4-1 STYR 2016_1176 Establishment and remit of the External Engagement Council No 4-2 STYR 2017_461 Amendment of the decision on the establishment and remit of the External Engagement Council
5	Folder / description of all the structured ext engagement initiatives at LU	No 5 Understand Explain Improve – Thematic Collaborations LU 2020
6	Campus Hbg	6-1 Transversal evaluation RQ20 intro 6-2 Key facts_eng Appendix 1 6-3 Strategic partner agreement excerpt Appendix2
7	What is partnership?	No 7 Strategic collaboration partnerships at Lund University
8	A case description for application for competence center at VINNOVA	No 8-1 Internal management rules for Vinnova CC 2020-Phase1
		No 8-2 Internal management rules for Vinnova CC 2020- Phase 2
9	Description of LU's engagement in Regional organisations e.g. FIRS, Lärosäte Syd, Regional Cluster development programme	No 9 Description of LU's engagement in Regional organisations
10	Description of LU's innovation systems (LU Innovation, LU holding, LU incubators and science parks)	No 10 LU Innovation Year in Brief 2019
11	LINXS	No 11 LINXS Annual report 2019
12	Excerpts from external subject panel reports on collaboration	No 12 Collaboration - panel reports
13 *NEW	Presentations of businesses, external engagement partners för session 3	No 13.1 Tetra Pak link: https://www.tetrapak.com/about/facts- figures No 13.2 Alfa Laval.pdf No 13.3 Novo Nordisk.docx + link: https://www.novonordisk.com/ No 13.4 Ericsson link: https://www.ericsson.com/en/about-us/ company- facts No 13.5 About Lunicore 2020.pdf + link: http://www.lunicore.se/ en/startpage No. 13.6 Miljöbron link: https://miljobron.se/skane/ en/om-oss/

## Background of Lund University

Lund University was founded in 1666 and is consistently ranked among the top 100 universities in the world. It is a comprehensive and research-intensive university, comprising a total of eight faculties, employing more than 800 professors and 4000 members of teaching staff, researchers and doctoral students, who jointly publish 5000 publications annually, while 40 000 students attend the University. Lund University has a total turnover of more than SEK 8 billion (approximately 850 million US dollars, 750 million euros), of which two thirds are dedicated to research. This makes it the largest in Sweden and second largest in the Nordic countries. Lund University is a national leader in obtaining funding from the European Union, and in national competition for large-scale and interdisciplinary programmes (Linnaeus, Strategic Research Areas). Lund therefore cherishes its interdisciplinary and ability to capitalise on the unique breadth of its research profile, as well as its international attractiveness.

The University is organised into eight faculties (areas), namely economics and management, engineering, humanities and theology, law, medicine, science, performing arts, and social sciences – and one special area directly under the vice-chancellor. Below are some key figures on the faculties (SEK 1 million is equivalent to approximately 104 000 US dollars or 94 000 euros):

- Economics and management: 37 professors, 160 researchers, teaching staff and doctoral students, 3 500 full-time students. SEK 100 million in direct government funding, SEK 150 million in external funding
- Engineering: 157 professors, 1 000 researchers, teaching staff and doctoral students, 6 000 full- time students. SEK 400 million in direct government funding, SEK 800 million in external funding
- Humanities and theology: 66 professors, 350 researchers, teaching staff and doctoral students, 3 700 full-time students. SEK 250 million in direct government funding, SEK 120 million in external funding
- Law: 14 professors, 90 researchers, teaching staff and doctoral students, 3 700 full-time students. SEK 40 million in direct government funding, SEK 20 million in external funding
- Medicine: 337 professors, 1000 researchers, teaching staff and doctoral students, 2 700 full- time students. SEK 700 million in direct government funding, SEK 1250 million in external funding
- Science: 143 professors, 706 teaching staff, 700 researchers and doctoral students, 1 600 full- time students. SEK 450 million in direct government funding, SEK 500 million in external funding
- Performing arts: 13 professors, 120 researchers, teaching staff and doctoral students, 600 full- time students. SEK 30 million in direct government funding, SEK 10 million in external funding
- Social sciences: 50 professors, 480 researchers, teaching staffs and doctoral students, 5 700 full- time students. SEK 150 million in direct government funding, SEK 150 million in external funding

## Background of RQ20

RQ20 was initiated by the vice-chancellor in February 2019, as the first comprehensive research evaluation conducted in 11 years. Its predecessor, RQ08, primarily aimed to assess the overall quality of research at Lund University, and graded it according to international standards. RQ20, like RQ08, has the ambition to gauge the international standing of research at Lund University. RQ20 has a different scope compared to its predecessor though: it is primarily oriented towards assessing (and giving advice on) *the preconditions* for high-quality research as they are expressed in procedures, strategies, resource allocation and networks.

RQ20 is intended to support the different units of the university (162 in total, including the synchrotron radiation facility MAX IV) in their aim to develop procedures for high quality and renewal in research, and the University as a whole to realise its potential through its breadth and interdisciplinary collaboration. High quality, and its preconditions, are concerns not only for the units themselves, but also for the university as a whole. For this purpose, and to highlight how university-wide task and responsibilities are managed – and might be improved – five transversal panels have been appointed. The transversal panels have specific areas of general concern to the university as their remit, and this is reflected in their composition as well as in their mandate. The task is to look into the conditions throughout the university in the areas – in this case, the governance of infrastructures.