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EVALUATION OF THE STRATEGIC RESEARCH AREA INITIATIVE 2010–2014

Swedish Research Council 2015

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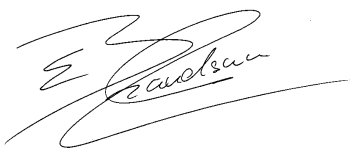
PREFACE

The Strategic Research Area initiative for research funding was launched by the Swedish Government in the research and innovation bill of 2008. In September 2010, the Swedish Research Council (Vetenskapsrådet), the Swedish Council for Working Life and Social Research (FAS now Forte), the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), the Swedish Energy Agency (Energimyndigheten), and the Swedish Agency for Innovation Systems (VINNOVA) were given the mission to evaluate the higher education institutions responsible for the strategic research areas and to present recommendations to the Government by May 1st, 2015.

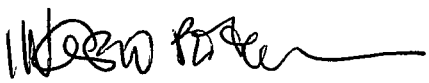
The overall evaluation has been conducted by an expert panel, consisting of six internationally renowned scientists with vast experience of research management and research and innovation policy assessment. To assist the expert panel, the evaluation also included 28 external reviewers, who assessed the outcomes of the research in the strategic research environments. The results of the panel's evaluation are presented in this report. We believe that these results constitute a key step in the further development of Swedish universities into world-leading research environments. As such, the evaluation will form an important contribution to the next research bill. The report also constitutes the basis of the five research funding organisations' recommendations to the Government on the future financing of the strategic research areas. These recommendations are presented in a separate publication.

On behalf of our organisations, we would hereby like to express our deepest gratitude to the expert panel members for their thorough evaluation, and for devoting their time and expertise to this important task. We would also like to sincerely thank all the external reviewers for their very important work. Furthermore, we would like to extend our thanks to the management teams and the researchers, in the strategic research areas, that have contributed to the evaluation exercise. The report's overall positive findings are the results of great efforts from both the higher education institutions and the research community involved in strategic research.

Sven Stafström, Director General, Swedish Research Council



Erik Brandsma, Director General, Swedish Energy Agency



Ingrid Petersson, Director General, Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning

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SAMMANFATTNING

De strategiska forskningsområdena (SFO) lanserades i 2008 års forskningsproposition. Där angavs att en satsning skulle göras på ett antal strategiska områden där svensk forskning tillhörde den internationella forskningsfronten eller bedömdes ha potential att nå dit. Den huvudsakliga modellen för finansiering av SFO-områdena innebar att Vetenskapsrådet, Formas, VINNOVA och Energimyndigheten utlyste medlen, bedömde ansökningar och gav rekommendationer till regeringen. Regeringen beslutade om fördelning av medel efter finansiärernas förslag. Detta gällde sammanlagt 43 forskningsmiljöer (”SFO-miljöer”) inom angivna strategiska forskningsområden. Medlen gavs direkt av regeringen som ett särskilt angivet tillskott till det berörda lärosätet för att möjliggöra en långsiktig uppbyggnad av forskningen. De ökade medlen till ett lärosäte kopplades till ett uppdrag till lärosätet att bygga upp forskning inom det strategiska området på högsta internationella nivå.

Vetenskapsrådet, Formas, VINNOVA och Energimyndigheten har fått i uppdrag av regeringen att i samråd och på ett likvärdigt sätt bedöma de strategiska forskningsområdena. Myndigheterna har därför valt att göra en gemensam utvärdering som med en bred ansats bedömt lärosätenas insatser för de SFO-områdenas utveckling i ett internationellt perspektiv. Forskningsrådet för hälsa, arbetsliv och välfärd (Forte) har som samarbetsmyndighet deltagit aktivt i arbetet med utvärderingen.

Utvärderingen har utgått från fem kärnfrågor:

1) Hur har forskningen planerats och styrts (”strategisk styrning”)?
2) Vilken har varit forskningens kvalitet, resultat och effekter?
3) Vilken har varit satsningens strategiska betydelse för samhälle och näringsliv?
4) Hur har samverkan med andra universitet och samhällsaktörer sett ut?
5) Hur har kopplingen mellan den strategiska forskningen och utbildning sett ut?

Satsningen på strategiska forskningsmiljöer har utvärderats av en expertpanel ledd av Tuula Teeri, rektor vid Aalto Universitet. Panelen har haft blandad expertis med hög kompetens och erfarenhet vad gäller frågor om organisationsutveckling, strategisk styrning, samverkan och utbildning. Till utvärderingen har kopplats 28 externa experter med vetenskaplig kompetens inom satsningens forskningsområden. De externa experterna har utifrån SFO-miljöernas ansökningar, uppföljningsdata, självvärderingar samt bibliometriska data gjort en initial bedömning av varje enskild SFO-miljös prestationer. Expertpanelen har, utifrån dessa rapporter, självvärderingar från lärosätenas ledningar samt intervjuer med ledningarna för lärosätena samt SFO-miljöerna, gjort en samlad bedömning av SFO-miljöernas utveckling och lärosätenas insatser.

Utvärderingsrapporten består av expertpanelens bedömningar och slutsatser.

Expertpanelen konstaterar att satsningen på strategiska forskningsområden har varit ett utmärkt och nyskapande initiativ från regeringen. Enligt dem har en av de främsta styrkorna med SFO-satsningen varit dess långsiktighet, vilket har möjliggjort att kombinera risktagande och höga ambitioner i forskningsprojekt och i rekrytering av ny personal, både juniorforskare och internationellt framstående forskare, liksom möjligheten att utveckla nya forskningsområden. Samtidigt uppvisar stödformen efter fem år ett antal tillkortakommanden, inte minst vad gäller de strategiska områdenas kopplingar till samhällets behov och utbildningarnas utveckling.

Det är uppenbart att SFO-miljöerna befinner sig i olika utvecklingsfaser. Omkring en tredjedel av SFO-miljöerna uppfyller idag målsättningen att tillhöra den internationella forskningsfronten. I de fall där miljöerna redan från början varit etablerade på den internationella forskningsfronten, pekar panelen på att SFO-medlen möjligen hade kunnat användas mer strategiskt av lärosätena. I andra fall finns ambitiösa forskningsinitiativ som även om de ännu inte är av ”världsklass” tydligt växer och förbättras. Omkring hälften av SFO-miljöerna hamnar inom denna kategori. Det är miljöer med en övertygande ambitionsnivå, bra strategier och potential att uppnå högsta internationella nivå med fortsatt stöd.

Av expertpanelens rapport framgår att omkring 20 procent av SFO-miljöerna har utmaningar både med hänsyn till forskningens kvalitet och strategier, och kommer att behöva hjälp och uppmuntran för att nå den internationella forskningsfronten. Den sistnämnda gruppen består av en heterogen skara forskningsmiljöer, där en del har bättre förutsättningar än andra.

SUMMARY

The Strategic Research Areas (SRA) was launched in the Swedish Government Bill on Research Policy in 2008. There it was stated that investments would be made in a number of strategic areas where Swedish research was of the highest international standard or was assessed to have the potential to be so.

The primary model for the financing of the Strategic Research Areas implies the following: the Swedish Research Council, Formas (Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning) VINNOVA (Swedish agency for innovation) and the Swedish Energy Agency give notice of funding, assess applications and then give recommendations to the Swedish government. The Swedish Research Council for Health, Working Life and Welfare (Forte) has actively participated as a collaboration partner in the call for proposals, in the follow-up studies and in the evaluation.

The government has followed the recommendations of the funding providers in the distribution of funds to a total of 43 research environments ('SRA research environment') in specified strategic research areas. The funds were provided directly by the government as a special additional contribution to the higher education institutions concerned in order to enable a long-term build-up of research. The increased funding for a higher education institution was tied to an instruction to the higher education institutions to build up research – within the strategic area – to the highest international level.

The agencies above have been instructed by the government, on the basis of consultation and using comparable yardsticks, to carry out an evaluation of the Strategic Research Areas. These agencies have therefore chosen to undertake a joint evaluation which, with a broad focus, has assessed the measures taken by the higher education institutions to develop the Strategic Research Areas in an international perspective.

This evaluation has been based on five key questions:

1) How has the research been planned and steered ('strategic management')?
2) What is the quality, results and effects of the research?
3) What has been the strategic significance of the initiative for society and for the business sector?
4) What is the state of collaboration between universities and with other stakeholders?
5) What is the state of the link between the strategic research and education?

The investment in strategic research environments has been evaluated by an expert panel led by Tuula Teeri, President of Aalto University. The panel possesses varied expertise with high competence and experience concerning issues of organisational development, strategic management, collaboration and education.

28 external reviewers have been recruited for an initial assessment of the performances of each individual SRA research environment. The external reviewers have used research environment applications, follow-up data, self-evaluations and the bibliometric data for their assessment. The expert panel has made an overall assessment of the development of the strategic research environments and the university inputs on the basis of these reports, the self-evaluations from the university management teams as well as interviews with university and research environment managements.

The evaluation report comprises the expert panel's assessments and conclusions.

The *expert panel* concludes that the investment in Strategic Research Areas has been an excellent and original initiative from the Swedish Government. According to them, one of the main strengths of the strategic research investment has been its long-term focus. This has made it possible to combine risk-taking and high ambitions in research and in the recruitment of new personnel – both junior researchers and internationally leading researchers – as well as developing new research areas. At the same time, the forms of support demonstrate a number of shortcomings, not least when it comes to linking the strategic areas to the needs of society and the development of undergraduate programmes and courses.

It is evident that the Strategic Research Areas happen to be at different development stages. Around one third of the strategic research environments currently meet the objective of achieving the highest international standard. In those cases where the research environments, right from the start, were in the vanguard of

international research, the panel points to the possibility of that the strategic research funds could have been used more strategically by the higher education institutions.

In other cases, there are ambitious research initiatives which – even where they still fall short of being 'world class' – are clearly growing and improving. Around one half of the strategic research environments end up in this category. These are environments with a convincing ambition level, good strategies and the potential to reach the highest international level with continued support.

The expert panel's report shows that around 20 per cent of the strategic research environments face challenges, both in respect of their research quality and their strategies; these will need help and encouragement in order to achieve research at the international frontline. This group comprises a heterogeneous collection of research environments, where some have better preconditions than others.

1 EVALUATION PROCESS

In the following chapter, the SRA funding scheme, the evaluation assignment and the evaluation process will be described.

1.1 The SRA funding scheme

The 2008 Government Bill 'A Boost to Research and Innovation' (prop. 2008/09:50) proposed support for 20 strategic research areas, the so-called strategic research area (SRA) initiative, that were defined by the Government.

The government used three criteria in prioritising the research environments (SRAs) that would be funded in these strategic research areas:

- research that, in the long term, has the prerequisites to be of the highest international quality
- research that can contribute towards fulfilling major needs and solving important problems in society
- research in areas that have a connection with the Swedish business sector

The Swedish Research Council (Vetenskapsrådet), the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), the Swedish Energy Agency (Energimyndigheten) and the Governmental Agency for Innovation Systems (VINNOVA) were commissioned to organise the application process and to review and recommend the allocation of funds to Swedish universities in these strategic research areas. The Swedish Research Council for Health, Working Life and Welfare (Forte) has actively participated as a collaboration partner in the call for proposals, in the follow-up studies and in the evaluation.

The agencies presented a joint proposal for funding. The Government followed the agencies' recommendations and decided to allocate research funding to the higher education institutions (HEI).

In total, 43 research environments at 11 host universities were funded with appr. 5270 MSEK during 2010-2014. The funds went directly to the universities, which host the SRA-environments. (An overview of the strategic research areas, SRA-environments and host universities can be found in Appendix 1). The Government also commissioned the agencies to conduct annual reviews of the strategic research initiatives: These annual reviews have shown that 2010 was a start-up year where the research environments created their organisations and procedures, and where a major focus was put on recruiting researchers and staff. During 2011 more and more research began and most of the research environments were well advanced in their recruitment procedures/strategies. By 2012, the environments had reached their full research funding and by the following year the focus was on research output. In 2013, the average SRA-environment consisted of 221 people which is nearly a 20 percent increase from the year before. Forty-one percent of the staff was women, a slight increase from previous years. The largest research environments, in terms of staff, can be found within the strategic area of medicine (average staff 281 persons), and the smallest research environments are found within the strategic area of Social Sciences and Humanities (average staff 59 persons). In total, more than 9500 researchers were reported to be affiliated with any SRA environment in the 2013 follow-up. The smallest SRA-environment reported a total income of 21 MSEK, while the largest environment reported 738 MSEK.[1]

[1] Under the heading 'Basic Facts' for each university text in the Evaluation Report from the expert panel (Appendix 4), the total received SRA–funding from the government, for the period 2010–2014, is presented. The total funding corresponds to what was decided by the government

1.2 The evaluation assignment

The Government Bill from 2008 announced that the SRA-initiative would be evaluated after five years from its start and that – depending on the outcomes of evaluation some of the funds could be reallocated between the research performers. In September 2010 the government commissioned the agencies to evaluate their respective SRAs (U2010 / 5685 / F).

According to the commission, the evaluation should be made with respect to the scientific quality in an international perspective and in terms of impact on society and business. The evaluation should include assessments of:

1) how the universities have managed the SRA-investment ('strategic management')
2) the quality, results and outcomes of the research in relation to the international research front
3) the benefit and value of the research for society and the business sector
4) collaboration with other universities, research institutes, industry and the community
5) the relationship between the SRA funded research and education

The evaluation should aim to identifify the overall added value of the SRA-initiative. The main questions to be answered were: Have funds been used in the intended manner in order to achieve the purpose of the initiative? Are the strategic priorities clearly and effectively targeting the government aims for the programme? If it appears that the funds have not been used effectively to achieve the aims of the SRA-initiative, the agencies shall recommend a reallocation of funds.

1.3 Project organisation

A project group with representatives from the funding agencies was formed in the autumn of 2013.

The permanent members of the project group were Bo Sandberg and Eva Mineur alternating as project leaders (Swedish Research Council), Lennart Norgren (VINNOVA), Erik Roos (Formas), Jonas Lindmark (Swedish Energy Agency) and Tommy Dahlén (Forte). In addition, Anette Rothberg (Swedish Energy Agency), Kenth Hermansson (VINNOVA), Tomas Andersson, Anders Sundin and Andreas Augustsson (Swedish Research Council) have been affiliated to the project group.

A steering group with representatives from the funding agencies has worked as the link between the General Directors and the project group. The steering group has been actively involved in larger decision-making about the evaluation and in the process translating evaluation results into policy recommendations. The members of the group have been Mats Ulfendahl (Chair, Swedish Research Council), Göran Marklund (VINNOVA), Lars Wärngård (Forte), Svante Söderholm (Swedish Energy Agency) and Emma Gretzer (Formas).

1.3.1 Reviewers

Given the nature of the commission and the focus on strategic management of the SRA initiative by the host universities, an international expert panel with vast experience of university and research management, as well as research policy formation and evaluation was recruited for the evaluation. The expert panel consisted of the following members:

- Professor Tuula Teeri (Chair), President, Aalto University
- Professor Erik Arnold, Chairman Technopolis and professor, University of Twente
- Professor Mary O'Kane, Consultant and New South Wales Chief Scientist and Engineer
- Professor Kalervo Väänänen, Vice Chancellor, University of Turku
- Professor Neil Geddes, Science & Technology Council, UK
- Professor Katherine Richardson Christensen, University of Copenhagen

Short CV:s for the expert panel members can be found in Appendix 9.

In December 2013 the SRA host universities where invited to nominate international scientific experts that would act as external reviewers to evaluate the outputs and quality of each of the SRA research environments. Together with summaries of the SRA monitoring reports, the university and SRA self-assessment reports and bibliometric analyses (see below), the evaluation reports of the external reviewers constituted key input data for the expert panel's overall evaluation. Out of around 150 scientific experts initially proposed by the universities, 28 were chosen for the assignment (listed in Appendix 10).

1.4 The Evaluation

The SRA initiative is a big investment, involving many universities and a great number of researchers within many different research areas and with very different prerequisites in terms of creating an international top quality research environment. Several of the 43 funded research environments already existed in an established academic context while others began to build up their activity with the SRA funding. To evaluate such a multifaceted initiative is therefore a difficult task.

Given this complex nature of the SRA initiative, preparations for the evaluation began with a pre-study in 2013 during which the project group worked intensively and in close collaboration with the steering-group to define the main questions for the evaluation and design the data collection by identifying the key components, activities, outputs and goals of the SRA initiative. The work group used the Government Bill, the commissions to the involved agencies and the call for proposals to identify the purpose(s) of the initiative, activities and outputs, intermediate and final outcomes of the SRA (see Appendix 3). This was made in order reduce the complexity of the SRA initiative and to achieve a logical summary of its key factors so that data collection and the analysis could be focused.

In December 2013 leaders of the SRA host universities were invited to a meeting where guiding principles and the overall design of the evaluation were presented. Detailed information about the evaluation was sent to the SRA research environments later the same month. The identified focal points of the assessment have also been discussed at a meeting with the Ministry of Education and Research in the early spring of 2014.

1.4.1 Data used for the evaluation

Multiple sources of data were used for the evaluation process of the Strategic Research Areas:

1) The original government call for proposals
2) The original application for SRA-grants from each research environment
3) 2010–2013 monitoring reports from the SRA research environments

Summaries of the 2010–2013 SRA monitoring data [2] for each SRA research environment were prepared by the agencies for the external reviewers and the expert panel. Each report summarised the overall development of the strategic research environment including overviews on personnel, sources of income, use of government funding, data on doctoral and licentiate degrees, conferences and visiting researchers. Also qualitative and quantitative information on strategic importance to society and industry, collaborations, education, etc. from the monitoring reports was included.

[2] SRA Monitoring reports (in Swedish) can be downloaded from http://www.vr.se/amnesomraden/amnesomraden/strategiskaforskningsomraden/arligauppfoljningar.4.7e727b6e141e9ed702b12fb2.html

4) Self-evaluations of the SRA research environments

Self–evaluations were collected from the research environments during March–May 2014. The self-evaluation focused on open-ended and process oriented questions covering the five dimensions of the evaluation. (The Self-evaluation questionnaire can be found in Appendix 5)

5) Bibliometric analysis

The analysis was been based on publication data obtained from the lists of scientific peer-reviewed publications in refereed journals listed by the research environments in the monitoring reports 2010–2013. The analysis includes all reported publications indexed in the Web of Science between publication years 2010–2013. The research environments were asked to complete their publication lists with Accession Number from the Web of Science. All bibliometric statistics were compiled using the publication database at the Swedish Research Council. Humanities, social sciences and engineering sciences are underrepresented in this database due to the lack of coverage of books, book chapters and proceedings.

6) Self-evaluations of the SRA host universities

Self-evaluations from the university management of host universities were collected March–June 2014. (The self-evaluation questionnaire can be found in Appendix 6)

7) Interviews with university and SRA leadership

The expert panel conducted hearings with represenatives of the leadership of each university and research environment representatives in Stockholm in the first week of December 2014.

1.4.2 Evaluation Process

During May–August 2014, each research environment was assessed by two external reviewers using the data sources 1-5 listed above. Each environment was evaluated on their own merits from their individual starting point. In order to select the best reviewers for each SRA, the recruited external reviwers were asked to rank their expertise in relationship to the research of the SRA environments. Two most suitable reviewers were assigned to each SRA. They first conducted an individual assessment of their assigned SRA with criteria and grades for different themes in the five dimensions (see Appendix 7).

The research environments were not compared to each other by the external reviewers. Instead, their own journey towards producing research at the international forefront was in focus for their assessments. Five dimensions were assessed by the external experts:

- Research Output (publication profile and scientific impact). Grades used*: Not convincing so far, reaching international standards* or *on the frontline*.
- Utilisation and Benefits (capacity to transfer research results, stakeholder engagement in problem formulation, impact on society and business, capacity to provide qualified personnel or research based knowledge). Grades used: *Not developed satisfactorily, developed satisfactorily* or *developed with great satisfaction.*
- Collaboration (collaboration between co-applicant universities, collaboration with other SRAs, international collaboration, strategic collaboration outside of academia). Grades used: *Not effective so far, effective in several dimensions* or *effective in all dimensions.*
- Integration with Education (the integration of the research environment with different levels of education). Grades used: *Not demonstrated so far, under satisfactory development* or *developed with internationally high standards.*

- Management (management of research environment, use of recruitment relative to the goals and intentions of the environment, management capacity as regards of societal needs). Grades used: *Not convincing so far, on target and developing with high standards* or *moving beyond set goals.*

The two external reviewers assigned to each research environment co-authored an Evaluation Report for the research environment in question grading it (see above) for each dimension (the dimensions are not weighted towards each other). The reports also include short description motivating their assessment. Thus, this initial step resulted in 43 assessment reports, one for each research environment in which the external experts evaluated the present status of the research environments and stated to what degree they had reached their goals (see Appendix 4).

The expert panel met or held telephone/skype meetings with the project group of the agencies in the spring and in the autumn of 2014 to prepare for the evaluation process. During the autumn of 2014 the expert panel received all of the evaluation data (see above) [3], and held interviews with the host universities and their individual SRAs during the first week of December 2014. The expert panel's evaluation (Chapter 2) focused on assessing the outputs and added value of the 43 SRAs in the light of the government goals for this funding initiative and strategic priorities made by the HEIs. They considered the strategic management and use of the SRA funding to conclude if and in what way the SRA initiative as such has provided added value to the research system in Sweden. The panel was specifically asked to address the question of whetheher the results in the SRA environments can be attributed to HEI strategies and the management of the SRAs.

To facilitate their analysis the Expert Panel used used an assessment protocol (Appendix 8):

1) *SRA Research Environment* protocols were used to support the panels' preparations for the hearing of SRA representatives but also to serve as the starting material for drafting a report. Before each interview, clarifying questions were written into the protocol, and answers to the questions recorded, together with general impressions received during the interviews. After the interview, the panel completed the protocol for each HEI and provided a grading for each criterion (*Inadequate, Good* or *Excellent*) with arguments based on all the data available for the evaluation.
2) *Representatives of each SRA were interviewed* with essentially the same questions as for the HEI. The answers and general impressions were then summarised in the evaluation protocols as decribed above for the HEI leadership using the same grading.

[3] The expert panel also had access to all of the data used by the external reviewers.

1.5 List of acronyms

Acronym	Research Environment	Acronym	Host University
TransCth	Chalmers Sustainable Transport Initiative	CTH	Chalmers University of Technology
MatCth	Strategic Initiative – Materials Science	CTH	Chalmers University of Technology
ProdCth	Sustainable Production Initiative	CTH	Chalmers University of Technology
NanoCth	Chalmers Nano-initiative	CTH	Chalmers University of Technology
EnergiCth	Chalmers Energy Initiative	CTH	Chalmers University of Technology
VårdGu	Toward Person-Centered Care in Long-term Illness: A Research Core Center	GU	University of Gothenburg
StamKi	Center for Regenerativ Medicine	KI	Karolinska Institute
DiabetesKi	Translational Program in Diabetes Research, Education and Care	KI	Karolinska Institute
CancerKi	Center for Integrated Cancer Studies at Karolinska Institutet (CICS-KI) – an environment for translational cancer research	KI	Karolinska Institute
NeuroKi	Cognitive and Motor functions in Health and Disease during the Lifespan	KI	Karolinska Institute
EpiKi	Epidemiology: from mechanism to prevention, from surveillance to safety	KI	Karolinska Institute
VårdKi	Bridging Research and practice for Better Health: The Comprehensive Care Science Centre	KI	Karolinska Institute
ITKKth	ICT – The Next Generation	KTH	Royal Institute of Technology
TransKth	TRENoP, Transport Research Environment with Novel Perspectives	KTH	Royal Institute of Technology
ProdKth	XPRESS – Initiative for excellence in production research	KTH	Royal Institute of Technology
EvetKth	Swedish e-Science Research Centre	KTH	Royal Institute of Technology
MolbioKth	Science for Life Laboratory – a national resource center for high–throughput molecular bioscience	KTH	Royal Institute of Technology

Acronym	Research Environment	Acronym	Host University
MatLiu	International Interdisciplinary Materials Science Laboratory for Advanced Functional Materials (AFM)	LiU	Linköping University
SäkLiu	Security Link	LiU	Linköping University
ITKLiu	eLLIIT – The Linköping – Lund Initiative on IT and Mobile Communication	LiU	Linköping University
HållLtu	Sustainable use of mineral resources – securing the future	LTU	Luleå University of Technology
EpiLu	Epidemiology for Health (EpiHealth): for Innovation and Excellence in Open-Access, Basic-Translational and Applied Epidemiological Research	LU	Lund University
StamLu	National initiative on Stem Cells for Regenerativ Therapy	LU	Lund University
NanoLu	The nanometer Structure Consortium at Lund University	LU	Lund University
NeuroLu	Multidisciplinary research focused on Parkinson´s disease – MultiPark	LU	Lund University
DiabetesLu	EXODIAB (Excellence of Diabetes Research in Sweden)	LU	Lund University
CancerLu	BioCARE – Biomarkers in Cancer Medicine Improving Health Care, Education and Innovation	LU	Lund University
PolregLu	The Middle East in the Contemporary World (MECW)	LU	Lund University
KlimLu	ModElling the Regional and Global Eart system (MERGE)	LU	Lund University
EffnatLu	Biodiversity and Ecosystem services in a Changing Climate – BECC	LU	Lund University
HållSlu	Forests and other plants	SLU	Swedish University of Agricultural Science
KlimSu	Modelling initiative of the Bert Bolin Centre for Climate Change	SU	Stockholm University
EffnatSu	A multiscale, cross-disciplinary approach to the study of climate change effects on ecosystem and biodiversity services	SU	Stockholm University
HavSu	Ecosystem Approach to the Baltic Sea	SU	Stockholm University
HavUmu	Ecosystem dynamics in the Baltic Sea in a changing climate perspective – ECOCHANGE	UmU	Umeå University
EnergiUmu	Bio4Energy	UmU	Umeå University

Acronym	Research Environment	Acronym	Host University
CancerUu	The U-Can Comprehensive Cancer Consortium	UU	University of Uppsala
VårdUu	U-CARE Better Psychosocial Care at a Lower Cost? Evidence-based assessment and Psychosocial Care Via Internet, a Swedish Example	UU	University of Uppsala
EvetUu	eSSENCE – An eScience Collaboration	UU	University of Uppsala
EnergiUu	StandUp	UU	University of Uppsala
PolregUu	Uppsala Russian Research Center (URRC)	UU	University of Uppsala
MolbioUu	Center for genomic and proteomic medicine	UU	University of Uppsala
SäkUu	Natural-Disaster Science	UU	University of Uppsala

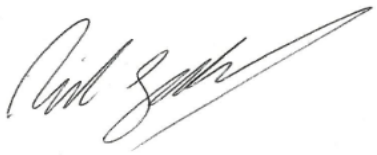
2 PANEL REPORT

At the request of the Swedish Research Council, we have evaluated the outputs and the added value of the Strategic Research Areas funding instrument of the Swedish Government. The panel takes full responsibility for the assessment and the conclusions presented in the following report.

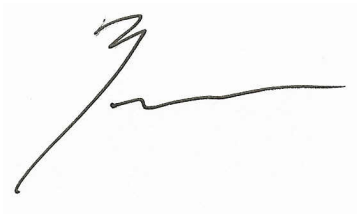
Stockholm, March 2015

Tuula Teeri (Chair)

Erik Arnold



Neil Geddes



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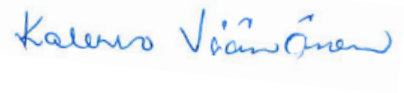
Katherine Richardson



Kalervo Väänenän

2.1 Introduction

The purpose of the evaluation process was to assess the success of the SRA funding instrument in five dimensions:

1) Strategy and management
2) Research output
3) Collaboration within and outside academia
4) Linking strategic research to education
5) Value for society and the business sector

To develop an overall assessment of the SRA funding instrument, the Evaluation Panel considered the self-evaluation reports provided by the universities and the SRAs, the external reviewers' reports and grading of each individual SRA, and the bibliometric analysis provided by the Research Councils. These were combined with face-to-face interviews of the leadership of the host Universities and the individual SRAs.
Based on the instructions received from the Swedish Research Councils concerning this evaluation, the panel has focussed its efforts in order to answer these two questions:

A. How well are the universities managing the SRA funding in order to achieve the government aims, and are their SRAs on the right track toward excellence?
B. What is the added value of the SRA initiative as a whole?

To answer the first question, the expert panel considered the overall performance of the SRAs ('are the SRAs on the right track') as well as the strategy and management ('achieving the government aims'). We conducted this evaluation at the SRA and the university level as follows:

We were evaluating the host universities (main applicants) for:

1) Strategic management and the use of the SRA funding instrument (self-evaluations and Panel interviews)
2) University outcomes and excellence (corroboration of the overall performance of the individual SRAs in the panel interviews, as guided by the external reviewers grading and bibliometric data of the individual SRAs)
3) General added value of the SRA funding instrument over that of external, project-based competitive funding from the university's perspective (an overall assessment based on all of the materials provided as well as the interviews and panel discussion)

The individual SRAs were evaluated for:

1) Performance (including research output, collaboration, integration with education and value for society which was based on the external reviewers' assessment of each SRA, the bibliometric analyses and the Panel interviews of the SRA leadership),
2) Strategy for the use of the SRA funding (based on the self-evaluation reports and the Panel interviews)
3) Added value of the funding for the development of the SRA (based on the self-evaluation reports and the Panel interviews)

In both categories we used a scale with the following grades: *Inadequate, Good* and *Excellent.*

In terms of challenges experienced in the evaluation process, many of the external reviewers expressed concern about the ability to assess research quality based on the material provided. In particular, they felt that they should have had access to lists of publications from the individual SRAs over the assessment period in relation

to the number of person years associated with the research. We, the Evaluation Panel faced some difficulty with how to interpret of the bibliometric analysis as the publication traditions vary significantly between the different fields. In addition, in several cases, the publication output was too modest for the bibliometric analysis to provide a robust assessment.

Availability of better quantitative data of the outputs over the assessment period would have undoubtedly improved the Evaluation Panel's evaluation of research output and excellence, educational integration and renewal and societal impact. We emphasise that the Panel's evaluation is based almost entirely on the qualitative descriptions of the outputs provided by the universities and the SRAs, themselves. The external experts' assessment reports and the panel interviews were helpful in clarifying some of these issues but the availability of explicit and comparable performance metrics would have provided a foundation for the peer review with which the external experts had more confidence in. However this is the first evaluation of what is an unusual and exciting experiment in higher education funding and from this evaluation we can all learn how to make subsequent evaluations more precise and informative.

2.1.1 Strategy and management (University level, SRA level)

The Swedish universities used very different approaches in their management of their SRAs. Overall, the SRAs in medical sciences were more strategically managed than most of the other SRAs. In some cases, there appeared to be more strategic thinking in the SRAs, themselves, than in their host universities. In this context, the most effective universities had a clear strategy and concrete measures for how the university management can support faculty in building and maintaining excellence without violating their academic autonomy and freedom to operate. These universities were focusing resources which supported their excellent research environments and were also able to abandon areas deemed to be of lesser quality and strategic value. Karolinska Institute, Chalmers and Umeå University were clearly in the top category in this respect with Linköping University not far behind. At some universities, such as Stockholm and Lund Universities, decision making appears to be distributed with minimal strategic guidance being provided from the University leadership. Strong research environments were also found at universities that did not provide convincing evidence of strategic leadership but were generally quite insightful which seemed to correlate with excellent quality and overall added value of the SRAs.

While the SRA funding initiative as a whole represents a considerable economic investment in Swedish research, it is divided over a large number of initiatives and environments. Thus, the actual funding given to the specific research environments is not large in international terms. Not surprisingly, the interviewed scientists from the SRAs all felt that without 'ear-marking' funding ahead of time, their own specific research area would not have otherwise received funding at the level which has been made possible with the SRA tool. Given that the funding for specific areas is not large in international terms, one could argue for the continuation of ear-marked funding if the SRA funding mechanism is to continue.

Most of the universities and their individual SRAs chose to use the SRA funding to recruit faculty from external (i.e other Swedish or international) universities. Thus, the SRA tool was widely used to address a need in the Swedish university system for increased mobility and renewal, especially from an international perspective. Driven by demographics, much of the focus was on the recruitment of junior faculty. Tenure track seems to be making inroads in the Swedish system but its application is voluntary and certainly not all universities are recruiting to tenure track positions.

The long term nature of the SRA funding appeared to give the research environments a very welcome opportunity to invest in high quality basic research and high risk projects that are often hard to support with short-term external funding. Doctoral training was another popular use of the SRA funding, as were strategic investments in significant infrastructures. After many years of excellent opportunities for infrastructure funding by the Swedish research councils and the Wallenberg Foundation, there now seems to be a deficit in this funding system that the SRA funding tool has been partly able to counteract.

The SRA initiative seems to contribute towards an opportunity for renewal and to facilitate the emergence of new research fields – a change agent. Some universities chose to invest in new areas which are considered strategic in the SRA call for proposals. Care science and security are such examples. The challenge of such

initiatives is how to develop research excellence in the absence of a strong research tradition. In the case of care science, we observed varying support for the development of the SRA by the host universities. Care science at University of Gothenburg was well supported by the university where there was a strategy to link it closely to clinical medical research. Others, such as Karolinska Institute, appeared to leave the new area to develop a research agenda and practice on its own. All three care science SRAs mentioned the inclusion of patient organisations for innovation and impact.

Transport and production are two other areas that would need strong backing from their host universities in order to develop into a modern research agenda of excellence. Although some improvement can be seen in research output during the duration of the SRA, these two areas are generally very heterogeneous and lack the clear focus needed for them to achieve excellence. Incentives for higher quality by the universities and better national collaboration are recommended in these areas.

The plans regarding continuation of the SRAs varied between universities. However our impression was that most universities were very satisfied with the progress of their SRAs during the first 5 years, and intended to keep supporting at least the best SRAs over the coming years.

One question for the future for most SRAs is how to integrate them into the universities' regular activities, as many are now operating as autonomous units. One can legitimately ask how likely renewal represented by the SRAs really is in cases where they are organisationally outside of the university structure rather than integrated into the faculties and departments. The need for increasing the focus on grand challenges and interdisciplinary approaches in order to tackle these issues raises the question as to whether the universities should modernise their organisations and structures. Chalmers is a good example of such development which is already underway.

2.1.2 Output and research quality

When comparing research output and excellence, it's obvious that the SRAs are in different stages of development. In some cases, we saw established research environments that continued to thrive on SRA funding. In these cases, it was not always clear that the SRA funding had been essential in maintaining these already excellent environments. In other cases, we saw evidence of new and ambitious initiatives which, although they are not yet world class, are clearly growing and improving. The added value of the SRA funding in 'kick-starting' these new initiatives cannot be questioned.

Based on the peer evaluation by the external reviewers, bibliometric analyses and interviews with both the university management and the individual SRAs, it is our impression that about 30% of the SRAs already clearly fulfill the requirement of highest international quality. A little over half of the SRAs has a convincing level of ambition, a good strategy and should be able to achieve highest international quality with continued support. The remaining SRAs still have challenges with respect to both quality and strategy, and will need help and incentives in order to reach an internationally competitive status.

Where they are already strong, the SRA funding could have been used more strategically. Karolinska Institute did this by using the resources to develop incentive packages to attract named researchers. KI and Umeå University were considering reducing the number of professors in order to offer attractive packages and good basic resourcing for new recruits.

Also, Linköping University directed core resources of the university to the SRAs as new faculty positions with attractive packages. Similar to a few other universities, LiU used the SRA to renew and extend already strong areas. The researchers who form MatLiU, for example, have been recognised internationally as a leading Material Science research group for some time. With the SRA funding they moved to renew the focus of the work and deliberately developed high-risk work on soft materials. This would probably be considered too risky for classic research council funding but now gives them a chance to tackle very difficult, leading-edge problems.

Some of the newer areas, i.e. mining at Luleå University of Technology and care science at University of Gothenburg seem to have benefited most from the SRA funding. It gives them the resources to build a strong base in these strategically important areas. Many other SRAs, i.e., HavUmU, PolregLU, NeuroKI, ITKLiU and

SäkLiU were also identified as having great potential for becoming world class in the coming years thanks to an excellent strategy which made use of the SRA funding instrument.

The SRA funding tool seems to have been important for supporting faculty renewal by recruitment, thereby improving the age distribution of research staff at all universities. Overall, this is a positive result as the balance between short-term external and relatively low basic funding at Swedish universities in recent years has made strategic staff renewal difficult. The Panel notes, however, that there are also risks in only driving renewal with such funding schemes when it means that large numbers of researchers accumulate in 'trendy' areas. This may not necessarily be in the interest of long-term renewal for the national knowledge-base. A strong strategic framework is needed to balance challenge-based research meets modern societal needs and researcher-driven excellence that creates entirely new opportunities for the future.

2.1.3 Collaboration within and outside academia

The most evident positive outcome of the SRA funding initiative was increased collaboration either within or between Swedish universities.

Essentially all recipients of SRA funding both at the University and the SRA levels identified that this funding tool had led to greater collaboration and, thereby, boosted both research output and quality. Often, this collaboration takes place internally within the universities (i.e. across faculties and disciplines). Thus, the SRA tool is identified as a good mechanism to stimulate cross-disciplinary research. Here, it can be noted that there is a growing international appreciation for the need to exploit the fertile research grounds at the interfaces of traditional disciplines (see e.g. The MIT White paper on The Convergence of the Life Sciences, Physical Sciences and Engineering, 2011 and the WTEC Panel Report on Convergence of Knowledge, Technology and Society, 2013), Thus, the SRA mechanism may help Swedish universities follow this international movement.

There seems to be a trend away from individual professor-led disciplinary research groups toward (communities) of professors that work together to build the critical mass required to tackle large and challenging research questions. In some cases this also includes cross faculty 'bridging' positions. The additional funding provided by the SRA instrument creates incentives for the faculty to appoint in totally new areas. This is reflected in the recruitment strategies of the best environments that focus on recruiting in order to 'fill the gaps' in their existing competencies and to achieve continuous evolution and renewal of their research agendas.

The collaboration stimulated by the SRAs also occurs at the national level. Recent historical traditions and funding mechanisms have not previously incentivised collaboration between institutions. That the SRAs encouraged these inter-institutional collaborations is one of the most positive characteristics of this funding tool. Geographic distance does not appear to be an obstacle for fruitful and constructive collaboration as evidenced by strong partnerships established between Lund and Uppsala Universities as well as and KI and Umeå Universities in their research on diabetes. In e-science, a strong national network was founded between KTH, Linköping and Stockholm Universities and Karolinska Institute. Strong partnerships were also evident also in cancer research between Uppsala and Umeå Universities with minor contributions from KTH and Stockholm University as well as molecular bioscience between KTH, KI and Stockholm University.

It was a disappointment to the Panel that the SRA mechanism did not appear to be widely used to develop international collaborations, although this was already happening naturally in the strongest environments. Thus, an apparently underutilised possibility with the SRA mechanism might be to direct SRA funds to build strategic long-lasting international collaborations.

2.1.4 Linking strategic research to education

The role of SRA funding in promoting new educational initiatives and reforms was very mixed and disappointing overall. There were apparently no mechanisms for renewing the BSc and MSc level educational programmes when these types of initiatives developed. There were some good examples such as the 5-year engineering programme focusing on 'Bioresource Technology' that was particularly successful in attracting female students at Umeå University. However, the tool could have been used much more proactively to

improve the education in these areas at a national level. In contrast, there were many positive examples where the SRA funding had been used to develop or strengthen doctoral programmes.

Based on the interviews, 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. The establishment of new units, while good for renewal of research direction, does not promote integration into the university as a whole. For the same reason, introducing cross-disciplinary programmes is a challenge. In some cases, developing a new module in existing MSc programmes seemed a successful recipe for incorporating insights from SRA funded research into education. In any case, this is an issue that Swedish universities will have to solve in the face of new demands for broad educational outcomes. At present, the only university that seems to have been successful in a major educational reform is Chalmers.

2.1.5 Value for society and the business sector

There was surprisingly little evidence of the creation of systematic processes to promote innovation in the SRAs, although some good practice was observed, mostly in the established, strong research environments into materials and nanoscience at KTH, LiU, and LU. KI has established a new position to promote innovation as had some other universities but the role of these innovation officers' job was not very clear. LU talked about improving regional impact but did not seem to have a clear strategic vision for this area. Some SRAs had established boards with industry and other stakeholders. Strategies for increasing patenting were referred to by some universities in the interviews. Some universities e.g. Lund, Chalmers and Luleå reported that they have enhanced their innovation activities, including technology transfer, although the outcomes of these activities were not described in detail. The ways in which some care science SRAs are working with patient groups was innovative. However, our general impression was that it is pretty much 'more of the same' and it is not very obvious that the SRA instrument has had much influence here. In the light of the Government goals concerning this funding instrument, more pressure should be put on the universities and their SRAs to develop efficient practices to promote innovation.

2.1.6 Concluding remarks

In the university interviews it was clear that the leadership has a general awareness of the importance of excellence in an international perspective, and there are some good strategies on how to achieve and maintain this. In general, however, there are few universities with clear incentive systems in place for rewarding excellence with increased resources or awards. Setting clear priorities is apparently very difficult in most universities and this is particularly true when it comes to terminating some activities in order to transfer resources to others that are of higher quality and priority.

In some universities the SRA instrument had clearly inspired strategic thinking beyond the usual, with shining examples at KI, CTH, UmU, and LiU. National collaboration, interdisciplinary work and, to some extent, mobility of faculty and students were strengthened through the SRA initiative. However the tool's influence on international collaboration was minimal. The SRAs influence on education was limited at the BSc and Master's levels but much more intensive at the PhD level. Again, more pressure or strong incentives should be used in the universities in order to reform their curricula so as to meet the future requirements of society.

The greatest added value of the SRA funding initiative was generated by the long term nature of the SRA funding that allows risk-taking with highly ambitious projects and funding positions of junior faculty and international talent. Many identified a problem with the funding distribution system in Sweden with many research councils and relatively small grants. Receiving funding for expensive but specialised infrastructures was considered difficult. The progressive universities made good use of the SRA funding. Yet, with the more traditional universities, we saw a risk that this additional money could get swallowed up in the big internal pool of institutional funding. In such cases the issue of the institutional vs project-based funding ratio has really not yet been solved.

Overall this has been an excellent and original initiative from the Swedish Government. All in all, the SRA funding instrument seems to have improved the quality of research in the majority of the SRA environments. The added value of the instrument was greatest in new and emerging fields and in cases where the strategic thinking was strong. Some already established strong environments benefitted from increased collaboration and recruitment opportunities. There was little evidence of positive outcomes in established research fields with a weaker tradition for excellence; such environments will need the help of the university leadership to reform and improve. The leadership of most universities maintained firmly that they expected to keep supporting their strong SRAs with the same level of resources in the coming years if the funding was available in the long term.

2.2 The Panel's assessments

2.2.1 Chalmers University of Technology (CTH)

Basic facts

Chalmers (CTH) applied for eight SRAs and received five. Furthermore, CTH receives funding as co-applicant from two other funded SRAs.

In total, CTH was allocated approximately 701 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 11% of the basic funding for education and research given to CTH from the government.

General comments

Chalmers had started to develop a new organisational structure and strategy before the call for present SRAs. It adopted a matrix organisation and its strategy was based on eight Areas of Advance (AoA) intended to increase cross-disciplinary collaboration and build inter-disciplinary research teams. This was expected to improve research quality and reduce compartmentalisation among research groups. The SRA competition was announced at about the time when the Areas of Advance were created. This provided a good basis for SRA applications. The call was in line with Chalmers' vision and strategies: 'Chalmers – for a sustainable future'. Five SRAs mapped directly onto Chalmers' AoAs. In addition, Chalmers has a further three, namely built environment, ICT and life science engineering.

Strategic management and use of the SRA funding – *Excellent*

Chalmers' current strategy is based on the eight AoAs, including those with SRAs. It decided to provide 50% co-funding to its SRAs, in order to strengthen the research environments further. About 30% of the faculty funding (the university's institutional research funding) goes to AoAs and the rest goes directly to the departments. This structure lets them tackle bigger challenges in close collaboration with Swedish industry. The university has signed 11 long-term 'open innovation' agreements with companies. All SRA researchers participate in teaching and there is growing interest in mixing education with AoAs. SRAs have substantially increased collaboration, not only across departmental borders but also internationally. The SRAs have also let Chalmers develop infrastructures like AstaZero. This creates an attractor relevant at the European level, not just at the regional level. Chalmers evaluates and benchmarks the SRAs against international research environments of the highest quality. At the university level CTH likes to compare itself with Stanford. University leadership is well aware of the activities in each SRA and appears to have a good strategic vision for the future.

University outcomes and excellence – *Good*

It is clear that SRAs have contributed to a transformation in both education and research at CTH. The international recruitment programme for young assistant professors has been especially important. Three out of five SRAs, namely EnergiCTH, MatCTH and NanoCTH, have succeeded in reaching a high international level

of research quality. Since these three were already at a good level at the start of the SRA funding, it is unclear to what degree SRA funding has further improved their research output. BothTransCTH and ProdCTH remain fragmented and significant efforts are required to improve the quality of the research in order to get better outcomes in these two important areas.

Added value of the SRA funding instrument – *Excellent/good*

The total added value of SRAs at the university level is very good. Strong strategic leadership is obvious. The SRA/AoA concept has strengthened Chalmers' outcomes not only in research but also in education and societal impact. It has helped the university to develop new strategies for collaboration with industry and clearly increased its opportunities to recruit excellent researchers from outside Sweden. The majority of Chalmers' SRAs have the capacity to become research groups of the highest international quality.

Summaries of the individual SRAs

EnergiCTH

Performance: Excellent/good
Strategy: Excellent/good
Added value: Excellent

The research output of EnergiCTH has been steady and has been of a high standard throughout the five year period. Their interaction with teaching is strong and new recruitments and guest lectures from different sectors have vitalised teaching a great deal. There has been extensive collaboration with industrial partners. Major infrastructure investments (demonstration and pilot plant) have become possible and the environment's unique infrastructure has increased its attractiveness, which is of the utmost importance in a European context. Considering the importance and the need for non-fossil energy solutions, this SRA has created excellent added value in terms of research, education and societal impact. In the long term this research could also bring huge economic benefits for Sweden.

TransCTH

Performance: Good/inadequate
Strategy: Inadequate
Added value: Good

The research output of TransCTH has been modest so far and has not yet reached a high international level. This is due to the very heterogeneous nature of the SRA. Strong leadership is needed to overcome this. In contrast, interaction with teaching is developing well and new recruitments are expected to help improve research quality over time. Collaboration with industrial partners is extensive and new major facilities have been established (e.g. AstaZero). The link to GU gives TransCTH access to psychologists and social scientists whose skills are needed for traffic safety. In several areas, transport and transportation research now needs to reach beyond engineering into the 'soft' disciplines. Closer collaboration with TransKTH is suggested. Overall, the added value of TransCTH is considered to be good but will require strong strategy to reach research excellence.

NanoCTH

Performance: Excellent/good
Strategy: Excellent
Added value: Excellent

Research at NanoCTH has reached high international standard. At present the researchers are able to publish papers in the best international journals. Some are winning Wallenberg and ERC grants. The graphene flagship would not exist without the SRA funding, which gave them the opportunity to take a risk by spending a great deal of time in preparing the application. The SRA funding also let them do a piece of risky research that the

Swedish Research Council had previously rejected but which paid off. Collaboration between the physicists and the chemists has improved dramatically because of the research networking the SRA has promoted. The SRA has also triggered changes in the curriculum. Some Master's level courses have been merged and students are now more closely involved in research. Significant numbers of people have been recruited onto PhD programme. Collaboration with industry has increased and since the flagship project was funded companies have pursuing the university rather than the other way round. Overall, the added value of NanoCTH is considered to be excellent.

ProdCTH

Performance: Inadequate
Strategy: Good/inadequate
Added value: Inadequate

The quantity of research at ProdCTH has been improving but its quality as indicated via publication is still at a rather modest level. This appears to be because the SRA continues to comprise a very heterogeneous collection of research activities. Research collaboration among different groups has improved but management needs to focus on increasing this further in future. Sustainable development has been added to the curriculum of undergraduate and graduate engineering programmes. In the long term this may improve the awareness of sustainability in the engineering industry. Collaboration with industry has been excellent in terms of implementation of scientific results and the number of industrial partners is impressive. The transfer of sustainable production technologies to industry is a significant contribution. However, at present the overall added value of SRA observed by the Panel was judged to be inadequate.

MatCTH

Performance: Good
Strategy: Excellent
Added value: Excellent

Research in MatCTH has developed well and is at the leading edge in terms both of quality and publication volume. A large number of papers have been published in journals with high impact factors. The cooperation with GU works well and money for researchers in both universities is allocated via a joint budget. There is extensive collaboration with NanoCTH. In education, SRA has increased the industrial exposure of Master students by organising final year projects in companies for around 40% of them. However, the SRA has not yet been able to induce the major curriculum renewal in material sciences that had been expected. A next step is to set up a materials innovation laboratory to close the gap between materials science and industry and improve the innovation process. The overall added value of the SRA is considered to be excellent.

2.2.2 University of Gothenburg (GU)

Basic facts

University of Gothenburg (GU) applied for twelve SRAs and received one. Furthermore, GU receives funding as co–applicant from six other funded SRAs.

In total, GU was allocated approximately 180 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 1% of the basic funding for education and research given to GU from the government.

General comments

GU is a traditional 'omniversity', covering a wide range of disciplines including aspects of information technology but not addressing engineering, which is tackled by the neighbouring Chalmers University of

Technology. In 2009, GU decided to invest in five 'areas of strength' in research: globalization; learning; opinion and democracy; cultural heritage and language technology. In 2010, it ran a university-wide research assessment exercise that identified areas of strength as well as a widespread problem of insufficient research quality. However, in the same year at the time of the SRA call, the university did not have the capacity to coordinate this type of large-scale opportunity and so elected to let any interested group apply. Of twelve applications led by GU, only one was successful. The University participates as a partner in a further six SRAs: two led by Chalmers and the remainder by Lund.

Strategic management and use of the SRA funding – *Good*

GU's strategy did not prioritize particular themes, disciplines or partner universities. Since the SRA competition, the university has begun to try to focus a little – for example by giving more prominence to molecular medicine – but there is still no overall approach to thematic prioritization. GU has the usual holding company, technology transfer and commercialization activities and a grants office that aims to coordinate these and other activities like other universities. GU has invested a significant part of its SRA revenues in recruitment, strengthening the university by acquiring younger researchers with good potential. Retaining SRA funding over a longer period would likely result in continued effort within the relevant SRA themes but with a gradual broadening of the focus.

University outcomes and excellence – *Good*

GU's SRAs do not appear to be all that interdisciplinary in origin – a likely result of the bottom-up approach the University took to the SRA application process – but the University has added co-funding, which it says is intended to stimulate interdisciplinary activities. One consequence of the SRA experience has been that GU has strengthened its central research management capabilities and its focus on recruiting younger academics to renew the academic body. Another is increased collaboration with other Swedish universities and widened research networks. In at least one case, participation as a second partner has boosted research quality at GU in an area of potential growth. The University Board has decided to use up to 15% of GU's institutional fund to promote change and renewal. GU has now launched a 'global challenges' research fund internally, channelling institutional funding towards areas of great social importance and therefore of future funding opportunity.

Added value of the SRA funding instrument – *Inadequate*

GU seems to have been one of the Swedish universities that have been slower to shift from a bottom-up style of management towards more strategic focus. It was therefore relatively unprepared when the SRA scheme was announced and was not in a strong position to take advantage of the opportunities it offered. The one SRA the GU was awarded is, however, performing well. Partly prompted by the SRA initiative, GU has increased its strategic capabilities but probably needs to develop further in order to keep abreast of others in Sweden, notably the more specialized universities.

Summaries of the individual SRAs

VårdGU

Performance: Good
Strategy: Excellent
Added value: Excellent/good

This SRA addresses important social challenges in the delivery of health care, which align with governments' increasing focus on patient participation and person-centered care (partly in response to the need to cut costs). Major obstacles to change include the fragmentation of service delivery among regional authorities (so that technological and organizational innovations disuse slowly) and an historically weak research background. This SRA takes up the challenge to make research in this traditionally low-status area more theoretically based and

more empirically rigorous. Integrating health economics allows it to demonstrate impacts and improve its chances of influencing innovation and policy. The team appears well networked with relevant stakeholders outside GU and across disciplines inside the university. Publication performance is a bit hard to judge because of the importance of professional as opposed to scientific journals as well as other grey literature in dissemination, but the SRA does reasonably well and has a strategy for improving performance. GU is supporting the SRA through co-funding and recruitment while the relevant Dean is supporting the use of research results in first-degree education and external short courses. The SRA appears to be building a critical mass of capability in an area where there are many other competitors within Sweden. Overall, the SRA appears to have triggered a 'kraftsamling' at GU in an area of scientific and social importance that would not have been possible for the university to achieve without this external stimulus and funding.

2.2.3 Karolinska Institute (KI)

Basic facts

The Karolinska Institute (KI) applied for seven SRAs and received six. Furthermore, KI receives funding as co-applicant from two other funded SRAs.

In total, KI was allocated approximately 631 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 8% of the basic funding for education and research given to KI from the government.

General comments

At the beginning of the SRA process, KI had already identified a strategy for improving research quality. This included an initiative to develop bibliometric monitoring of research outputs, identifying strong research areas and an emerging focus on translational medicine. The completion of current construction projects (Biomedicum and University Hospital at the Solna campus) in 2018 will see 60% of KI research staff at the Solna campus in new premises (1700 researchers) with a likely reorganisation of traditional departments. Consequently the SRA initiative was generally aligned with KI planning. The Panel did not explore the means by which KI chose which SRA applications to submit or how the university leadership was involved in this process. The operating SRAs are virtual centres embedded in departments for administration purposes. Each SRA operates with a governing board that meets regularly with the KI Board of Research and the Deans office.

Strategic management and use of the SRA funding – *Excellent*

It was clear that many of the SRA actions, e.g. around prioritisation of SRA funds, faculty renewal, innovation, and teaching, are responding well to overall KI strategic priorities and support. Hence, it is evident that KI set a clear strategic framework within which the SRAs operate with a large degree of autonomy.

The primary strategy for the use of SRA funds has been to focus on recruitment of world class junior faculty (though this has not been followed by all SRAs). Recruitment is (quite rightly) seen as an investment rather than just a cost. Areas for recruitment, and potential target candidates, are identified by the SRA leadership, with the final recruitment decisions resting with KI management (departments, faculty, President or Vice Chancellor, depending upon level). All recruitments are done through open international competition. Positions are not linked to specific departments and the successful candidates can often choose his/her location. Links to clinical practice are encouraged, driven by current KI strategy. SRA funds have been used to develop attractive start-up packages to attract good candidates (several examples were provided). It is worth mentioning that, in anticipation of continuing rather limited university core funding, current (published) KI strategy is to reduce the overall number of professors (through retirements) in order to provide better support to faculty staff and allow recruitment of junior researchers at the highest level.

Innovation is recognized as important at a high level within the organisation and the institute is addressing this through the appointment of a deputy Vice Chancellor for Innovation. KI also supports 3 innovation officers

to work directly with the SRAs, but acknowledged that there is room for improvement in this particular area. Highlights in this area are direct links to the health care system, recent spin-out companies (related to regenerative cardiology) and the joint research center set up with AstraZeneca to explore regenerative medicine treatments to treat heart failure.

For the next 5 years the KI strategy is to continue to support the current SRAs, and they are expected to align with the overall KI strategy for 2014–2018. This includes the relationship and co-funding with partner universities. A full review of the SRA areas will be carried out after 10 years.

Improving international collaboration is a goal for the future, supported by closer working with and between the 6 Swedish medical faculties where KI expect to take a leading (coordinating) role. KI is the first non-Danish university with a Novo Nordisk Postdoctoral programme; other international alliances will be announced soon.

University outcomes and excellence – *Excellent/good*

KI management indicated that all SRAs are (and were) seen as internationally competitive and new recruitments are seen as a means of strengthening this through adding new competences, new technology expertise and through the expansion of collaboration networks. The current quality of the SRAs was not uniformly supported by the expert reviewers and Panel, but overall the quality of the KI SRAs was impressive. KI has provided leadership training for department heads and recognises the need to provide this for group/centre leaders in the future.

In identifying best practice across the SRA, KI highlighted the work in regenerative cardiology; emphasising the commercial alliances that had grown out of this work, including direct collaborations with AstraZeneca and the cross university doctoral initiatives with Oxford, Copenhagen and others.

Not all faculty at KI teach, but it is acknowledged that this is an important opportunity and will be increasingly required as a part of the KI strategy as it moves forwards. The SRAs are intentionally focused on post-graduate teaching but at least one SRA has had, and continues to have, a significant influence on undergraduate teaching through the recent reorganisation of the KI medical curriculum.

Added value of the SRA funding instrument – *Excellent*

SRA funding is generally a small component of funding in KI strategic areas, but very important as it is the only grant[4] that can be used strategically for given research areas (i.e. not tied to specific projects or problems). Priorities for the future of SRA funding are to continue to develop and support a tenure track system, infrastructure, and national and international collaboration.

Summaries of the individual SRAs

CancerKI

Performance: Excellent
Strategy: Excellent
Added value: Excellent/good

The SRA leadership claim to have an excellent international standing for their research, a view which is generally supported by the referees. They acknowledge that closer interaction with the health care system could further strengthen this, but this would partially depend on more appreciation for the need of research within the latter and a merging of clinical oncology and cancer biology. The SRA has strong strategic planning which is focused on new junior faculty recruitment and infrastructure. Priorities for funding were identified by SRA staff and supported by international peer review processes. The SRA has been well supported by KI management and Stockholm County Council investments. There is collaboration with the other national Cancer

[4] Reference to the SRA 'grant' illustrates the general tendency across all universities to regard this funding as limited in time similar to other Swedish government schemes.

SRAs (U-CAN and BioCare), recognising the need for national coherence and standards, and coordination in several developments. The SRA was clearly contributing to broader coherence in cancer research, and had a significant effect on graduate teaching and establishing a pro-active programme of faculty renewal.

DiabetesKI

Performance: Excellent
Strategy: Excellent
Added value: Excellent

This is a historically strong research area at KI that remains excellent, with a number of distinguished leaders holding significant international roles (e.g. chair of European Association for the Study of Diabetes). 50% of the PIs are clinicians and one PI is member of the board of the national diabetes association, helping to ensure relevant focus for research activities and public visibility. The SRA is well supported by KI (and nationally) through infrastructure investments such as SciLifeLab. Four or five of the PIs have their own biotech spin-out companies to exploit the research developments. Research developments are passed on to graduates and undergraduates through endocrinology teaching and graduate courses. Joint courses are run between Umeå and KI. Support for life science innovation which is generally funded through a national VINNOVA programme and based on collaboration between KI, Umeå, Lund and Uppsala, would probably not have happened without the critical mass supported through the SRA programme.

EpiKI

Performance: Excellent
Strategy: Excellent/good
Added value: Excellent/good

This is a strong SRA, rated very highly by reviewers. It has a strong bibliometric performance and strong engagement with the business sector, where the high quality cohort data opens opportunities for innovation in clinical epidemiology. SRA funds have been focused on faculty renewal, but there has been strong infrastructure support for this SRA from KI e.g. in the form of biobanking and the LifeGene Project. Although challenging to initiate, this SRA has a very significant impact on the education of medical students, responsible for the scientific development component of undergraduate education and the Master's examinations as well as graduate courses. The future strategy is to continue the successful approach to data, with a focus on recruitment and education, including an initiative for an advanced research school in epidemiology and a research education program in clinical epidemiology for clinicians

NeuroKI

Performance: Good
Strategy: Excellent/good
Added value: Excellent

The major focus of the SRA has been on infrastructure renewal for neuro-imaging (PET etc.). The reviewers expressed some concerns that the SRA represented a loose consortium of existing experts rather than a close collaboration, but acknowledge the world leading work of the group. The improved infrastructure has seen increasing collaboration within the SRA, which is based around the method platforms, and has attracted increasing external interest and potential for future collaboration. Perhaps the best example of existing collaboration is the National Magnetoencephalography (MEG) platform (funded as a research infrastructure). Umeå and KI have collaborated on development of a new PhD programme and provide medical imaging courses at both universities. Societal relevance of the SRA work is through the fact that the PIs are embedded in university hospitals (clinicians). This is also the way to ensure that developments are exploited. One recent innovation is a new patent regarding the treatment of brain tumours, which has helped create a new company funded with $5 million by investors. Another PI has developed a compound to treat glioblastoma, which should move into phase I trials shortly.

StamKI

Performance: Excellent
Strategy: Excellent/good
Added value: Excellent

This SRA includes several groups which are rated among the best in the world, with 5 ground-breaking contributions listed by the expert referees. Their strategy to stay at the forefront of research is focused on recruitment and retaining the best researchers, with recent high profile recruitments arriving from Oxford and Imperial College. KI support (described as 'phenomenal') has been vital to these efforts. An area for improvement is the relationship with KI hospital; however, all recent recruitments include a built in clinical aspect. Possible future areas of focus (e.g. kidney) have been identified through a combination of relevance to Swedish society and assessment of opportunities for stem cell/regenerative medicine contribution. The SRA also sees increased interest from industry, reflecting their high academic profile. The SRA director acknowledged that the processes for identifying future priorities (including stakeholders) and improving collaboration with industry are areas that could be improved. AstraZeneca staff are already active at KI. This could be extended to other companies' in the future, however, careful thought is needed on how to manage these different business collaborations (balancing independence with need for an exploitation pathway).

VårdKI

Performance: Good/inadequate
Strategy: Good/inadequate
Added value: Good

This SRA is supporting research which is improving in quality, assessed as 'reaching international standards' by reviewers. The SRA has strong links to Stockholm county and run national PhD schools focused on care sciences. The focus for the first 5 years has followed the original proposal and priorities identified in the original 2008 Government Bill. An external advisory board has been in place since the beginning and has advised on resource allocation, however, overall this was by far the weakest of the KI SRA in terms of research quality and planning/strategies for the future. The impact of the SRA initiative was clear, and significant, but this relatively new area would clearly benefit from more support for strategic planning and building a strong research agenda and practice. For example, it was stated that a recent change in KI policy made it impossible to recruit at a professor level; a view not supported by discussions with other SRA.

The SRA has a strong connection to education, with all faculty engaged in teaching and it has direct involvement in all professional training programmes of KI. Recent highlights include putting their research into practice for the treatment of elderly people. There is a growing acceptance of evidence base care, and new information tools have been developed for elderly care (e.g. a Mobile app for PARK patients). A strong focus on software-related opportunities has stimulated growing collaboration with KTH. In general, small software businesses are the major collaborators.

2.2.4 Linköping University (LiU)

Basic facts

Linköping University (LiU) applied for eleven SRAs and received three. Furthermore, LiU receives funding as co-applicant from two other funded SRAs.

In total, LiU was allocated approximately 253 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 3% of the basic funding for education and research given to LiU from the government.

General comments

LiU leads three SRAs and is a partner in two more. It highly values its SRAs as mechanisms to strengthen and renew strong areas (notably Materials Science and ICT), to introduce a new cross-disciplinary area (Security), and to have an even stronger industry impact. It also aims to maximize the value of partnerships with other universities through shared SRAs. This was highlighted in interviews with individual SRAs, notably EvetKTH and ItkLiU.

Strategic management and use of the SRA funding – *Excellent/good*

University support is specifically targeted at Government goals for the SRA programme. Support includes:

- close monitoring and support (through the Grants and Innovation Offices) of SRA development by senior management while leaving the research environments to be responsible for overall management, recruitment and transfer of knowledge
- all SRA funding going to SRAs; there is no central subvention but the University makes a significant investment of its own faculty grants in SRAs
- 16 professorial contracts awarded to the SRAs with 2.2MSEK/person/year additional funding for 5 years
- continuous discussions on how to implement good practices with emphasis on collaboration in projects across faculty borders
- moving to a tenure-track-like system
- special programmes for early career researchers and in order to attract high-profile international visitors.

LiU has reviewed its handling of its SRAs over the last 5 years noting what could be improved and developing detailed plans for the future of the SRAs. These include further development of academic leadership; increasing international collaboration; seeking to extend the impact of the SRAs on the undergraduate curriculum; and consolidating and investing more into research infrastructure and making it more readily available to other partners – especially those from industry.

University outcomes and excellence – *Excellent/good*

As evidence of success, the University cites the excellent results for its SRAs in winning external funding and major prizes. It is particularly proud of the ERC grants awarded to its junior scientists.

LiU's SRAs have also enabled more and stronger collaborations with industry, building on an already strong base. On education, LiU notes that the biggest impact for both undergraduate and postgraduate has been in the ICT. This field has a large number of students but specialist graduate courses have been introduced from the other SRAs. Additionaly senior researchers from laboratories in other countries are sending their graduate students (with their own funding) to conduct research in the SRAs.

Added value of the SRA funding instrument – *Excellent*

LiU had a spectrum of concrete measures in place to support the development of the SRAs in all dimensions from research excellence to integration with education and tangible societal impact. In the words of the LiU Vice-Chancellor, 'The SRAs have clearly contributed to the positioning of LiU, both nationally and internationally'. This is not surprising, as LiU has worked hard to maximize the value of SRA funding, which constitutes more than 10% of the total funding for its Faculty of Engineering. The University stressed that the SRA funding has made it possible to initiate high-risk research, which is generally not funded by the research councils. Some of this high-risk research is carried with industry. The long-term nature of the funding is particularly valued in this respect.

LiU has high ambitions both in Materials Science as well as in ICT. It aims to be in the top 5 in the world in Materials Science with world-leading infrastructure. It believes the SRA funding will enable it to realise these ambitions.

Summaries of the individual SRAs

MatLiU

Performance: Excellent
Strategy: Excellent
Added value: Excellent

MatLiU focuses on Advanced Functional Materials and is world-leading in some areas, notably soft materials. It has a high-impact publication record, with three papers in Nature Materials this year alone. Since 2010 MatLiU has attracted significant prestigious prizes and grants including 3 ERC Starting Grants, 2 ERC Advanced Grants, 2 Wallenberg Scholars, 3 KAW Projects, and 3 SSF Future Research Leaders. SRA funding has been primarily used for recruitment and support of high-profile senior and junior faculty and support for nationally relevant infrastructure which is available for industry use. The funding has allowed MatLiU to undertake high-risk research. It has also strengthened its commercial and industrial impact with several new spinoff companies, new patents, more joint positions with industry, and the majority of its PhD graduates working in industry on graduation.

ItkLiU

Performance: Good
Strategy: Excellent/good
Added value: Excellent

ItkLiU is an SRA spanning the research fields of communications, networks, control, electronics, embedded systems, software, autonomous systems, and complex systems and reaches the highest international quality for research in control theory. It has four participating higher education institutions – LiU (as host), Lund University (LU), Blekinge Institute of Technology (BTH) and Halmstad University (HH) – and has strong links to industry including an industrial board with representatives from Ericsson, ABB, Scania, Sectra, Schneider, Axis and SAAB. This board, along with the SRA's International Scientific Advisory Board, has provided valuable guidance on which research programmes to support and which to abandon. SRA funding has been used primarily to recruit high-quality researchers. Through the SRA funding ItkLiU has significantly strengthened cooperation between its participants; it has attracted >76 MSEK in new grants; filed several patents: and had a significant impact on education at all levels.

SäkLiU

Performance: Good
Strategy: Excellent/good
Added value: Excellent

SäkLiU is new venture for its core partners, LiU (host) and FOI (KTH and Chalmers are also contributors), but fits in well with their priorities and expertise with its focus on ICT theory and methods for security applications. As it has relatively modest SRA funding (7.6MSEK pa in the last few years), the priority has been to recruit quality research talent and then support the SRA's researchers in gaining sufficient external funding for the environment to help it reach optimal size. An indication of its growing research impact is that it already has a strong presence in EU Security projects with around a 50% application success rate. SäkLiU receives guidance from its industry board and has good bi-lateral collaborations with several industrial partners. In education, its graduate school, Forum Securitatis, has been successful with 20 current PhD students and all graduates to date being employed by industry.

2.2.5 Luleå University of Technology (LTU)

Basic facts:

Luleå University of Technology (LTU) applied for six SRAs and received one. Furthermore, LTU receives funding as a co-applicant from two other funded SRAs.

In total, LTU was allocated approximately 169 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 5% of the basic funding for education and research given to LTU from the government.

General comments

Forestry and mining are long-term features of the Swedish economy and mining was one of the reasons LTU was originally created. Today the University's strategy focuses on mining, metallurgy and energy. The leadership of LTU has taken a very active role in the development of SRAs. At present SRA funding has been used to support research activities, particularly basic research, and new recruitments, including international recruitments at both junior and senior level. Funding has also been used to support infrastructure development and educational initiatives. At the start, industry had a big influence on research projects but now the situation is reversing and researchers bring more and more new knowledge into the companies. It can now be said that mining at LTU is becoming a real hub for international knowledge.

Strategic management and use of the SRA funding – *Good*

LTU's research priorities have been largely focused on mining, metallurgy and energy. Thus the three SRAs, where LTU is involved namely HållLTU (leading partner: 100%), Bio4Energy (partner: 36.8%), and StandUp (partner: 6%) are all part of fulfilling the University's strategy. The leadership of LTU is deeply involved in the work of CAMM (Center of Advanced Mining and Metallurgy, also referred to as HållLTU) and other SRAs and the university also targets substantial additional funding for these areas. Tools for mining have changed significantly in recent years and this funding has allowed the university to renew and to become a leading player in this field not only in Sweden but increasingly worldwide. LTU has developed the full breadth of mining activities from prospecting, extraction, mineral processing, and metallurgy to environmental research.

University outcomes and excellence – *Inadequate*

LTU originally submitted six applications with only one selected into the SRA programme. This reflects the fact that overall research quality in LTU was not at a high international level and the research quality of CAMM is not yet on the frontline. However, there appears to have been a good improvement over the last five years in terms of the number and quality of publications. CAMM is now recognised as the leading institution for mining in Sweden and is increasingly seen as an important institution worldwide with a range of research and education partnerships developing with leading centres in other countries. Also CAMM has succeeded in furthering development of industrial collaboration and regional development.

Added value of the SRA funding instrument – *Excellent*

The SRA funding programme has clearly given excellent added value in terms of developing research quality in focus areas of university strategy. It has especially improved collaboration among scientists in LTU and between university researchers and the mining industry. Development of more strategic collaboration between LTU, MEFOS and the mining industry has clarified the roles of each player and developed collaboration to more strategic level. In addition regional development has become considerably stronger due to SRA–influenced policies. Since Sweden is Europe's most important metal producer, the positive development of mining research towards a competitive international level important for the national economy in the future.

HållLTU

Performance: Inadequate
Strategy: Good
Added value: Excellent/good

This SRA focuses on the sustainable use of mineral resources. Research quantity and quality of HållLTU was at modest international level when the SRA funding started, but the evaluation noted a strong upwards trajectory of journal publications although there is still a need for major improvement. The research environment has been successful in facilitating patents and establishing new products and processes. All of the SRAs researchers teach and students get to join research projects early on and receive work experience in companies. The SRA has also attracted new students into mining. Collaboration at different levels has greatly increased and the SRA has also been successful in recruiting new staff from abroad. This has vitalised research activity and quality. In conclusion, this SRA has clearly created added value in research, education and societal impact. Strong strategic planning and collaboration with MEFOS and industry has clarified the roles of each player and further improved the expected outcome of the funding.

2.2.6 Lund University (LU)

Basic facts

Lund University (LU) applied for sixteen SRAs and received nine. Furthermore, LU receives funding as co-applicant from three other funded SRAs.

In total, LU was allocated approximately 715 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 5% of the basic funding for education and research given to LU from the government.

General comments

Lund University is a comprehensive research university encompassing science and engineering, medicine, humanities, social sciences and law, economics and management, theology, fine art, music and drama. In recent years LU has carried out a comprehensive research assessment exercise (2008), implemented the tenure track career system for faculty and is investing heavily in international scale infrastructures such as the MAXIV electron accelerator laboratory and the European Spallation Source (ESS). LU has created well-established leadership training programmes for researchers and managers, which seem to be highly appreciated. It currently has identified 29 priority areas for research which also encompass the nine SRAs.

Strategic management and use of the SRA funding – *Good/inadequate*

While one aim of the SRA initiative seemed to be to improve research quality by generating competition between Swedish universities, the chosen strategy of LU was to bring together resources in key areas by cooperating with either Gothenburg or Uppsala universities in six out of its nine SRAs. By avoiding unnecessary overlaps and by generating synergies they hope to strengthen the Swedish research base. The LU management states that ‘you don’t have to be the best but you must be able to interact with the absolute top’ and they see collaboration as one path toward excellence. The management prefers to support strong groups rather than individuals and believe that such groups help create a culture of excellence by their example.

The concrete means by which the university is supporting the SRAs include a continuous dialogue between LU management and the SRA coordinators, a leadership program, provision of administrative support e.g. for the annual reporting, and inviting ‘critical friends’ from collaborating international universities to mentor the initiative. LU is also supporting the top groups to increase their visibility by good communication.

The SRAs do receive resources from the university but there are no apparent incentive systems linking excellent performance with university support. How the university tackles the challenge of research areas with lesser quality, whether SRAs or others, was not clear in the materials provided nor the interviews. Compared to other excellence funding in the strong research environments at LU, the SRA funding seems to be an add-on without additional strategic relevance or added value. A stronger strategy will be needed which prioritise and focuses resources to areas of excellence and relevance in order to improve the overall performance of the university in an international perspective.

University outcomes and excellence – *Good*

According to our assessment, LU gets the highest overall grading for its SRA in nanoscience (NanoLU), and excellent grades for diabetes research with Uppsala University (DiabetesLU), neuroscience with University of Gothenburg (NeuroLU), and climate research with University of Gothenburg (EffnatLU). These are established research environments that seem to have further improved their competitiveness through collaboration with their SRA partner universities. With the exception of NanoLU, such collaborative synergy seems to be the most tangible benefit for these RSA's. Five of the nine SRAs do not appear in the top 30% of the national SRAs, and it is difficult to predict whether the SRA funding will help them to improve in the long run. It was not clear how the university management is planning to support these SRAs toward excellence. It was also not clear whether the university intends to redirect any of the SRA funding between the top SRAs and those with lesser performance in the long run, which however, would be necessary to reap the maximum benefit from the initiative.

Added value of the SRA funding instrument – *Good*

The added value for the four best SRAs of Lund University was productive collaboration with either Uppsala or Gothenburg. There was limited evidence for major effects on the university strategy, organisation or modes of operation due to the SRA initiative. It seems that the university considers it as yet another competitive grant for research groups. However there was excellent strategic leadership in some of the individual SRAs which created significant added value beyond in the general at the university level.

Summaries of the individual SRAs

CancerLU

Performance: Inadequate
Strategy: Inadequate
Added value: Inadequate

This is a collaborative SRA between LU (70%) and University of Gothenburg (30%) that focuses on translational research to utilise biomarkers in cancer medicine to improve health care, education and innovation. Research output is high in terms of publication numbers but publication quality as measured by citation impact is not yet above international average. CancerLU has a potential competitive edge in the availability of biobanking materials and has formed strategic alliances, mainly with the health-care sector but also, increasingly, with industrial partners. There is evidence of integration with education at the University of Gothenburg. The main added value of the SRA funding is the establishment of a joint Research School which organises biannual symposia with invitations to health-care and industrial collaborators to stimulate exchange. Two new cancer centres have been established to develop necessary infrastructure and to help recruit younger scientists. The spectrum of themes in this SRA is very diverse, and improved strategic thinking is needed to help focus research towards reaching excellence at the highest international level.

DiabetesLU

Performance: Excellent/good
Strategy: Excellent
Added value: Excellent/good

This SRA is an example of excellent integration between Lund (70%) and Uppsala (30%) Universities, and includes key industrial partners who provide complementary and crucial expertise and resources. One example is the preparation of high quality human islets in Uppsala for use in advanced omics studies in Lund. Research quality is at the highest international level, and the consortium is prepared to take risks and constantly challenge its own views. There are many breakthrough articles in this field, some leading to new treatment options in the hospitals. Large pharmaceutical companies approach the SRA, there is a high degree of international collaboration and they have received several international awards and increasing invitations to deliver keynote lectures in international meetings. The SRA funding has changed the culture of the research environment that and they are proud of their success in translation. There is apparent collaboration with Karolinska institute for innovation and collaboration with EpiKI. The added value is described as effective utilisation of the tissue bank for ground-breaking research and financial strength so they can continue recruit high quality researchers

EffnatLU

Performance: Excellent/good
Strategy: Excellent/good
Added value: Good

This is an SRA which focus on the effects of climate change on natural resources, ecosystem services and biodiversity that utilises genuine collaboration between LU (78%) and University of Gothenburg (22%). The number and quality of their publications is impressive, with a high percentage of their papers in the top 10% and top 1% most cited papers in the World of Science. These papers address the needs of society in Sweden and internationally. The SRA funding has been used to create a common research environment that can contribute to important research questions. The SRA has a board that supports their development by ensuring a strategic allocation of the funding. There is also a stakeholder panel which oversees and guide the research programme and a communication office that has helped facilitate the translation of the science for the public. There are excellent networks establishedwith agriculturalists and foresters, science and technology in the industry, government policymakers and relevant international bodies. There is a good integration of the research with education at Masters, PhD and Post-doctoral levels and a joint graduate training programme. The programme is well organized with a strong strategy and solid management framework and infrastructure for effective development.

EpiLU

Performance: Good
Strategy: Good
Added value: Good/inadequate

This is an SRA between LU (60%) and Uppsala University (40%) which focus on basic-translational and applied epidemiological research. The two host universities are pooling their resources in epidemiology, but how this is done is unclear. The publication profile is on the frontline. Theere are joint publications of large consortia in the top journals but difficult to pinpoint the contribution of individual scientists or groups to the work. Even with the broad nature of epidemiology research, there is evident risk with very widespread interests including obesity, functional food products, diabetes type 2 and cardiovascular disease. SRA funding was used to start the Epi-Health cohort which includs bio-banking, building infrastructure and recruitment. There are widespread national collaboration and contacts with AstraZeneca, the food industry, local biotech SMEs and county councils in Skåne and Uppsala as well as in Stockholm. Education is also integrated into the teaching programmes of each host university with one annual course jointly organised on ‘Advanced epidemiology’.

KlimLU

Performance: Good
Strategy: Good
Added value: Good

This SRA, which focus on modeling regional and global earth systems is led by LU and involves four other universities (CTH, KTH, GU and Linnaeus University) and the Swedish Meteorological and Hydrological Institute (SMHI). Through increasing recruitment this SRA is building the critical mass in Earth system science. The added value is obvious through synergistic interactions and interdisciplinary work between the partners. There are an impressive number of publications that are reaching international standards in quality. Stakeholder engagement is a strong point, and impact is emerging through global and regional climate models for mitigation of and adaptation to climate change. A Swedish climate adaptation portal uses information from this SRA. Doctoral training within KlimLU attracts students from all over Sweden and internationally, adding an element of much needed mobility. The research school is innovative and foster trans-disciplinary knowledge.

NanoLU

Performance: Excellent
Strategy: Excellent
Added value: Excellent

Research within NanoLU is organised into six major research areas including materials science, quantum physics, nanoelectronics and nanophotonics, nanoenergy, nanobiology and nanoneuroscience as well as nanosafety. The quality of publications is very high with 20% of publications in the top-ten percentile. Innovation in entirely new ways of making nanowires was immediately picked up by an industrial partner as a start-up activity. Applications in solar cells and for medicine is under development, and the nanolab facility is shared with industry. There is good integration with education with BSc and MSc level courses in nanoscience. There is also good national collaboration; they organise a joint summer school with the Chalmers Nanoscience SRA and share facilities with MatLiu As well as being well connected internationally. In spite of their excellent performance, co-publishing outside of academia is relatively scarce. Strategic collaboration with stakeholders is, however, evident in terms of shared infrastructure.

NeuroLU

Performance: Excellent
Strategy: Excellent/good
Added value: Excellent

NeuroLU consists predominantly of research teams in Lund with one group working in Gothenburg on drug development aspects. The SRA focuses on a translational pathway for Parkinson's disease and related disorders, spanning from basic research to patient based research. This SRA enjoys a long-standing world class reputation in neuroscience; the publication profile and scientific impact of the research environment are at the forefront. Some of their published work is pioneering, e.g. in pre-clinical and clinical research on Parkinsons. Multiple links to partner companies are clear, and the SRA appears committed to bringing their discoveries to the marketplace. Integration in education concentrated to MSc and PhD levels but many PI's teach at the undergraduate level. They are a core partner in a national graduate school for ageing and health. There is good national networking and collaboration with four other SRAs including, StemTherapy, BioCare, EXODIAB and EpiHealth. There is a clear management plan and excellent leadership is in place. This is strong and steadily well-funded group, although some questions remain on the strategic use and added value of this particular form of funding.

PolregLU

Performance: Excellent/good
Strategy: Excellent/good
Added value: Excellent
An SRA focusing on Middle Eastern studies and comprising of staff from five different faculties at LU, PolregLU has grown substantially due to both recruitment and transferring staff to the SRA. They have excellent publication performance, international and cross-disciplinary collaboration and expertise in combining their knowledge in politics, industry and community in the Middle East. There is good integration with education at the MSc level with students involved in research, and they provide training courses for ABB that operates in the Middle East. There is a strong media presence concerning Middle Eastern issues and with the current turbulence in the Middle East and their broad scope and excellence, this SRA brings genuine added value.

StamLU

Performance: Good
Strategy: Good
Added value: Excellent/good

This is a strong interdependent collaboration between LU (80%) and Uppsala University (20%), which focus on regenerative therapy. Their publication record is at good international level, but there has been no significant improvement despite a 50% increase in personnel over the past five years. They have maintained international networks and collaboration with top universities and institutes. There is excellent recruitment of young PI's who have attracted significant external funding at least doubling the SRA investment, and there is a mentorship programme for junior faculty. There is a plan for increased collaboration with KI. There is apparently good integration with education at all levels, with PhD scholarships granted for PI's to distribute from the Master programme. SRA funding is used strategically for recruitment, new technology platforms and new technology development. Most of the potential clinical applications are still on an experimental stage, although one advanced protocol has converted to a commercial product in collaboration with Primotigin Biosciences in Wisconsin, U.S.A. There is a strong focus on translation, but so far few investment of new initiatives into stakeholder programmes or end user groups.

2.2.7 Royal Institute of Technology (KTH)

Basic facts

The Royal Institute of Technology (KTH) applied for eight SRAs and received five.

Furthermore, KTH receives funding as co-applicant from five other funded SRAs.

In total, KTH was allocated approximately 579 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 6% of the basic funding for education and research given to KTH from the government.

General comments

KTH appears to have been strategic in applying for SRA funding and had a high success rate. It can be noted, however, that the SRAs at KTH are very different in size, focus and international scientific standing. KTH focused on faculty recruitment and building up research infrastructure, however, it is not clear if or how the SRA funding is prioritised to the specific needs of the individual SRAs. KTH is historically strong, especially in engineering fields and one sense that some parts of the university system may regard the SRA funding as 'just one more in a long line of funding programmes'. Indeed, KTH was the only university management interviewed that indicated a clear expectation that SRA funding in the long run will be subject to internal KTH-

strategic prioritization, i.e. the management hopes to gradually move some of the funding to other strategic areas.

Strategic management and use of the SRA funding – *Good*

KTH has strategically used the SRA funding for staff renewal and strengthening within the specified areas and expects the 'fingerprint' of these recruitments to be visible in the staff profile for many years to come. There is awareness and a focus in the KTH leadership on 'cross-school/disciplinary' recruitments and they are in the process of identifying 8 broad areas for 12 new positions funded by core resources which will announced soon. The SRA funded recruitments also have allowed for the development of new areas identified by the steering committees for the SRAs. The SRAs, together with research platforms, are used to promote best practice and for sharing experience. These environments are encouraged to develop new proposals to other funding sources (i.e. EU H2020).

University outcomes and excellence – *Good/inadequate*

While the KTH management generally feels that there is too much piecemeal funding initiatives in Sweden (and would prefer to see more unrestricted core funding), there is the general impression from the KTH leadership that the SRA funding scheme has worked well. KTH has both excellent (MolbioKTH, EvetKTH) and rather disappointing SRAs. It is not clear to what extent KTH leadership has strategically used the SRA funding to strengthen the weakest of the SRAs. Indeed, one could get the impression that the SRA environments have received the funding and been left alone to establish the criteria upon which their success should be determined. Publication rates have increased in all 5 of the KTH SRAs (although citation bibliometrics indicate that some of the SRAs still have a considerable way to go in order to attain the international 'cutting edge'). Research from the SRAs has been to an acceptable degree incorporated in teaching, although education at KTH is organised around 'programmes' rather than courses which may impact the rate of renewal and incorporation of new research results. A new joint (between 3 universities) Master's programme is beginning in 2015 in association with SciLifeLab. This appears to be a direct result of the SRA funding scheme.

Added value of the SRA funding instrument – *Good*

There has been clear added value of the SRA at KTH both in relation to the recruitment of younger staff and in the form of increased collaboration within the SRA partners. This collaboration is especially obvious in relation to MolBioKTH (SciLifeLab).

Summaries of the individual SRAs

ITKKTH

Performance: Good
Strategy: Good
Added value: Good

Based on the material made available to the panel, this appears to be an internationally competitive group although some areas publish less actively than others. The SRA opportunity was used to good advantage as it has helped KTH to address the new research questions emerging as ICT increasingly becomes embedded into other fields. SRA funds have been focused on recruiting (15) junior faculty, where targeted individuals have been offered attractive startup packages. An international Masters in Embedded Systems (as a component of EIT ICT Labs) has been initiated using SRA funding. Focus areas include definition of 5G communications technology and working with medical sciences and transport to understand the implications and opportunities in this area. There is good international collaboration (i.e. EPFL in Europe, UC Berkeley, MIT in the US) as well as collaborations with industry. The group works well with the LiU ICT SRA and with relevant groups in Lund

but does not support the merging of these groups. All faculty supervise graduates and undergraduates and support the incorporation of systems thinking into engineering education generally at KTH.

ProdKTH

Performance: Inadequate
Strategy: Inadequate
Added value: Good/inadequate

The SRA funding has been used in an effort to transition this production research environment from classical mechanical engineering into 'the modern age'. While there is still a focus on machining and manufacture, facilities and the approach have been updated (approx. 40% of the SRA funding has been used for infrastructure, i.e. (clean) lab). The group appears to have considerable industrial collaboration but does not score highly in terms of numbers or impact of basic research contributions. It is argued, however, that the SRA has been helping to direct more attention towards publication and publication rate has been increasing during the SRA period and, indeed, the publication rate has increased during the funding period. Through collaboration with Saab, the group is working to increase the technological knowledge in Brazil. Within Sweden, the group collaborates with the prod SRA at Chalmers, but these two groups apparently have different foci where CTH works with design theory and KTH on production theory. Aside from some interaction with ITKKTH, there seems to be little interaction between this and other SRAs.

TransKTH

Performance: Good/inadequate
Strategy: Good/inadequate
Added value: Good

The SRA funding for this area has been used for international recruitment and to support research aimed at being able to support future policy (i.e. topics not yet on the political agenda). The societal value of this research area is aimed more at policy-making than industry. While there are quite a number of research publications coming out of this group, they are not highly cited internationally. One focus for the area has been developing Smart City Logistics in Sweden and the SRA funding has allowed support of a visiting professor from Barcelona in this area. Internationally, the group has had some activity related to greening urban transport in China where Eliason is a visiting professor at a Chinese think tank supporting the ministry. The Panel was concerned that this group has produced relatively few PhDs in recent years and seems to be experiencing a recruitment problem. There appears to be some peripheral contact to/collaboration with the TransCTH SRA but the Panel notes that the foci of the two groups are very different. Transitioning to a new transport system is vital for societal development and this is a very important research area both for Sweden and internationally. The Panel was concerned that there may be unrealised potential in this group and they could contribute more actively to this critical societal transition.

EvetKTH

Performance: Excellent/good
Strategy: Excellent/good
Added value: Excellent

The research in this group appears to be internationally competitive. The SRA funding has enabled development of infrastructure and collaboration. Their strategy has been to identify the best groups from a development and exploitation perspective and connect them across the 4 participating universities. They have promoted the use of e-science in these communities and systematically bridged the gap between tool developers and the actual users. They feel that SRA funding has increased their capacity to work with industry and they have a long list of industrial collaborators. There is informal collaboration with the other e-science SRA (Essence). A national graduate school has been developed using SRA support in order to develop existing initiatives. Their aim is to make this a Nordic school. Within this SRA, the Advisory group appears to have

been particularly strategic and has encouraged the community to develop ‘flagship’ projects not included in the original proposal.

MolbioKTH (SciLifeLab)

Performance: Excellent
Strategy: Excellent
Added value: Excellent

There seems little doubt that the SRA funding has been critical to developing a genuine collaboration between the 3 participating (Stockholm) universities. This initiative receives funding from several sources, but none of the other sources seem to incentivise the collaboration between partners to the extent that the SRA funding has achieved. The scientific publications coming out of this initiative rank competitively internationally and there is clear added value for Sweden in creating a centralised facility housing the expensive infrastructure required for molecular biology. The external expert evaluations of SciLifeLab expressed concern over management of the KTH part of the SRA as the Scientific Advisory Board has never met in full. However, this appears to have been a conscious and justified decision to delay the meeting until a single SAB across all participating universities could be created. The first physical meeting of this common SAB is scheduled (Feb. 2015). Both clinical and environmental genomics are areas that will hopefully be developed in coming years.

2.2.8 Stockholm University (SU)

Basic facts

Stockholm University (SU) applied for five SRAs and received three. Furthermore, SU receives funding as a co-applicant from four other funded SRAs.

In total, SU was allocated approximately 359 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 3% of the basic funding for education and research given to SU from the government.

General comments

SU is the leader in three SRAs, all within the Climate theme. It is also a partner in SciLifeLab, focusing its interest in that SRA on life science and bioinformatics, and on environmental applications, in the eResearch SRA, EvetKth, and in CancerUU. Given SU’s long-term strength in science, the University is pleased that its SRAs are in complementary fields as this should significantly strengthen and broaden the University’s already well-established environmental and climate science capacity. The SRA money is 10% of the SU’s base research funding in science.

While the expert assessors in their consolidated reports did not give any of the SRAs which SU leads top rating for research output, they were awarded all three top ratings for integration with education.

Strategic management and use of the SRA funding – *Good/inadequate*

SU offered an unapologetically different approach to the strategic management of its SRAs as compared to all the other universities interviewed. The University does not give special treatment to SRAs per se but successful research entities such as SRAs attracting significant funding can establish new university positions, which are decided at the faculty level. The university (faculty) underwrites these positions long-term. One example is the seven associate professor positions created in the SRA, KlimSU.

Thus the default aim of the university strategy for supporting SRAs is underwriting recruitments for them. Appointments to SRAs followed international recruitment. The recently introduced tenure-track process helps ensure high quality appointments.

Management of SRAs, including recruitment, is decentralised, being left to the relevant Departments and Faculties. The University stresses that for basic research the prioritisation has to be bottom-up. Management's role is to manage the process, ensuring that new funding does not simply support old areas.

As the SRAs that SU leads are all cross-faculty, they each have a cross faculty council that includes relevant deans. These councils determine how the SRA funds are distributed. Other University support mechanisms for the SRAs include:

- the University's emphasis on efficient university administration – in this regard it offers management-training programmes
- the Research Liaison Office created in recent years provides assistance with grant applications
- the Innovation Office helsp with commercialisation
- the appointment of a new Vice-President for research cooperation at SU and the establishment of a new Communications Office. The University has recognised the need (not least in the Baltic Sea SRA, HavSU) to report the basic research that SU does more effectively.

With regard to education, the University puts strong emphasis on teaching by staff at all levels.

The strategy of recruiting high-quality tenure track staff is a good use of SRA funds that was adopted by many universities. The actual management of the SRAs seems to have been more problematical with EffnatSU, and has yet to settle into a satisfactory centre structure within the University.

University outcomes and excellence – *Good*

The University is wary of the use of bibliometrics and believes it is too soon to see the true impact of SRA funding. Nevertheless with regard to present outcomes, it noted at interview that the bibliometric scores of the SRAs have increased over the last 5 years and the SRAs have attracted increased external funding.

SU sees the prime stakeholders for outputs from the SRAs as government and trans-governmental bodies. Thus it was pleased that KlimSU findings were referred to in the most recent IPCC report.

Because the SRAs are cross-faculty entities, the University notes that impact on education is not significant to date although some new (Masters) courses have been developed.

Added value of the SRA funding instrument – *Good*

The University was clear that the greatest added value of the SRA funding has been stimulation of new research which is more strongly focused on the needs of society and that it has led to collaboration across departmental and faculty boundaries in ways that are hard to achieve with the University's current funding-distribution mechanisms. In the next 5 years, SU will continue to use the SRA funding in the same areas, but will vary the allocation of funds to encourage yet more collaboration across faculty boundaries including humanities and law.

Summaries of the individual SRAs

KlimSU

Performance: Good
Strategy: Good
Added value: Good/inadequate

KlimSU is an extension of a structure (Bolin Center) involving four SU Departments that came together for a Linnaeus Grant awarded some years ago. With the SRA funding it has, through 7 new appointments, built up its competence in climate and Earth system modelling. The purpose of the SRA is to stimulate the comparative use of climate models in research and to provide feedback on these models. Accordingly KlimSU has studied several models, has links to many other modelling groups, and works closely with HPC groups at KTH. Its societal impact is largely managed through its partnerships with the Rossby Centre and SMHI, but it also runs a

programme for schools. KlimSU is working with others to build a stronger Nordic climate-modelling capacity and it has held a joint seminar with HavSU on Baltic Sea matters. While its work has been picked up in the latest IPCC report, the KlimSU leadership group notes that the research impact to date has been modest as the last 5 years have been primarily about getting people and models into place. Now that a foundation has been laid, its impact over the next 5 years should be considerable.

EffnatSU

Performance: Inadequate
Strategy: Inadequate
Added value: Inadequate

The goal of EffnatSU is to create integrity and coherence in ecosystem services especially by acquiring comprehensive and quality environmental data and seeking to transfer scientific knowledge to organisations, especially governments, who could make more informed decisions with this data and knowledge. To date, EffnatSU's main contacts have been in hydrology and through contacts with the water management industry. As yet it would not claim to be doing frontline research, as the focus over the last 5 years has been to establish the centre, with the funding used mainly to appoint several postdoctorates and PhD students. The next 5 years should see EffnatSU functioning as a centre. It intends to grow the number of partners including adding competence in political science. It will also build tools mentioned in the original proposal. Nevertheless it has had some achievements including a Master's course, 7 PhD graduations, and the building of a very large multi-factor environment database in collaboration with a nuclear waste repository institution.

HavSU

Performance: Good
Strategy: Good
Added value: Inadequate

HavSU inspired the creation of the University´s Baltic Sea Centre and will in the future be a component of that Centre. It received comparatively low amounts of SRA funding that it devotes primarily to new appointments. It does not claim frontline research status but it has some publications in top journals and many in good journals in relevant fields. It notes that an indicator of success will be when it sees its work significantly being used to manage the Baltic. It already has some impact on ICES fish stock assessments and its models of the eutrophication process being used as the basis of decisions by Helcom. With regard to education outcomes, HavSU already cooperates with the SU Baltic Sea Centre. It also contributes to a Master's programme on ecosystem management and its researchers teach at all levels. It aims to get ecosystem management taught as an integral component of many other courses.

2.2.9 Swedish University of Agricultural Science (SLU)

Basic facts

Swedish University of Agricultural Science (SLU) applied for four SRAs and received one. Furthermore, SLU receives funding as a co-applicant from two other funded SRAs.

In total, SLU was allocated approximately 143 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 2% of the basic funding for education and research given to SLU from the government.

General comments

Following an externally moderated review of research quality and priorities at SLU, the SRA initiative was well-aligned with the SLU goals and structure. In response to the SRA call, SLU senior management chose

which SRA proposals to submit based on a bottom-up process of developing ideas, selecting those ideas that complimented SLU priorities. Collaboration with Umeå was a continuation of a long-standing relationship. If SRA funding is not continued, support for the priority areas will continue, though the university funding will most likely be at a reduced level.

SLU have recently restructured their tenure track processes to open up competition for, but more tightly control, appointments of professors. Faculties have the largest responsibility for deciding upon positions to be opened, although the vice chancellor makes the formal and final decisions. The recruited professors salaries are then paid from the basic university (faculty) funding, representing a strategic commitment to the chosen area. There is a lot of cross faculty collaboration, managed at a faculty level.

Strategic management and use of the SRA funding – *Good*

SRA funds have been allocated to the groups involved in the applications, according to the plans in the original proposal. The Board of the deans had an important role in the original proposal, the daily management is now delegated to the SRA. The funding has been (temporary) directed towards younger researchers, doctoral students and post-doctorates, as a strategic choice for success in the future. Fifty to sixty people are directly involved in the programme and this areas will continue to be a priority. Detailed plans have recently been developed, awaiting the outcome of the SRA funding. This programme is central to SLU and will continue independent of the SRA funding for next 5 years, although if the specific SRA funding is reduced, the programme will also most likely be reduced. Umeå is planning to evaluate researchers and then decide if the University is ready to fund the faculty directly.

University outcomes and excellence – *Excellent*

The research output from the SRA is of high quality, assessed as 'on the frontline' by expert reviewers. Publication output has improved in quality and quantity with the SRA funding. Skogforsk is an important collaborator and there is generally a lot of industry involvement. SLU can produce trees that are better in terms of quality and stress resistance, and the genomic programme is working to ensure biodiversity in the future. SLU have a big collection of new trees, with various companies apparently very interested.

Added value of the SRA funding instrument – *Good/inadequate*

There is significant product innovation in this SRA programme. A number (unspecified) of GMO products have been developed for likely markets in Sweden or Brazil. IKEA is funding a Master's programme and there are other examples of short courses targeted at industrial collaborators. SLU runs a research school, and in principle all researchers teach at graduate or undergraduate level, although in practice there is often not enough teaching for everybody. SLU is currently implementing a totally new structure for basic education, based around a managed curriculum rather than ad-hoc professor-defined courses. Umeå has started two Master's programmes linked to this. SLU has a holding company and innovation office (12 people) to pro-actively develop the exploitation of SLU research outputs. This activity explicitly involves students. The overall programme is strong, but the added value of SRA mechanism was less clear.

Summaries of the individual SRAs

HållSLU

Performance: Excellent
Strategy: Good/inadequate
Added value: Good/inadequate

A number of research areas in the SRA are felt to be in the top 5–10 groups worldwide e.g. forest genetics and tree breeding. Reviewers rated the overall research as 'on the frontline'. In general the SRA researchers are free to pursue their own research, with little interference from the steering group. The SRA funding is viewed

essentially as a large grant. It makes up a small fraction of total funds, but has allowed a more pro-active approach to new projects, i.e. the SRA/researchers can choose which avenues to pursue or which grants to apply for rather than simply responding to available calls. There is significant innovation and exploitation across the SRA, with new trees and new products already available. A number of future research priorities have already been identified that would be difficult to pursue without SRA funding.

2.2.10 Umeå University (UmU)

Basic facts

Umeå University (UmU) applied for six SRAs and received two. Furthermore, UmU receives funding as co-applicant from four other funded SRAs.

In total, UmU was allocated approximately 226 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 3% of the basic funding for education and research given to UmU from the government.

General comments

There appears to have been strong involvement from the university management in the selection of which SRAs to bid for and the development of applicants. Only SRA proposals within areas considered by the university to be within their areas of 'strength' were selected to compete for SRAs. There also appears to have been considerable university support given during the preparation of the application. UmU has primarily used SRA funding to support recruitment of both junior and senior researchers and to develop regional and national collaborations. Indirectly, the funding is also supporting the development of international collaborations as the SRAs develop. SRA funding has also supported infrastructure development and educational initiatives. In terms of the educational initiatives, it was noted that UmU has succeeded in starting a Bioresource Technology Master's course which is attracting high-achieving students. It is also worth noting that representatives from industry also participate in teaching. The UmU PhD education has expanded and is now increasingly reaching out internationally. SRAs (as other centres) are periodically evaluated for research quality.

Strategic management and use of the SRA funding – *Excellent*

UmU management appears to be quite realistic about the current level of research quality and societal value associated with the two SRAs they lead and they seem to be using the SRA funding strategically to support these groups where support is most needed. The management acknowledged that one of the greatest challenges in the 'stop-go' funding climate which has resulted from myriad programme initiatives is in developing and maintaining a healthy profile of well-qualified staff. The President identified a strategy to reduce the number of professors in order to release pressure on core funding and to allow room for staff renewal and to support staff in pursuing basic and risk-taking research. UmU has developed a local form of 'tenure track' to support career development.

University outcomes and excellence – *Good*

UmU appears to have clearly used the SRA funding strategically to further develop areas of expertise. They are well aware that one of their SRA areas is small and at a less developed stage in terms of international scientific standing than the other, and that the 'products' of these two SRAs are useful for different sectors of society. SRA funding appears to have been used appropriately to support these SRAs where support is most needed. In addition to supporting strategic staff recruitment, there is evidence that the SRA funding mechanism has significantly stimulated collaboration at the local, regional and national level.

Added value of the SRA funding instrument – *Excellent/good*

Out of the university management teams interviewed, UmU was among the most convincing in terms of presenting a clear strategy focusing on research quality, support of 'risk-taking', innovation and the leveraging of regional (i.e. establishment of an Arctic center) as well as university strengths. The SRA funding mechanism allows relatively long-term funding at the core level and appears to have been strategically used by UmU to contribute to the long-term sustainability of the university through support staff recruitment at both the senior and junior level and to develop collaboration. The SRA funding program has clearly given added value in terms of developing research quality and collaboration between scientists, universities and other sectors of society.

Summaries of the individual SRAs

HavUmU

Performance: Good
Strategy: Good
Added value: Excellent

Even with the SRA funding, critical mass remains a challenge for HavUmu. The university has their own ships for coastal work as well as some access to coast guard ships but, generally, access to expensive national infrastructure (ship time) is a challenge given the expenses involved in steaming ships normally based in southern Sweden to the northern Gulf of Bothnia. The UmU management appears to be actively engaging in addressing this challenge. This SRA has some way to go in terms of achieving a strong international scientific profile. However, the publication record is increasing and their scientific visions are clear. Thus, there may be considerable potential if the group continues to be supported. This was the only SRA that included a stakeholder representative of the municipal water district authority in the team when interviewed. This suggests a close relationship between the relevant sector and the research which is being conducted. The messages sent in the interviews of management and the SRAs were similar suggesting good interaction between the two levels. SRA funding has clearly been of enormous added value for this group both in terms of recruitment and in the forming of collaborations. The group has a clear plan for the next 5 years.

EnergiUmU

Performance: Excellent/good
Strategy: Good
Added value: Good

Most of the funding (65–70%) for this SRA has gone into recruitment and 3 professors have been recruited (from Norway, Italy and Greece) as well as several junior PIs. Scientifically, this UmU SRA has the strongest international standing, but there is still room for improvement. The SRA has increased output by the group as a whole in peer reviewed literature during the period of the SRA (note, however, that the materials supplied do not allow evaluation of production per FTE). A focus of this SRA is to support innovation in the struggling pulp and paper industry. One of the actions the centre is taking is to try to mitigate these problems and they have close collaborations with industry. This SRA has set up a graduate school across the three universities in the SRA; they will restart their (failed) attempt to set up a European-level graduate school. This SRA also has a clear plan for the next 5 years where they intend to launch some new strategic areas as they believe that some of those identified 5 years ago are now mature enough to be able to attract support from alternative sources. Added value of this SRA funding mechanism for this group has been in supporting recruitment and allowing 'risk-taking' research.

2.2.11 University of Uppsala (UU)

Basic facts

Uppsala University (UU) applied for twelve SRAs and received seven. Furthermore, UU receives funding as co-applicant from three other funded SRAs.

In total, UU was allocated approximately 503 million Swedish Crowns by the government for the SRAs (2010–2014).

During 2014, the SRA funding corresponded to 4% of the basic funding for education and research given to UU from the government.

General comments

UU is an 'omniversity', covering a wide range of disciplines. UU said that it applied for SRAs in its areas of strength, some of which were confirmed in its internal quality evaluations in 2007 and 2011. The university actively decided not to apply in certain areas, where it felt it was not as strong. Of twelve applications led by UU, seven were successful. The University participates as a partner in three further SRAs, all led by Lund. Like other Swedish universities, UU has an innovations office and a holding company that can invest in patents and licensing. It also has an established tradition of 'AIMdays', so it is well equipped to 'push' for commercialisation.

Strategic management and use of the SRA funding – Good

The university's strategy dates from 2007 and is essentially to pursue all three university missions in an excellent manner. There is no overall thematic prioritization. UU has aimed to integrate its SRAs into the university from the start. Each has a 'programme council' chaired by a vice-rector or a dean of faculty. The link to senior university management is important both to embed the SRA in the university and to help overcome internal (typically organisational) obstacles to interdisciplinary. SRAs are implemented wholly within faculties – apart from the programme councils, so they won't function separately from the normal university governance. The SRAs are all quite different. Some have a lot of external money, others less. The university provides resources to all of them but in varying amounts and – as a result of the differences in other funding – therefore it provides different proportions of their total incomes. A lot of the money has been invested in new appointments – both from Sweden and from abroad, since the key need is excellent personnel. However the flexibility with which SRA funding can be used is appreciated by the university. The university anticipates that if the SRA funding is prolonged and incorporated into UU's institutional funding, it would continue to invest in the SRA areas although the balance among them would change. The SRAs are able to use UU's comprehensive commercialisation infrastructure so this link with innovation is seen as secure.

University outcomes and excellence – *Good*

UU believes that the SRA experience has taught it to cooperate more effectively with other universities. It has highlighted the need for more research management training across the university – both in defining and managing one's own research agenda. It also wants to make faculty more aware of people and activities within the university which have a potential or collaboration. The SRA money appears to have strengthened central management's hand in developing the university but the SRAs have not been used to enter new areas but to reinforce existing strengths. The university believes that the link from the SRAs to education has been comparatively weak, suggesting a need to make education more flexible in future.

Added value of the SRA funding instrument – *Good*

UU is a traditional, full-spectrum university whose central management's power and strategic capabilities are nonetheless in a process of expansion. SRA resources are largely devoted to the existing university strengths so that while they help pay for strengthening and renewal, they do not create new strategic possibilities. UU mirrors the national performance-based research funding system in allocating institutional funding for research

to individual faculties. While the amount of strategic funding the rector can control has increased recently, it is not clear that this is a direct result of the SRAs. Overall, UU has used SRA funding to strengthen its established positions but does not appear to have made strategic use of the money. So the value added is financial rather than strategic.

Summaries of the individual SRAs

SäkUU

Performance: Excellent/good
Strategy: Good
Added value: Excellent

This SRA uses an interdisciplinary approach to disaster management and response. It brings together several strong disciplinary groups at UU but it has been difficult to manage across organisational boundaries. There are few role models globally that are truly interdisciplinary – perhaps only 4 or 5, including IRDR at UCL (with whom they are starting to cooperate), ARMIT at Melbourne and a group at Columbia University. There are also links with the insurance industry which for obvious reasons has a long tradition of trying to understand disasters.

Hiring 30 PhDs has been a major use of resources and the SRA has established a graduate school in its area. Very large numbers of people applied for these posts. Four graduates have found jobs quickly (3 of them in academia). The intention is to shift recruitment toward post-doctorates and KaU and FHS are starting Bachelors and Master's courses in the area. UU is supporting the centre through 'general' measures such as its programme council and the willingness to invest in new people. UU plans to establish the SRA as an organisationally self-standing center jointly between the disciplinary domain of (i) Humanities and Social Sciences and (ii) Science and Technology – So far, the main influence on innovation has been through the SRAs engineering activities – other things will take a long time to filter through to the economy. The SRA appears to be doing good research and to have a strong strategy for its medium term development. A key uncertainty is the extent to which this value added will be counteracted by the institutional rigidities of the university.

PolregUU

Performance: Good/inadequate
Strategy: Inadequate
Added value: Good

This is a small SRA, focusing on the politics and social development of post-Soviet Russia. This is clearly an area of great social interest and importance. However, it emphasises that it does not aim to serve the policy community directly nor to act as a 'think tank': it decides its own research topics internally. The centre claims to be unique in Sweden and one of only two similar centres in the Nordic area. Some 40% of the center's funding comes from external, competitive projects. It highlighted its cooperation with three organisations in Russia and attracts upwards of a dozen visitors to work at the centre (6 of whom it can fund) at any one time. UU provides support in the form of willingness to recruit but the centre cannot itself recruit PhD students – these have to be recruited by the relevant faculties. While being located at UU offers opportunities to work with up to 5 different university faculties, in practice working across faculty boundaries is difficult. UU's decentralised tradition gives the centre a lot of autonomy, but gets in the way of exploiting the intellectual breadth of the university. While the work of the centre appears to be of good quality, it does not appear to have been able to use the SRA resources significantly to strengthen its position within and outside of the university and to establish a stronger reputation and image.

MolbioUU

Performance: Excellent
Strategy: Excellent
Added value: Excellent

This SRA (Center for Genomic and Proteomic Medicine) has a long-term strategy to build up tissue samples and understand the molecular basis for human complex diseases and then to shift its focus to exploitation of the sample base through research. So far, about half the SRA money has been spent on biobanking and one third on recruiting young researchers. This activity builds of existing areas of strength in UU and is integrated into the SciLifeLab centre, providing synergies with other SRAs and research at UU and elsewhere. The centre sees itself as (together with the Stockholm site) a platform for drug discovery and has orientated its graduate school towards that activity. Other funding, for example from VINNOVA, is being used to strengthen this activity. The university commercialisation infrastructure provides a strong platform from which to benefit from this activity. The SRA appears to be producing good work and has built a platform for continuing to do so, based on the existing strengths of the university. The area has benefited considerably from the SRA funding and made good use of the money to strengthen its own and the university's position.

EvetUU

Performance: Good
Strategy: Inadequate
Added value: Inadequate

This is one of two e-science centres in Sweden, working on computational and data-centred challenges in e-science and building up infrastructure. It is a virtual centre federating UU, LU and UmU. Projects are initiated internally, with 10% of the SRA money set aside for collaboration within the consortium. However, the SRA accounts for only about 10% of the consortium's total funding, so it has limited leverage over the overall activity. SRA funding has been used to strengthen the centre through recruitment. The centre seems to have limited cooperation with counterparts abroad and does not to cooperate much internally. Industrial interaction is also limited – chiefly to AIMdays, which is surprising given the importance of scientific computing to many of Sweden's major companies. While the centre appears to be doing good quality work based on its previous experience and track record, it is hard to see that the SRA money has added much value to it or that the centre as a strategy for doing so.

CancerUU

Performance: Excellent/good
Strategy: Excellent
Added value: Excellent

This activity builds not only on an area of research strength at UU but also on blood samples, tissue samples and clinical data from cancer patients in the participating counties, aiming to build up a comprehensive and longitudinal set of tissue samples. The intention is to use these to identify biomarkers for disease, the effectiveness of treatment and understand resistance to treatment. UU has other activities such as competence centres active in the area, so the SRA money is connected with a bigger effort. So far the university has supported the centre through middle-level recruitment and funding and purchasing equipment. The link to education is largely through postgraduate short curses, rather than affecting the first-degree level. There is now a need to find a 'home' for the tissue samples, recruit more senior people and focus more fully on the research that the biobank enables. In practice, the biobank is partly distributed across different organisations in the County and an organisational solution is needed for managing this. The SRA cooperates with other centres at UU (eg SciLifeLab) and elsewhere. Strengthening the biobanking platform provides a strategic basis for research growth and an attractive area of research in which UU is likely to continue to play an important role.

VårdUU

Performance: Inadequate
Strategy: Good
Added value: Good

This centre aims to develop ways to use the Internet to improve the quality and reduce the cost of psychosocial care of patients alongside medical treatment. A key success indicator is in the reduced amount of time patients spend in hospital and how it empowers them to play a more active role in their own care. The centre focuses on people with somatic illnesses who develop psychological stress. The SRA works with some 20 PhD students, mostly linked with the medical faculty. The research is said to be needs-driven, based on consultation with patients. The SRA federates activities across a number of departments and faculties rather than being institutionally distinct. While the SRA aims to do medical-style control experiments, the quality of this kind of practical research aimed at professional practice can be hard to assess externally, such as through using bibliometrics, but the centre has yet to mark out a distinct international competitive position. Today, some 10 studies are using the Internet portal – three of which are internal to the SRA and seven external. The centre appears to have made good use of the SRA funding to strengthen its position but there is still further development needed to transform this into a leading centre.

EnergiUU

Performance: Excellent
Strategy: Good
Added value: Good

This centre works on technological and economic aspects of energy production from renewable sources, integrating electricity from renewable sources into the distribution grid and electric propulsion and hybrid vehicles. UU leads this SRA, though KTH actually receives a larger share of the money. It federates the work of four universities, and sees itself in aspects of its work as comparable to the Karlsruhe Institute, CEA, Illinois and Munich. The SRA has added value by allowing them to recruit junior researchers and renew their part of the research community. They overlap with Chalmers but see this both as a source of healthy competition as well as an opportunity for collaboration. In practice, the group of Principal Investigators from the four universities involved allocate the resources across the universities and activities, so the strategy is more bottom-up. The role of UU is to fund recruitment, to coordinate activities within the SRA and to build a common environment for energy research performed at the four partner universities. There has been a substantial – perhaps even too large – effort in Master's-level education based on the work of the SRA. The SRA expects to continue after Year 5 and has established a strategy group to plan the continuation. While there appear to be issues of potential fragmentation, both among organisations and across fields, the SRA appears to have made good use of the opportunities provided by the money and to have clear ideas about how to continue.

APPENDIX 1: OVERVIEW OF SRA RESEARCH ENVIRONMENTS

Theme (3)	**Main applicant** (11)	**Number of research environments** (43)	**Strategic Research Areas** (20)	**Main Agency** (4)
Medicine	KI	1	Cancer	Swedish Research Council
	LU	1		
	UU	1		
	LU	1	Diabetes	Swedish Research Council
	KI	1		
	LU	1	Epidemiology	Swedish Research Council
	KI	1		
	LU	1	Neuroscience	Swedish Research Council
	KI	1		
	KTH	1	Molecular biosciences	Swedish Research Council
	UU	1		
	LU	1	Stemcells and regenerative medicine	Swedish Research Council
	KI	1		
	GU	1	Health Care Research	Swedish Research Council
	KI	1		
	UU	1		
Technology	KTH	1	e-Science	Swedish Research Council
	UU	1		
	KTH	1	IT and mobile communications	VINNOVA
	LiU	1		
	LiU	1	Materialsscience	VINNOVA
	CTH	1		
	CTH	1	Nanoscience and nanotechnology	Swedish Research Council
	LU	1		
	CTH	1	Production-technology	VINNOVA
	KTH	1		
	CTH	1	Transport-research	VINNOVA
	KTH	1		

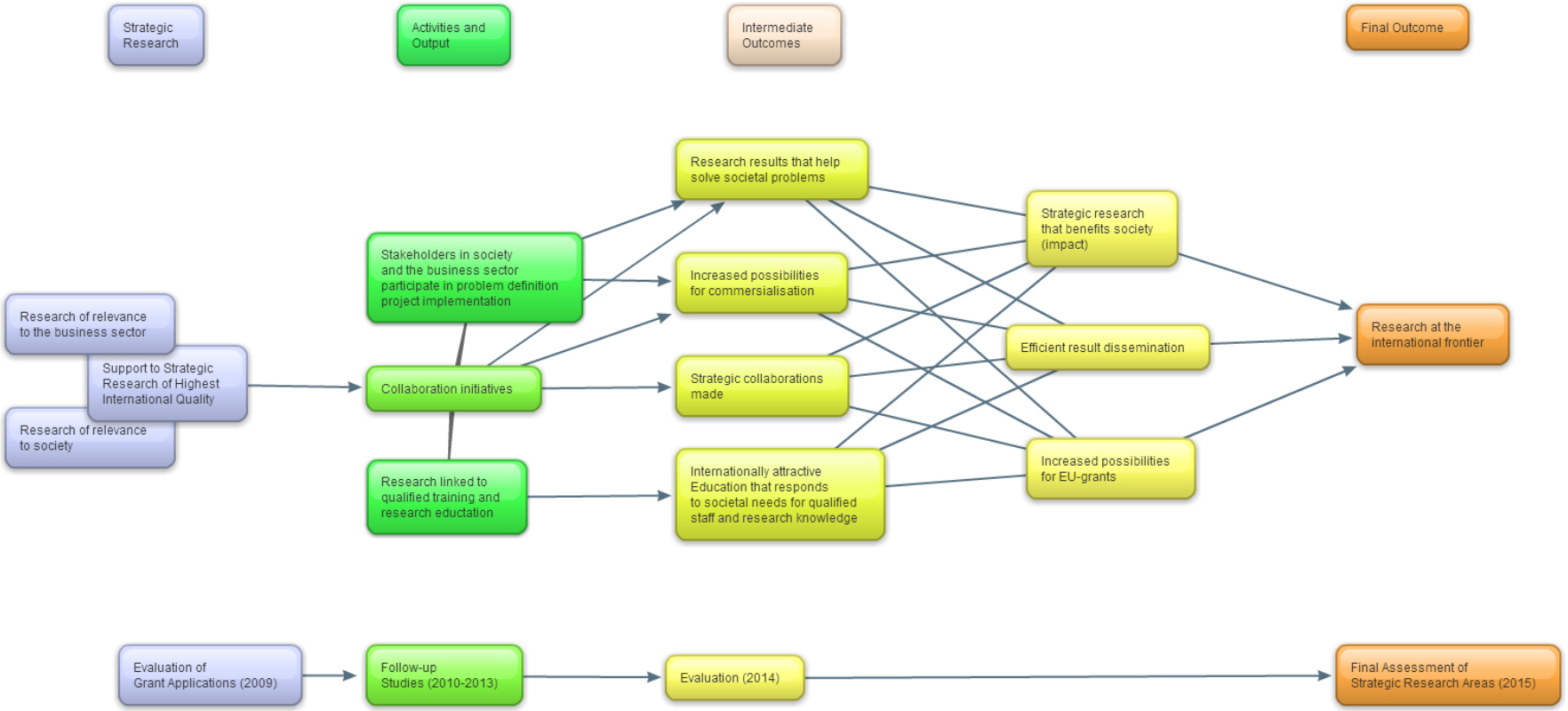
Theme (3)	**Main applicant** (11)	**Number of research environments** (43)	**Strategic Research Areas** (20)	**Main Agency** (4)
Climate	SU	1	Impact on natural resources	Formas
	LU	1		
	CTH	1	Energy	Swedish Energy Agency
	UmU	1		
	UU	1		
	LTU	1	Sustainable use of natural resources	VINNOVA
	SLU	1		
	SU	1	Climate models	Formas
	LU	1		
	SU	1	Marine environment research	Formas
	UmU	1		
Other Areas	UU	1	Security and emergency preparedness	VINNOVA
	LiU	1		
	UU	1	Politically important geographical regions	Swedish Research Council
	LU	1		

APPENDIX 2: SRA TOTAL ECONOMY

Note: Main applicant (black); Co-applicant (red)

Akronym:	CTH	GU	KI	KTH	LiU	LTU	LU	SLU	SU	UmU	UU	BTH	FHS	HHa	LinU	KaU	MdH	Total
CancerKi			74 550															74 550
CancerLu		19 170					44 730											63 900
CancerUu				3 728					3 728	29 820	37 275							74 551
DiabetesKi			90 525							15 975								106 500
DiabetesLu							74 550				31 950							106 500
EffnatLu		22 000					78 000											100 000
EffnatSu									68 000									68 000
EnergiCth	230 000																	230 000
EnergiUmu						72 717		36 358		88 525								197 600
EnergiUu				97 152		12 144		20 240			72 864							202 400
EpiKi			42 000															42 000
EpiLu							25 200				16 800							42 000
EvetKth			9 440	44 840	31 860				31 860									118 000
EvetUu							35 700			20 400	45 900							102 000
HavSu									41 600									41 600
HavUmu										21 240					14 160			35 400
HållLtu						83 941												83 941
HållSlu								86 448		21 612								108 060
ITKKth				127 260					14 140									141 400
ITKLiu					58 770		58 770					6 530		6 530				130 600
KlimLu	1 740	6 960		1 740			22 620								1 740			34 800
KlimSu				7 320					65 880									73 200
MatCth	82 720	11 280																94 000
MatLiu					110 000													110 000
MolbioKth			133 699	133 699					133 699									401 097
MolbioUu											171 900							171 900
NanoCth	129 500																	129 500
NanoLu							106 500											106 500
NeuroKi			94 600	4 400						11 000								110 000
NeuroLu		3 300					106 700											110 000
PolregLu							51 000											51 000
PolregUu											34 000							34 000
ProdCth	101 260						20 700											121 960
ProdKth				60 000													20 000	80 000
StamKi			118 000															118 000
StamLu							90 400				22 600							113 000
SäkLiu	912			3 040	26 448													30 400
SäkUu											29 366		8 117			8 117		45 600
TransCth	155 000	27 000																182 000
TransKth				95 500	25 500													121 000
VårdGu		90 000																90 000
VårdKi			68 000							17 000								85 000
VårdUu											40 000							40 000
	701 132	179 710	630 814	578 679	252 578	168 802	714 870	143 046	358 907	225 572	502 655	6 530	8 117	6 530	15 900	8 117	20 000	4 521 959

APPENDIX 3: SRA LOGICAL FRAMEWORK



APPENDIX 4: EXTERNAL REVIEWER REPORTS

Evaluation categories and grades (See External Reviewer Protocol, Appendix 7, for detailed information).

- Research output (publication profile and scientific impact). Grades used*: Not convincing so far, reaching international standards* or *on the frontline*.

- Utilisation and Benefits (capacity to transfer research results, stakeholder engagement in problem formulation, impact on society and business, capacity to provide qualified personnel or research based knowledge). Grades used: *Not developed satisfactorily, developed satisfactorily* or *developed with great satisfaction.*

- Collaboration (collaboration between co-applicant universities, collaboration with other SRAs, international collaboration, strategic collaboration outside of academia). Grades used: *Not effective so far, effective in several dimensions* or *effective in all dimensions.*

- Integration with Education (the integration of the research environment with different levels of education). Grades used: *Not demonstrated so far, under satisfactory development* or *developed with internationally high standards.*

- Management (management of research environment, use of recruitment relative to the goals and intentions of the environment, management capacity in regards of societal needs). Grades used: *Not convincing so far, on target and developing with high standards* or *moving beyond set goals.*

CONTENT APPENDIX 4

Evaluation Report for EnergiCth, CTH (Chalmers Energy initiative)

Research output

The overall grading of research output of EnergyCth in an international perspective is *on the frontline.*

The research environment has an outstanding publication track record in terms of both number and citation of research with a mean citation rate more than 50% over world average. Almost 15% of the publications are among the 10% highest cited and 1.5% among the top 1%. It is noteworthy that 32% are joint publications with national collaborators and a high 38% with international collaborators. Although the research output has been steady since the CEI started, publications have to a larger degree become co-authored between groups at Chalmers which is a good sign of different types of collaboration and research areas resulting from the centre. With a higher degree of cross fertilization between groups, combined with already excellent international collaboration, the centre will likely develop even stronger in terms of research publications in the years to come.

The self-assessment indicates that all four groups included in the centre are performing equally well, which is commendable. The research environment had an output of 18 Patents (the majority jointly with industry) and established 6 companies in the project period so far. In the period, the research environment has produced 70 PhD´s (22 female) and 71 Licentiates (21 female) and over 600 MSc candidates

In addition, other outputs include: Invited speakers at international meetings. Due to the reputation and the level of research activities, the environment had four international conferences within smart grid technologies, process integration, life cycle management and chemical looping.

Opening of new research. Due to the strategic funding not least investment in experimental infrastructure has led to novel bio refinery concepts. Other highlights include energy modelling packages (incl. comprehensive European dataset) and experimental research at the Battery Research Lab complemented by LCA

Utilization and benefits

The overall grading of utilization and benefits for EnergyCth in an international perspective *is on the frontline.*

The research environment collaborates very actively/closely with industry and appears to be effective in transfer of knowledge and research results to these partners. In addition, the research environment participates in both national and EU-level policy committees, transferring energy system research findings into societal use. 18 Patents, the majority jointly with industry, is indicative of a high degree of utilization of research results. The establishment of 6 companies in the project period so far is impressive. Examples of utilization and benefits:

Research collaboration includes four strategic research collaboration with industry (ABB, Göteborg energi, E.ON and Preem), 85% of patent application is together with industry, ~200 industrial PhD, adjunct professors and researchers spend time at partner industries

External grants: The environment is partner in 46 EU projects, 5 of which are coordinated by the environment. Included are also an ERC starting grant and an ERC advanced grant. Account is also given to the Area of Advance energy which includes the environment in a larger strategic energy initiative together with other energy related areas at Chalmers – additional 35 EU projects are highlighted. All in all, the strategic funding has been instrumental to broaden the competences in critical areas, to be an attractive partner in international projects and thereby obtain further funding.

Education collaboration includes efforts to increase master thesis together with industry. E.g. ABB offers 20 master projects and 40 summer trainee positions on a yearly basis. Further the environment is linked to the Chalmers professional Education offering a range of contracted courses (36 clients being reported table 9). Meeting places with industry are facilitated a.o. through the research infrastructure and experimental facilities. The partners SP and Innventia are part of facilitating the transfer of research to industry and society. The publication profile of the environment also include more than 300 popular science contributions, making energy and environment the top of Chalmers media exposure.

The Chalmers School of entrepreneurship is also an excellent example of efforts to nurture a culture of bringing research result to business.

The environment has, through the case study, demonstrated and excellent approach to bringing research into society with multiple benefits for research, education and business.

The fact that the research environment is often called upon in societal energy debate and policy discussions (national transport- and environment roadmaps etc.), is a good sign of societal impact/benefit.

Collaboration

The overall grading of collaboration of EnergyCth in an international perspective is *effective in several dimensions.*

Due to the strategic funding and not least the investments in infrastructure and experimental facilities, the environment is internationally attractive for a range of academic and industry partners and collaborations have increased during the time period, leading to participation in many EU projects, hosting of four international conferences and a steady number of co-publications. This has been pursued through a two tiered approach, one where each research area identifying the international partners most likely to contribute to the further development of the area, and the other cross cutting managed by the international coordinator of the environment.

There are no other partner University co-applicants. However, research institutes Innventia and SP are part of the centre with 10% of its budget. The collaboration between CTU and the institutes appears to be developing positively as the centre is progressing with a common strategy of researcher mobility and adjunct positions. The self-assessment implies that the collaboration has become better with a clarification of roles and focus areas. Joint use of research infrastructure is emphasized and evaluated positively. The partners also have plans for joint national and EU policy work. As future sense is used in the self-assessment, this is interpreted as plans which have to date not been actualized.

The content of collaboration between CEI and other SRA´s is described poorly in the self-assessment. It however appears as if CEI collaborates effectively with other CTU SRA´s (Transport, Materials) and has some researcher exchange activities with other Energy SREs outside Chalmers such as Bio4Energy and STandUP for Energy. The international collaboration has been developed strategically (choosing attractive partners that can contribute to CEI development) over the funding period and an increased number of joint publications with international partners has been reported from 2011–2013 (USA, Europe, China and Japan. An extensive international collaboration on e-book publication is noteworthy. The engagement in EU projects has also increased over the funding period and environment is partner in 46 EU projects, 5 of which are coordinated by the environment. On a strategic level, the centre has engaged the former director for the Swedish Energy Authority as responsible for external relations. He is Executive Board Chair of the Japan Renewable Energy Foundation, securing a strategically important relationship and standing in Asia.

The research environment has built strong relationships with companies both in Sweden (ABB, Göteborg Energi etc etc) and internationally (E.ON etc). According to the Leiden 2014 ranking, Chalmers has been placed as number two in the world in terms of research collaboration with Industry – a very prestigious position which seems to reflect the operation of the CEI. The chosen case study on large scale production of transport fuels from Biomass together with Göteborg Energi and Valmet Power illustrates well the successful collaboration between CTH and industry during the life cycle from small scale laboratory experiments to a full scale commercial 80–100MW plant (in 2017).

Integration with education

The overall grading of integration with education for EnergyCth in an international perspective is that it has *developed with internationally high standards.*

During the first years of the environment, the Chalmers Energy Academy played a role in exchanging information, knowledge, and ideas about how to adapt BSc, MSc, PhD programs and courses and continuing education to comply with societal need for skilled personnel in the energy area. With the institutionalization of

the environment in the Area of Advance, this Academy seems to have fulfilled its role. It is evident that the 10 energy related MSc. Programs and PhD courses have benefitted from the strengthened strategic energy research, first and foremost through the teaching obligation of the researchers, guest lecturers from industry and abroad, easy access to and collaboration with industry partners and with revised and new courses reflecting the state of the art knowledge within the field. The environment also promotes the student participation in a number of international energy related competitions such as Solar Decathlon, ECO-Marathon etc. and participates in a number of international educational activities, including an Erasmus Mundus program on energy storage and conversion materials

This has led to the top evaluation score of the MSc. Programmes in a recent national evaluation (2013), with 5 programs receiving the top grade 'very high quality' and the other 5 receiving the grade 'high quality'. It should also be noticed that some MSc. Energy programmes attract a high proportion of international students and in general Chalmers has a high reputations in the International Student Barometer.

Management

The overall grading of management of the EnergyCth in an international perspective for is that it is *moving beyond set goals.*

The CEI has held 'meeting societal challenges' high on its research agenda. It has significantly contributed to scientific knowledge in the energy area, been instrumental in developing industrial processes and products and graduated many candidates for recruitment in industry, academia and the public sector who will solve future energy challenges. It has attracted and educated an acceptable balance of both female (approx. 1/3) and male candidates.

The environment has continued its original management set-up with a director, an industry advisory board and a scientific advisory board and building on the existing Chalmers Energy Centre (CEC) established in 2004. It has been an advantage that Chalmers has further strengthened the strategic area though the launch of the Area of Advance in Energy, which has been important to include other energy areas otherwise, being excluded. It has therefore been wise to have the same director for both the AoA and for the environment so that these two bodies could be aligned to create synergy and avoid overlap in research and educational efforts. This environment is well managed, due to its management set-up with a director and a management team taking constantly the initiative externally towards strategic partners, stakeholders and the society at large and internally towards the researchers involved, educational activities and administration. Strategic management has also been applied in attention to cooperation between research areas in the centre, opening up for new research areas Leadership training for both experienced and young researcher has clearly also paid off given the strong international standing of CEI researchers, making them attractive as leaders and participants in a large number of EU projects (46 incl. 5 coordinated). This certainly promotes the environments international standing.

Part of the CEI success is a very clear and efficient recruitment strategy. Effort has gone into recruiting international top talent in form of assistant professors with a tenure track. The same goes for international PhD students, achieving a good mix of international and national researchers and a dynamic, well connected environment. In addition, the research area has been very strategic in identifying gaps and developing the research portfolio in terms of new recruitment filling the gaps. A smooth transition between staff generations is attempted by employment of experienced professors in addition to younger researchers. The strong focus on research leadership and training at Chalmers is commendable.

Evaluation Report for TransCth, CTH (Chalmers Sustainable Transport Initiative)

Research output

The overall grading of research output for TransCth in an international perspective *is reaching international standards.*

The environment itself explains that the increase in publications is due to the fact that more researchers are active in the field. The number of journal articles has increased by 3.3 and the numbers of other publications have also increased. It is positive that a publication strategy is pursued to increase publications per researcher (publications in reviewed journals have risen from 1.4 to 1.9 per researcher – no evidence provided) and co-publications with industry (no evidence provided).

The mean citation rate is about 1 while the proportion in top 10% is 6.9% and top 1% is 0.2%. Since the funding in the last year was 4.6M euros, the journal articles per M euros of funding was 76. It should however be mentioned that app. 31% of the publications is not covered by WoS. The proportion of publications based on national and international collaboration is 31% and 43% respectively, which compared to other environments are high.

To properly assess the publication profile, better statistics is needed, for example number and category of full time equivalent researchers involved. It is not convincing just to count participating researchers (more than 10% of full time personnel), nor mentioning the increase of principal investigators from 10 to 50, nor highlighting that 190 senior researchers are involved in 2012. And it is misleading to mention the CWTS Leiden Ranking 2014 for co-publications with industry, which ranks universities and not cross-institutional strategic research environments such as the Transport environment.

All in all, their transport efficiency and transport safety approaches seem unique and forward looking and bring together an interdisciplinary approach which is good. This includes the new programme on Li-S technology in Sustainable Vehicle Technology and the world's first full-scale test facility for future traffic safety solutions in Traffic Safety, not only for its large size, but for the possibility to test all modes of road transportation, and their interaction, in different types of traffic environments such as city, highway and rural roads.

The environment is expanding internationally with collaborations with US partners who have US funding. Also, the environment has participated or participates in many EU projects. However, there is some data quality issues regarding the timing of projects and also if the environment per se has had an impact on participation and success rate of such grants.

Utilization and benefits

The overall grading of utilization and benefit for TransCth in an international perspective has *developed satisfactorily.*

This is an area of particularly strong results – based on the project's evaluation. They have worked to enable the establishment of Joint research centres and collaboration with industry and societal actors. This has been accomplished through 135 researchers (of 557) working with 202 companies and about half that number having connections with Swedish and international societal organizations, and 92 with research institutes in Sweden and abroad. Through their education program, there were 58 industrial PhDs, 380 master's theses through work with companies, 10 patents and 5 start-up firms. They have also involved society in educational programs. There is good interplay with and participation in governmental strategy processes and commissions, including contributing to national research agendas.

Joint research projects are highlighted as the main mechanism to engage stakeholders and these have led to improvements and optimization and improvements in vehicle controls and there have been over 80 such direct impacts. Industry has also been invited to help set research agendas in two specialized research centres (no information of which). Chalmers has involved stakeholders in transfer of research results with an innovation

office that supports overall strategies, processes and methodologies for knowledge transfer and impact generation. They seem to be responding to societal needs through the attention to transport challenges, such as, the need to change technologies and behaviors in the transport system and to other developments that can contribute to making future transport solutions green, safe and efficient. The number of PhD degrees increased from 19 in 2010 to 34 in 2013, although the number of females was the same in the two years. The number of licentiates increased more significantly, from 6 to 43 with similar increases in both male and female students. They report that their graduates are consistently employed in highly relevant positions, and the Swedish Higher Education Authority has given it high ranking. Importantly in terms of the connectivity and expansion of the field is that their transport research impacts directly on over 50% of Chalmers' education programs. A final positive impact on the research based knowledge is that the number of conference s, visiting researchers and research visits has increased.

Collaboration

The overall grading of collaboration for TransCth in an international perspective is *effective in several dimensions.*

Chalmers receives 85% of the strategic funding, and thus is far the dominating part in the collaboration. Perhaps therefore, the environment has chosen to use own institutions and existing centres as communication platform instead of building its own platform. This was further institutionalized when Chalmers established Transport as an Area of Advance, which has strongly contributed with strategic direction and operation management capability and capacity. It is positive that efforts are made to integrate the Gothenburg coordinator in the AoA management set-up, though evidently it remains an unequal collaboration with unequal influence. There are some difficulties as noted: 'Our two universities are large organisations and transport research is a multi-disciplinary activity, engaging about 200 senior researchers from almost all Chalmers departments and four University of Gothenburg faculties. Thus, it has been challenging to find and bring together researchers doing relevant work. This was particularly challenging at the University of Gothenburg, where researchers must identify as members of particular disciplines who study transport, rather than as transport researchers.'

Since the Energy SRE is at Chalmers there is collaboration on the chain from biomass sources to the combustion and exhaust treatment of new fuels, as well as joint research on hybrid and electric drivelines, extending to 'smart grids' on the Energy side. Their battery research also has links to the Material SRE. They are also working with KTH on a variety of activities, including an annual conference. The environment notes that they took part in '248 collaborations with 147 academic partners in Europe, and 144 with 96 partners outside of Europe'. They also have networks in China (Swedish-Chinese Centre for Traffic Safety with Volvo Cars, AB Volvo, Tongji University and China's Research Institute of Highways (RIOH)), US, Finland and Germany as well as with foreign research institutes such as the Indian Institute of Technology in Delhi, IFSTTAR, TNO, UMTRI, and JARI – quite impressive, though it is unclear whether these partnerships are institutional partnerships or partnerships with the environment. They have many foreign visitors and invites to other universities.

They are working to build a European regional network which looks good for long-term benefits.

The SAFER case connecting with Volvo and the focus on safety research looks very good with long-term benefits. It illustrates how researchers and industrial partners together discuss the future of accidents avoidance and the associated research agenda. The research to be made is problem/challenge driven and hence by nature multi-disciplinary and funded by different sources (no information given on which one). The ASTAZero safety test facility is owned by Chalmers and SP and provides an attractive international platform for national and international stakeholders.

Integration with education

The overall grading of integration with education for TransCth in an international perspective is *under satisfactory development.*

The numbers of participants and students getting degrees and involvement of industry as described by the self-evaluation is quite impressive. Researchers are involved in 18 of 25 BSc programmes at Chalmers and 14 BSc programmes at GU; participate in 27 out of 40 MSc programmes at Chalmers and 13 at GU; and participate in PhD courses and supervision in 16 out of 17 departments at Chalmers. In 2013, more than 1400 participants from industry and authorities participated in contract education. CATA has coordinated special students events such as Formula Student and Eco Marathon and various industry collaborations (Thesis, internships).

Management

The overall grading of management for TransCth in an international perspective is *on target and developing with high standards.*

The management seems mostly to have engaged in the distribution of strategic resources and less on follow up on results and the further development of the environment. It is the impression that the further development has been delegated to the centres, their respective research councils and boards and the three profiles. It is rather difficult to judge whether the ambition to 'stimulate cross-fertilization between 'Transport efficiency and customer adapted logistics' and 'Traffic safety' ' (Application, page 3) has been met and what is done to further develop the environment. More info is needed on how the management strives to fulfill their mission as described in the application.

The environment has focused on recruitment of post docs, mostly international, to make a smooth generation shift and also attract both women and men. This has benefits but needs to also be considered in terms of the longer term implications for hiring of their and other Swedish graduate students. They have increased the number of PIs quite impressively which offers short and long-term benefits. Efforts to clarify further career opportunities at both Chalmers seem to have facilitated recruitment of talented people. The environment highlights the dynamic network of research leadership, in which management is embedded, including app. 40 researchers with network tasks, something which – it is argued – has facilitated the recruitment or appointment of leaders. Little information is provided on the recruitment, except that internal recruitment is as important as external. In addition, Chalmers has supported the AoA with a global recruitment scheme for talented young researchers from external institutions.

The environment is generating excellent research and producing many educational benefits. It is also connecting with industry and with the international communities. The overall responsibility to address societal needs is delegated to existing centres and profiles, each of which has their own set-up /research council with whom needs are identified and discussed. The overall organization of the environment seems to be substituted by the AoA organization at Chalmers, making it difficult to distinguish between the one and the other both in terms of researchers involved, financial resources and results and strategic endeavours. The heavy investment of Chalmers in the development of the AoA in Transport is positive in the sense that it contributes to the overall strategic development of the environment, but it may leave GU and other institutional collaborators at the margin of such strategic effort.

Evaluation Report for NanoCth, CTH (Chalmers Nano-Initiative)

Research output

The overall grading of research output for NanoCth in an international perspective is *on the frontline*.

The centre nearly doubled its publication output from 2010 to 2013, with 267 publications per annum in 2013. This number, divided amongst the number of PIs in the effort, is comparable with top international research centres. The scientific impact of these publications is also of very high caliber. The group has several papers in *Nature* and *Science* highlighting key achievements with graphene, superconducting devices, and many milestones in the biosciences. The top research centres in Europe and the US that target specific areas have more high profile publications, but what is impressive here is that the centre has 143 papers over many topics in journals with impact factor 7.5 or higher, demonstrating a high volume of solid science. The research themes include nanoscience, nanobioscience and molecular nanoscience, with such attributes as quantum phenomena, devices and sensors. An overarching mission is to combine top-down and bottom-up approaches to nanoscale fabrication, processing and manipulation.

Chalmers has taken a very visible leadership role in graphene research through the Graphene Flagship. There are many other notable achievements, such as the fundamental experimental discovery of the Dynamic Casimir Effect and advances in phototherapy. The infrastructure development has been vigorous. Altogether 7 ERC grants have been won, as well as other recognitions and awards.

Utilization and benefits

The overall grading of utilization and benefits for NanoCth in an international perspective is *developed with great satisfaction*.

Chalmers has a very sophisticated mechanism for transferring technology from academia to industry, with an internal intermediary organization to assist with prototyping as well as a clear, established path for managing IPR. NanoCTH is doing exemplary work in this area. It has well-functioning mechanisms for knowledge and technology transfer. The track record for industry collaboration and co-publishing is world-class. There are several established partnerships with companies and a rapidly developing start-up culture. There appears to be good interaction between industrial partners and nascent companies to influence research directions, especially in the bio-sciences domain where synergy with pharmaceutical companies is significant. The strategic advisory board is also effective. The instruments for stakeholder engagement include adjunct professorships, industry PhD students, joint meetings and collaborative projects.

The research topics chosen are indeed applied and are having or will have in the near future a significant impact on society at large as well as on Swedish businesses. Impact on society or business is sought in several areas, such as energy storage and generation, fuel-cell catalysts for transport, and diagnostics and treatment of diseases through nanotechnology methods. The SRA is also engaged in safety aspects of nanotechnology, and in outreach activities towards the public at large. Nanoscale sensors, in particular devices with overlap in bio-sciences, are indeed high impact ventures which are being nurtured carefully within the institute.

The Chalmers Nano-Initiative is employing a large number of post-docs and students who are carrying science forward on a global level and is thus supplying society with an ample stock of high technical, qualified personnel.

Collaboration

The overall grading of collaboration for NanoCth in an international perspective is *effective in several dimensions*.

The centre does not have significant collaborations with co-applicant universities. With respect to collaboration with other SRAs, there is obvious overlap with other Chalmers SRAs (Materials, Energy, and Catalysis). It appears that there are still further benefits to be gained from coordination and collaboration, e.g.

through common infrastructure, researcher training, and outreach activities. There is some overlap with NanoLu (superconductors, nanowires), and joint educational activities (summer school). The Nano-Initiative does collaborate with a large number of international partners on all levels, and is engaged in problems of global relevance. The groups that participate in the collaboration are of the highest international standing and significantly increase the centre's scientific output through joint publications. The efforts could, however, be further strengthened via strategic partnerships with selected institutions.

A number of companies have spun off from the institution and continue to benefit from its support. Moreover, several COINS agreements are either already in place or being developed with major international companies. The number of international collaborations outside academia is increasing steadily, but it is somewhat difficult to see the strategic value of these. The interaction with AstraZeneca appears to be successful on all accounts and appears to be nurturing long term interactions via sponsored postdocs. The results transfer technology to the industrial sector while generating high profile publications. Additionally, information appears to flow in both directions with academic researchers keeping abreast of industrial needs and mutual information exchange via lectures and conferences.

Integration with education

The overall grading of integration with education for NanoCth in an international perspective is *under satisfactorily development*.

The centre has 50 PhD students and 15 postdocs in additional to many Master's students. The level of European collaboration is high with a seamless flow of resources across the EU, further strengthening the prestigious record of this university. There are also initial plans to revamp the university education towards multidisciplinary nanoscience and nanotechnology.

Management

The overall grading of management for NanoCth in an international perspective is *on target and developing with high standard.*

The effort appears to be advancing on pace with the activities growing both in volume and breadth. The centre has successfully recruited Prof. Orwar and Prof. Hook in key strategic areas. Moreover, the institute seems willing to expand the number of permanent positions to attract key scientists and maintain excellence. Finally, the centre is also channelling resources to junior researchers to sow the seeds for future success. These are all commendable measures.

The institute interacts in a very natural and organic way with industry to meet societal needs in a direct way, and its members appear to be keenly aware of current technological trends. The overall centre is very strong and very well integrated with international academic and industrial partners. The nanofabrication and characterization facilities are world-class. My only observation here is that there are many researchers working on an extremely large number of different, loosely-related topics. As such, many initial developments happen at the university level and then are transitioned out to industry. This is a successful model in the biological sciences. For more conventional condensed matter physics applications, including quantum information science, such a vehicle for advanced development is not available given the academic nature of the field. As such, the most successful groups in the world are rather large and undertake many tightly-knit projects in parallel. The work in this area at Chalmers is of high quality indeed, but not dominating the field which continues to move very rapidly. Additional resources would be required to compete at the international level.

Evaluation Report for ProdCth, CTH (Sustainable Production Initiative)

Research output

The overall grading of research output for ProdCth from an international perspective is *reaching international standards.*

With respect to publication profile the absolute publication output reported is significant – 481 journal papers; 702 conference papers and 106 books. The publication rate has about doubled and there has been an increase per employee of about 33%. While impressive for production engineering this is a moderate publication rate. Importantly international trends are increasingly focusing on high impact journals and citations rather than solely on publication output numbers. The mean citation rate is only 0.67.

As would be expect from production domains, the scientific impact is more pronounced in terms of the industrial and partner impacts rather than achievement of more traditional academic publication metrics. Determined by volume of output and data returns the impact and scale is impressive. Actual impacts are however harder to tie down to detail in the response. The project reports that, *according to their assessment*, there has been 'an unprecedented change of Sustainability Awareness in a large researcher group'. They note there have been major scientific advances in terms of packaging technology, factory operator performance and stress analysis and in approaches to balancing methods in the utilization of multi-robot stations. The collaboration with industry was been excellent in terms of implementing these scientific approaches.

Utilization and benefits

The overall grading of utilization and benefit for ProdCth from an international perspective is *developed with great satisfaction.*

SPI clearly has the capacity to transfer research results for utilization. They have been effective with collaboration in 2013 with more than 130 industry partners. They have involved industry in research projects with positive benefits. Methods transfer is high (290), 5 spin outs have been created and 11 IP applications made. 42 researchers have been employed by outsiders. There has been good stakeholder engagement in original problem formulation and implementation. The report notes that extensive interviews and consultations were made during the formulation of the project and the preparation of the proposal. This involved industrial partners in Europe as well as US, China and Japan – leading to the national research agenda (Production 2020). This led to the applied and industry collaborative approach now being followed. With the establishment of the project, Chalmers and LU have had a continuous collaboration with partnership companies and COINS provides a governance mechanism at individual project level. Through these partnerships they have developed engineering approaches and solutions but, consistent with the concepts of sustainable development, technical production performance solutions that are coupled with socially sustainable workplaces. This approach has both industrial benefits as well as wider societal benefits beyond the specific company. However there seems to have been little change in direction from the roadmap other than the development of the Sustainable Production Measurement effort – this may imply a lack of either external challenge or not sufficient internal/self-challenge – this is important given the stretch implied in the language of the original proposal e.g. 'scientific leap' 'radical renewal' 'new concepts'. SPI should perhaps reflect on this.

The impact on society or business of the research is high. There has been good interaction with industrial partners. As noted above 134 industry partners where engaged in 2013, with 54 in the core group. The data return indicates that industry is 'massively involved'. This shows excellent impact/involvement with industry/business but there could be stronger evidence by multiple examples with more depth.

The environments capacity to provide qualified personnel or research based knowledge is good, for instance 42 researchers have been employed/engaged by industry. However the number of PhD students (and publications) appears to now be saturating. The number of female Licentiates has remained the same over the 4 years.

Collaboration

The overall grading of collaboration for ProdCth from an international perspective is *effective in most dimensions.*

There is good collaboration between the co-applicants managed the geographical separation and a 'positive collaborative atmosphere' has been developed. There has been co-publication, joint projects and cross-supervision of PhD students, and educational and laboratory exchanges. They have pursed complimentary research topics. The two regional locations also complement each other and improve access to industry. An example of the benefits of cooperation has been the development and use of the four national production innovation labs. They note the need to review and focus on the continuation of the SPI and with an appropriate focus of modelling and visualization.

With respect to other SRA's, there is cross working at Chalmers. They report strong collaborations with Material Science, Energy, Transport, and Nano Science with applications in manufacturing from new materials, nano-based components, and product development for transport solutions. The most significant area in which the production engineering SRA's are working together is in national production research strategy and PhD programmes in Produktion 2030.

International collaboration is good, with EU partners and international industrial partners via research institutes. Appropriate connections are in place to research in the USA and Asia with researcher exchanges, bilateral research projects and educational course exchange. Their development has led to increased international respect and interest because the scale of the program and integration of two strong Swedish Production Engineering universities. Between 2010 and 2013 global university collaboration tripled (from 13 to 39) – primarily with China, Canada, and USA. European collaboration more than doubled (from 29 to 73) – primarily with Germany, Norway, and UK. International collaboration follows patterns typical of universities through project consortia and local collaborations. There is good involvement with EU funding including securing an above average 21 projects from 49 applications. Other EU activities are strategic with good involvement in EFFRA and the KIC. Leadership in Europe for 'Social sustainability in manufacturing' is excellent and reflects Swedish traditions.

Strategic collaborations outside academia are excellent, as shown by the number of industrial partners both in and outside Sweden. This collaboration has the benefits of technology transfer, training, and feedback on issues, problems and research directions of importance. The value of the collaborations is reinforced by them being expert providers of contract education (73 clients). The case example is extremely well presented and a benchmark for pragmatic industry academic collaboration where the academic partners are delivering real value to a real problem.

Integration with education

The overall grading of the integration with education for ProdCth is *under satisfactory development.*

There have been several advances in the undergraduate and graduate engineering curriculum to promote and advance the concepts of sustainability which are expected to have long term benefits. The transfer of SPI to the Swedish industry and business sectors via courses for professionals seems to have been effective. The linking with BSc and MSc levels has also been effective with 324 industry employees participating in courses in 2013. The Challenge Laboratory is an interesting innovation.

Management

The overall grading of management for ProdCth in an international perspective is *on target and developing with high standard.*

With respect to management of the research environment and the achievement of international standing SPI have established 4 coordinated National Product Innovation (NPI) Labs and 7 Centres of Excellence. There has been extensive collaboration with the Volvo group and other parts of the aerospace industry. The NPI labs have provided a vehicle for Chalmers–Lund collaboration and brought in industrial partners – with positive results. This activity is without doubt a success, and a success at considerable scale. The leadership is growing and

sustaining their enterprise and internationalizing their research with a step change in particular in international collaborations and making a significant and distinctive contribution to EU policy formulation. They have however to demonstrably deliver on their ambitious and transformative – radical – goals as promised in the proposal, it is hard to distinguish what is truly radical within their portfolio perhaps because of the lack of detail allowed by the returns. The question remains as to whether their science is as transformational as their aspirations in the proposal. This is particularly important given that SPI is likely to be a continuation of work that has been going on for a number of years at CTH and with Lund. With respect to recruitment there has been a major increase in the number of personnel participating in the environment – about 5 times over the period – with the relative increase in females being slightly higher than for males (although in 2013 the female/male ratio was still 0.34). It is clear that this will have given SPI a number of recruitment issues and challenges and that it has and is actively addressing them.

The management of the research environment with respect to societal needs is primarily via its focus on sustainability. SPI clearly has strong interactions with business, the transfer of sustainable production technologies and support for them to industry is a significant contribution to society. SPI claims 'sustainability awareness increased 84% over 4 years' but gives no clarity about how this is measured. The additions of sustainable development to the curriculum of undergraduate and graduate engineering programs will also have benefits in long term.

Evaluation Report for MatCth, CTH (Strategic Initiative – Materials Science)

Research output

The overall grading of research output for MatCth in an international perspective *is on the frontline.*

The strategic research area has three main themes, Soft/Supramolecular Materials, Functional Surfaces and Interfaces, and Characterization/Modelling. Chalmers and Gothenburg University have strong traditions in these, and both organizations are successfully executing a generation change in research leadership. The publication activity is vigorous, and the ambition level is high. The SRA has consistently maintained an average of 250 publications in journals of generally high stature. The field-normalized citation count (1.33) is excellent.

The SRA is making a strong scientific impact, on its own but especially when viewed together with the closely related NanoCth SRA. There are obvious synergy benefits between the two, and together they constitute an internationally visible stronghold in materials research in the Gothenburg area. One example of this is the European Graphene Flagship coordinated by Chalmers. The local infrastructure is competitive (e.g. cleanrooms, high-resolution electron microscopy, the MACH materials analysis laboratory etc.). The SRA is linked to existing capabilities in such spectroscopy user facilities as ESRF, ISIS and ILL, and also to emerging capabilities in MAX IV and ESS. The strong Chalmers tradition in electronic-structure calculation is continued, for example in the path-breaking work around van der Waals-density functional. One highlight of the current work is membrane protein enrichment and biomimetic bone-implant interfaces. These are good examples of a particular strength, the multidisciplinary efforts between materials scientists and clinical researchers. Another highlight is polymer solar cell materials, which have received much attention. In biomaterials, controlled molecule delivery to implant-bone interfaces targets improved healing processes for wound implants. The SRA has attracted one ERC starting grant and a number of European and national contracts. MatCth researchers have received awards and recognition.

Utilization and benefits

The overall grading of utilization and benefits for MatCth in an international perspective is *developed with great satisfaction.*

The research is organized to focus on three major utilization areas, Energy, Health and Sustainability. Chalmers is among the world leader universities in co-publishing research papers with industry, and this is also reflected in the work of the MatCth SRA. There are a large number of patents/patent applications, and an impressive number of spin-off ventures. The SRA is effectively using its resources to transfer technology to the workplace, via such vehicles as Chalmers Innovation, Industriteknik and Invest. Around 25 patents have so far been obtained, and there is a link to the School of Entrepreneurship.

Measures are in place to facilitate a continuing dialogue with industries to identify and formulate relevant problems and needs. The SRA philosophy is to maintain two-way communication with such vehicles as Materials for Tomorrow events. The governing board includes representatives from industry.

There is an extensive network of industrial contacts and collaborations, and many graduates find employment through this. There are PhD students co-funded by industry, and a large number of adjunct professors. The industry-academia interface is strengthened by consolidating the challenge-driven profile areas (Health, Energy, Sustainability) to a joint platform, and by enabling open access to the Chalmers Materials Analysis Laboratory. The SRA has spun off nine startups, and is actively engaged with 55 companies. Impact areas include polymer composites derived from wood-based raw materials, materials recycling, and sustainable-energy materials.

The SRA performs excellently in training personnel and in transferring knowledge to meet industrial and societal challenges. It also employs a large number of post-docs and students carrying science forward on a

global level. The fact that businesses are keen to maintain close ties with the SRA through sponsoring students and postdocs is indicative of the attractive source of qualified personnel at Chalmers.

Collaboration

The overall grading of collaboration for MatCth in an international perspective is *effective in several dimensions.*

The effort is collaboration between Chalmers and Gothenburg University. The latter has a visible effort in biomaterials. Chalmers and GU thus have complementary capabilities, especially in the Materials for Health area (for example biomimetic and bio-compatible materials). However, the coordination of activities and division of responsibilities could be further developed to make full use of all the synergy benefits.

The collaboration with Chalmers NanoCth is natural and extensive. Similarly, there is collaboration with the Energy SRA at Chalmers. The collaboration with other SRAs is at an informal level, for example via the utilization of computational resources available through the e-science SRAs.

There are strategic partnerships with major research universities worldwide, a growing number of exchange programs, and growing number of research projects conducted jointly with foreign institutions. There are 27 EU funded projects, and standing agreements with prestigious institutions such as Stanford, UCSB and ETH.

There is a vibrant interface for industrial collaborations, with a strategic component in many of them. The SRA is well integrated with industrial partners and welcomes their input and support at all levels. The case study described is based on a most effective partnership between Chalmers and a major chemical company. There is a multifaceted joint program in place between Chalmers and AkzoNobel in the area of silica chemistry and applications, with industrial PhD students and an adjunct professor.

Integration with education

The overall grading of integration with education for MatCth in an international perspective *is under satisfactory development.*

The SRA is academically strong with its educational efforts distributed over five major departments at Chalmers. There is a graduate school and many attractive Master's programs. Around 30 PhD and licentiate degrees are awarded annually. The SRA is also committed to broader spectrum of educational activities towards industrial partners, schools, and public at large.

Several measures are in place to further enhance educational activities in materials science, including internships, workshops/conferences organized with Areas of Advance, graduate student days, and specific courses in sports technology. However, it is not clear how a full-fledged curriculum design is proceeding to incorporate the multidisciplinary aspect of materials science (e.g. especially in the Materials for Health sector). It appears that MatCth could be in the position to drive a major curriculum renewal in materials science both at the undergraduate and graduate level.

Management

The overall grading of management for MatCth in an international perspective is on *target and developing with high standard.*

The effort appears to be advancing on pace with the growing activities. The management structure is sound, with the managerial load spread over much of the senior faculty. The operative management is overseen by a strategic board and there is an international advisory group. The management structure has well defined branches covering research, education, and facilities.

The SRA recognizes the challenge of attracting and sustaining the best talent for junior faculty, and has implemented mechanisms such as seed grants and excellence positions for junior researchers. Well delineated and apparently successful recruitment paths are in place for graduate students and postdocs.

The SRA is in direct dialogue with industry and engaged in obtaining feedback for its development.

Evaluation Report for VardGu, GU (Towards Person-Centred Care in long-term illness)

Research output

The overall grading of research output for VardGu in an international perspective is *reaching international standards.*

The number of outputs has grown considerably over time and the majority are journal articles which suggest scientific focus. The bibliometrics suggest that just over half are based on international collaborations and the citation metrics are reasonable. Given the time lag involved in producing results based on controlled studies, the output is likely to increase further in future.

In terms of scientific impact, GPCC has initiated a new research area (controlled studies in patient-centred care) and there are some indicators to suggest they are at the forefront internationally: it is noted that such studies are rare in the literature and 2 of the 7 studies reported have been undertaken by researchers from this group; that results are referred to in various documents from agencies; and that one paper is the second most downloaded in a particular journal.

The degree to which the group constitutes a Centre, as opposed to a Network, is not always clear, with the self-evaluation noting the things they do to create a 'centre feel'. There are some potential advantages to being a centre with a clear base, with core people physically located together, and it might have been expected that a vision for such a centre would be in place.

Utilization and benefits

The overall grading for utilization and benefits for VardGu in an international perspective has *developed satisfactorily.*

The assessments for this area are somewhat mixed, with some strength but some areas of less than satisfactory development and as such this is a borderline grading. In terms of transfer of results for utilization, the involvement of the hospitals (PCC reference wards) is to be expected given the focus on clinical studies, but there should have also been scope for evidence of further transfer of results, as promised in the application. There are some activities aimed at assisting transfer such as a dedicated 'utilization function' and reporting of 113 activities in 2013 aimed at 'impacting policy', but the extent of such impact is rather more vague. Details of stakeholder engagement in problem formulation and implementation is also lacking in terms of concrete information – so there is discussion of industry partners in co-designing projects and some remarks about interaction of researchers with government, but nothing very clear that demonstrates the engagement in problem formulation, as opposed to participation in research. The involvement of patients as stakeholders is described more fully and the case study outlines the importance of the partnerships in the development of tools, training and methods to capture patient perspectives.

In terms of the impact on society and business, the results are mixed. There is an impressive list of business sector collaborators, but little about actual impact and there is likely to be scope for more extensive links with firms involved in service design. The discussion suggests this is in hand for the future but perhaps more could have been expected to date. Likewise, it is claimed that 24 public sector organisations have been influenced by results in 2013, but it would be good to know what sort of organisations they are. The examples of impact given are rather brief, but they do have the advantage of trying to capture it quantitatively.

The production of qualified personnel or research based knowledge is good with a large number of PhD students and post-docs attached to the Centre. Overall, it is recognised that there will be some time lags in the utilisation of knowledge from the controlled clinical studies undertaken in this programme, but in some areas more progress might have been expected to date. There is potential for impact and benefits, but the evidence that it is happening is rather sparse, so this remains a borderline grade and close attention should be paid to progress in the near future.

Collaboration

The overall grading of collaboration for VardGu in an international perspective is *effective in several dimensions.*

Again, this is a somewhat mixed result. The grading in some areas is higher and some effective progress is seen with regard to collaborations to develop international standing, including some specific examples of collaborations within and outside of Europe and an EU grant secured with several partners outside of Sweden. It is less clear whether some of those that have been 'identified' (e.g. Health Foundation and Griffith University) is active collaborators, or has just been identified as doing PCC research. In terms of collaborations outside academia, links to some business organisations are listed – although it is noted that in 2013, only 2 of the 11 business collaborations were of 'type 3', i.e. contributing with resources, and that is perhaps a little modest given the potential for technology development. However, there is an interesting link with SCA (a global hygiene and forest products company) which involves a pilot project funded by SCA, which bodes well for the future.

The case study provides an example of collaboration outside academia who is involved in the research (e.g. IBM and AstraZeneca) that appeared keen to understand PCC in order to enhance their products and assess new business opportunities. This sounds good, but it is not clear whether the partners really were an intrinsic part of the work as they almost seemed to be observers rather than working alongside as a core element of the study, and whether they provided funding or not, is not documented. The evaluation notes that engagement with regional authorities was challenging and in fact the issues around compatibility of IT systems were not resolved, but the group should get some credit for their attempts to do so.

A real weakness appears to be fairly limited collaboration with other SRAs – there were no co-applicants so it may have been expected that there was scope for collaboration with other SRAs within care sciences, but also outside of this topic, given the focus on technology and IT issues. The information provided on discussions about forming a common research group to include partners from other Universities is brief.

Integration with education

The overall grading of integration with education for VardGu in an international perspective is *developed with internationally high standards.*

The involvement in education is impressive, with new course having been formed and researchers involved in the education of health personnel, especially through the executive education programme. The latter has trained 450 health professionals to date with more waiting to be trained. Masters level nurses have also benefitted from training including a large number of specialist nurses. It is possible that other groups could benefit from learning from what appears to be a highly successful educational programme that can make a real difference to the workforce in the healthcare sector. There are also concrete examples of (a) educational activities (e.g. special exhibition, leadership forum); and (b) educational resources (e.g. a film for those speaking with patients with aphasia; YouTube videos), that are valuable to those working in the field. These are impressive achievements over the time period.

However, some further scope exists for more in this area – for instance, there does not seem to be any collaboration on PhD courses with other SRAs which might be of mutual benefit (aside from career planning course with Vardal Institute); there may be scope for managers (as opposed to health professionals) to gain from the educational programmes in relation to PCC concepts.

The undergraduate programme is yet to begin (to be piloted in 2014 for a 2016 start)

Management

The overall grading for management for VardGu in an international perspective is *on target and developing with high standard.*

With regard to the management of the environment to advance international standing, there are some reservations with this grading because, as noted earlier, there is a lack of clarity about the exact nature of some

of the collaborations identified which seem quite loose. Future international collaboration is likely to hinge on the interest in the PCC trials as they develop further.

There is a tendency to recruit Swedish students as it is stated that knowledge of the Swedish system is required for some of the research; the documents state that recruitment has been undertaken to attract top senior researchers but with no indication of success. There is a specific plan for development of a 'road map' of key challenges for healthcare which sounds interesting as long as it manages to get beyond the high level challenges of which everyone is aware. It may be a useful vehicle for engagement with the stakeholders listed. There is some concern that there are several managing bodies that may require a lot of resource and co-ordination.

Evaluation Report for CancerKI, KI (Centre for integrated Cancer Studies at KI – StratCan)

Research output

The overall grading of research output for StratCan in an international perspective is *on the frontline.*

The research output of the StratCan research environment has been commendable. A rising number of papers have been published in the most prestigious international biomedical journals like Cell, Nature, Science and PNAS. A considerable number of reports have also appeared in leading journals with a more clinical profile like NEJM, The Lancet, J. Clin. Oncol. and J.Clin. Invest. The total annual volume of published paper has increased from the previous year with about 50% during 2013. In lack of actual lists of publications a thorough evaluation of the scientific output is however not doable.

The usefulness for the scientific community of scientific reports by StraCan is reflected in an overall citation rate that is twice the average in the field. Several of the most highly cited papers represent basic molecular and cell biology but there are also translational reports of high impact. Among the novel contributions is identification and functional characterization of a common SNP in the promoter of c-myc that associates with increased risk of human colorectal and prostate cancer. Conceptually novel contributions are the discovery of altered one-carbon metabolism in cancer calls that may offer a novel pathway for therapeutic targeting. The report of the phase II trial using the APS-246 drug to reactivate mutant p53 represents the cutting edge. Taking together, the scientific output ranks the cancer research activity at KI including StratCan as a leading centre of translational cancer research in Europe.

Utilization and benefits

The overall grading of utilization and benefits for StratCan in an international perspective *is between has developed satisfactorily and has developed with great satisfaction with a tendency closer to has developed satisfactorily.*

A considerable proportion of the scientific activity at the StratCan environment represents cancer research at a basic level of cell and molecular biology. Given this, the timeline is too short to allow assessment of the ultimate usefulness of the novel results for clinical practice. The high citations rates of the published reports anyhow indicate that the scientific community consider several findings of significant potential. The novel observations of genetic alterations associated with elevated risk of different cancers are of potential use in clinical counselling and follow-up of cancer patients.

The high publishing profile of the StratCan PI:s demonstrate their ability to focus on relevant and fashionable problems and to successfully pursue projects aiming a answering fundamental questions. As indicated above, many results are still waiting for the implementation in a translational setting.

a) StratCan scientists have initiated clinical trials for prostate cancer markers aiming at improvement of diagnostic and prognostic accuracy. The on-going trial will also validate the impact of a newly discovered 8q24 SNP in a larger clinical material. StratCan also provides scientific expertise to clinical trial education programs. The environment is involve engaged in the phase I clinical trial units which manage over 50 on-going projects that evaluate novel therapeutic strategies.

b) The creditable and diversified cancer research conducted at StratCan makes the environment an interesting partner for the pharmaceutical industry. There is on-going collaboration with several leading pharmaceutical companies that are utilizing StratCan expertise and exploiting the innovations. To facilitate efficient commercialization of generated discoveries has StratCan engaged an Innovation Officer who will provide support in identifying inventions of commercial potential and assist in establishment of spin-of enterprises. There has been only occasional employment of persons from industry or non-academic organisations in the environment. The same is also true for direct engagement of StartCan employees in

the industry or industrial research institutes. Taken together this indicates that a productive cross talk between the environment and the industry is not given highest priority. Industrial needs appear to have had a minor impact on the choice of research topics. StratCan has shown adequate activity aiming at impacting general public policy through media, textbooks and conferences.

Stratcan has been able to recruit internationally leading scientists such as David Lane and Randall Johnson. They are establishing a joint international PhD track with StratRegen, StratNeuro and SRP Diabetes. However the number of PhDs graduating is very low: 38 over the whole period.

Collaboration

The overall grading of collaboration for Statcan in an international perspective is *effective in several dimensions.*

StratCan has established networks of collaboration with several leading international institutes of cancer research including the MD Anderson Cancer Centre and the German Cancer research Centre DKFZ. Active contact between StratCan employees and investigators from universities like Oxford University, Yale University and Mayo Clinic has resulted in co-authorship of number of high-impact publications. StratCan is steadily in close collaboration with other research associates at KI, in particular as StratCan PI's are frequently also affiliated with other environments.

StratCan has established collaboration with the pharmaceutical industry to do identify and validate tumor drug targets and biomarkers. These include Aprea, AstraZenica Pfizer. StratCan has hired and Innovation Officer to explore and manage the commercial potential of innovations made in the environment. The aim of the established Clinical sequencing centre, ClinSeq is to organize a platform for clinical genomic studies of highest standard and to develop genome-based diagnostics and therapy. A basis for ClinSeq is a well-characterised dataset of bio-banked material in combination with pertinent clinical information. Key collaborators include Unilab, AstraZeneca SciLifeLab and a large network of clinical researchers. Being is still in its start-up phase ClinSeq is of significant potential and has already gained international attention both in the scientific community and among the pharmaceutical industry. There is an increased demand for reliable bio-bank data to validate the current flood of information generated by high throughput genomic sequencing.

Integration with education

The overall grading of integration with education for StratCan in an international perspective is *developed with internationally high standards.*

The PhD program of StratCan is largely integrated with the biomedical PhD education at KI with special emphasis on tumor biology. The StratCan post-doc program has supported both domestic and international trainees. A praiseworthy educational initiative is the grants managed by StratCan intended for post-residency training in translational cancer research. There is a global shortage of cancer researcher with a solid clinical background which also have profound training in up to date cell and molecular biology that is a prerequisite for successful translational cancer research. Such person are instrumental when it comes to narrow the distance between bench and bedside.

The environment is also running interactive summer school with international participants. In addition to education the events provide excellent occasions for networking and future collaboration. StratCan's one-semester projects for medical students may in addition to research education facilitate future recruitment to a scientific career.

Management

The overall grading of management of the StratCan in an international perspective *is developing with high standard.*

The practical leadership and management is run by a director and two deputy directors with support of an Executive Board that in addition to the directors is composed of coordinators for three TTCs and two Linne'

centres. The coordinator of the National research school in clinical cancer research and the coordinator of molecular pathology and cancer tissue bio-banking program are on the Board. The composition of the Faculty reflects the integrative nature of the KI environments engaged in cancer research. There are six women among the 23 Faculty members.

Recruitment of an international Scientific Advisory Board for the StratCan environment including the three TTCs is under planning.

StratCan has engaged a program manager for daily operational tasks and an Innovation manager to handle commercialization of StratCan innovations though collaboration with KI Innovations AB.

The management looks at a first sight rather extensive in relation to the extent of its activity but if the executive board meets on six times annually it is not too burdensome. Given the close integration between different research environments at KI including PIs with several affiliations much of the decision-making on a daily basis can be less formal.

KI is an attractive scientific environment of international reputation. This is of advantage for recruitment of post-docs and StratCan is no exception in this respect. StratCan has managed to attract international leading scientist (David Lane and Randall Johnson).

The multitude of scientific clusters at KI with PIs holding several affiliations somewhat obscures the specific profile of StratCan. The extent of added value given by the StratCan investment that represents less than 15% or the total research budget of the involved PIs is difficult to assess. It may (or may not) be symptomatic that among the nine research highlights listed in the 'självvärdering' financial support by SRA is explicitly acknowledged only in two out of the nine original papers.

Evaluation Report for DiabetesKI, KI (Translational Program in Diabetes Research, Education and Care)

Research output

The overall grading of research output for DiabetesKI in an international perspective is *on the frontline.*

During the period 2010–2013, scientists from DiabetesKi have published 279 papers, with an estimated coverage in the WoS of 87%. These included 35 papers in top journals such as Cell, Nature, Science, N Engl J Med and The Lancet. The proportion of these being of national and international collaboration is 63% and 66%, respectively. The proportion of publications in the top 10% and top 1% is 15.7 and 1.2%, respectively. Since each exceeds the 10% or 1% value, this indicates that a greater than expected number of the unit's publications are amongst the best in the world for this field. Five books, 9 book chapters, 35 conference publications and 28 'other' publications were also published by the unit. Importantly, several of these papers are authored by junior PIs within the group.

The bibliometric analysis shows a mean citation rate of 1.54, indicating that the unit's publications are cited above the world average by 54%. The average impact factor increased from ~6 to ~7, with an increased number of journal articles published in the top 10% than at in 2010. There are 26 groups with 230 researchers in this SRA.

Several of the papers published by scientists in the project have provided important advances in areas such as the impact of life style factors on metabolism (via epigenetic changes), fat turnover in humans, novel in vivo approaches to visualize function and viability of human pancreatic islets, novel functional data on type 2 associated genes etc.

Utilization and benefits

The overall grading of utilization and benefits for DiabetesKi in an international perspective *has developed with great satisfaction.*

There is a very active collaboration between PIs from DiabetesKi and pharmaceutic industry/SMEs. This is helped by the fact that several of the PIs have funded start-up companies to develop new drugs for diabetes prevention or treatment. This has resulted in a large utilization of methods by other organizations (38), introduction in the market of improved products in 2012 and 2013 and 14 applications for immaterial property rights. This should be further improved by the recent hiring of a new Innovation Officer, with the task to identify and verify projects with a commercial potential.

There is intense engagement of industrial partners and academic colleagues in problem formulation. At least 10 PIs have implemented their research to healthcare systems, with a transfer of people to/from industry (Merck, Nestle, Pfizer, Biovitrum). There was no detailed mention, however, of the eventual engagement with patient organizations and there were no collaborations described with Public Agencies.

An important component in DiabetesKi has been the development of research infrastructures, including metabolic phenotyping, a centre for animal models, a metabolic clinical research centre and enabling biologies/technologies (with focus on high throughput technologies) and beta cell imaging. This provides support for the different groups, including younger PIs, allowing them to focus on their projects without the need to establish complex and expensive methods/equipment. On the other hand, there seems to be limited cross-fertilization between the senior PIs, with limited number of joint publications and collaborations. This was already evident from the original application, which covers several different areas of diabetes/metabolism research but without a clear 'conducting line'.

DiabetesKi organizes courses (involving 25% of the clinical PIs) in training doctors in endocrinology/diabetology and kidney diseases. It is part of the AMGEN scholars program for undergraduates.

Collaboration

The overall grading of collaboration for DiabetesKi in an international perspective is *effective in several dimensions.*

The collaboration between the Karolinska Institutet (KI) and Umea University (UmU) remains somewhat limited. The leadership of the project recognized the problem, and addressed it by appointing Dr Helena Edlund, UmU, to the management group. It remains to be seen whether this will indeed foster collaboration. Another issue is that there seems to be limited cross-fertilization between the senior PIs, with limited number of joint publications or clear collaborations. This was already evident from the original application, which covers several different areas of diabetes/metabolism research but without a clear 'conducting line'.

DiabetesKi collaborates with Exodiab (SRA DiabetesLU; this seems, however, to be limited to receiving human islets isolate in Uppsala), and with SciLifeLab. The DiabetesKi senior PI is the KI SciLifeLab scientific director. This SRA also collaborates with StratRegen, StratNeuro and Epi.

There is a very active collaboration between PIs from DiabetesKi and pharmaceutic industry/SMEs. Specifically, seven collaborations between DiabetesKi PIs and industry have been added since 2010 (with pharma such as AZ, Lilly, Sanofi Pasteur, GSK, Pfizer, Daiichi-Sankyo, Chugai) plus 13 biotech companies. This is helped by the fact that several of the PIs have funded start-up companies to develop new drugs for diabetes prevention or treatment. Of note, there are 121 collaborative partners in total, with 59 being in academia (49% of total). DiabetesKi has developed strong bonds internationally, with US researchers at UMass, Joslin Diabetes at Harvard, Salk institute and top European labs at Cambridge and INSERM. Dr. Zierath, coordinator of DiabetesKi, is organizing the EASD 2015 meeting, is chair of the Nobel committee, and Editor of Diabetologia (leading diabetes journal of Europe).

The report describes a very interesting collaboration with AstraZeneca in the AZ-SciLifeLab joint research program for the 2014–2018 periods. The project includes multidisciplinary expertise, with clinicians, physiologists, endocrinologists, geneticists, engineers and bioinformaticians, and aims to provide a genomic and metabolic fingerprint of muscle insulin resistance and the adaptive response to exercise in diabetic patients.

Of some concern, some of the senior PIs seem to have multiple appointments outside Sweden, which may hamper their focus on their key activity, i.e. foster diabetes research in Sweden and drive forward the present consortium.

Integration with education

The overall grading of integration with education for DiabetesKi in an international perspective *has developed with internationally high standards.*

The consortium describe their general aims to provide diverse courses that represent the latest findings in diabetes and metabolism, mentoring of young PIs and developing of a series of seminars with up-to-date lectures and targeted meetings for young scientists with top scientists ('meet the professor' etc). An MD/OD-PhD program was established in 2010 to increase the possibilities to combine research and clinical practice. Diabetes research education at the Karolinska was extended to include courses and lectures from Umea University. An annual research symposium on Diabetes and Obesity is held annually and attended by ~150 local researchers and students, with students being awarded graduate course credit for attendance. At least 60% of groups are involved in undergraduate teaching, and 25% are organizing their own PhD courses. Approximately 2/3 of postdocs and 1/3 of PhD students originate from other countries.

These initiatives are apparently integrated with the broad goals of the Karolinska Institutet. One misses, however, specific initiatives by DiabetesKi, aiming to train multidisciplinary scientists in diabetes research, able to foster collaboration between the diverse projects.

Management

The overall grading for management for DiabetesKi in an international perspective *is on target and developing with high standards.*

There is in place a good structure for the management of DiabetesKi. There is also concern regarding the limited collaboration between the KI and UmU, and the integration between the different projects in DiabetesKi, as evidenced by limited joint publications. The main connecting factor between the different projects that compose DiabetesKi seems to be the development of research infrastructures or platforms, but no information is provided on the use of these platforms by the different partners. For instance, who uses the beta cell imaging facility besides the colleagues working directly with beta cells?

The consortium has an international scientific advisory board (US, Canada, INSERM, Dublin, Germany). An innovation board is added to support commercialization of new discoveries. In 2013 a dedicated communications officer was added to strengthen community outreach. The original SRA, SFO Diabetes, was merged with a program called Theme Centre in Diabetes, to generate the now SRP Diabetes. This provided additional funding for and emphasis on clinical research.

There is a good strategy for the recruitment of new PIs, with focus on young scientists. The positions are open for international competition, and the consortium has already attracted some talented young scientists. Due to initial budget reductions the decision was made to hire preferentially young promising junior faculty early in their careers (1st ten years of independence). Later a clinical researcher grant allowed for the hiring of 4 MDs to support clinical research. An additional senior researcher was added as an affiliate from Umea. Mid-stage PIs (docent) are been assisted by attaining Rolf Luft Senior researcher grants.

Evaluation Report for EpiKi, KI (Epidemiology: from mechanisms to prevention, from surveillance to safety)

Research output

The overall grading of research output for EpiKi in an international perspective is *on the frontline.*

The research output is large, more than thousand papers. They have been cited substantially above world level of citations in their field. Their output also includes a respectable number of papers in the top-most journals as 22% of the papers have been published in journals belonging to the best 10%. Thus the productivity has been high, both quantitatively and qualitatively. Of note is that also the young investigators have been successful. It is difficult to give a more precise evaluation of their output since the reports sent to us do not include publications from the members, for instance listing the most important papers that they have published. The brief bibliometric analysis shows different numbers for the publication output as those given by EpiKi itself.

The self-evaluation of EpiKi lists a disperse list of examples that reflect the strategic impact of the consortium. These include effects and risks of influenza and HPV vaccination, safety concerns with immunomodulatory therapies, and studies of life span approaches to health and disease, which all have increased awareness of these issues. This wide repertoire of research topics and areas are only possible because of the large size of the EpiKi and marked funding besides the SRA funding. Somehow one wonders whether the small SRA funding (32 million SEK) is spread too broadly over too many areas. This spreading makes it difficult to be more precise in evaluating this (and other SRA) consortia. One also has to consider that less 22% of the funding comes from SRA and the majority from other sources.

Utilization and benefits

The overall grading for utilization and benefits for EpiKi in an international perspective has *developed satisfactorily.*

Since EpiKi is positioned in epidemiology, their goal is to come up with research data that can be utilized by the public sector. They therefore have contact to patient organizations including asthma, allergy and rheumatoid arthritis as well as clinicians who are opinion leaders in the areas where EpiKi works. They are also in intimate contact with public authorities such as the Stockholm County Council. They have also initiated a program of how to get new important clinical research results translated to improved treatments. The contact with the business sector is mostly channeled through the Centre for Pharmacoepidemiology at KI. These activities are concerned with the effectiveness and safety of new and old drugs.

The consortium that forms the EpiKi is located at one centre but its members are active in different areas of research. The collaborative actions have clearly been improved by the SRA funding. The precise mechanism employed to engage stakeholders in problem formulation is not so clear but it is evident that there is an ongoing discussion with a host of different organizations. In this way their voice will be heard. Whether any of the findings of EpiKi have already been implemented in prevention or health care is not evident from the material presented and this is probably too early to judge because implementation takes time.

The impact on society was briefly summarized above. EpiKi has developed contracts and collaborations with many stakeholders in the Swedish public sector. The business side has been developed by a number of collaborations with pharmaceutical companies. The most important goal is to reduce the risk of adverse effects to drugs. EpiKi emphasizes that these collaborations are guided by strict rules that avoid compromising scientific integrity. Despite several activities aiming at impacting the society and business, the numerical output regarding this impact have so far been low or non-existing.

EpiKi has been interacting heavily with partners within the Karolinska but also with the Stockholm Gerontology Centre and relevant institutes at the Stockholm University. In addition contacts with public institutions have been expanded to facilitate communication with the goal to improve public health. The

number of people within the consortium and number of graduations have increased significantly during the existence of the centre and based on the performance their quality has been very good. The EpiKi is providing PhDs to industry, specifically mentioned are AstraZeneca, Pfizer and Bayer but also to public institutions that need qualified personnel, trained in epidemiology. However, the 'exchange' between academia and industry has remained limited.

Collaboration

The overall grading of collaboration for EpiKi in an international perspective is *in between effective in several dimensions and effective in all dimensions.*

EpiKi is collaborating with StratCan regarding prostate cancer susceptibility and SFO-V on social aspects. They also have collaborations with MolBiolKth and EpiLu. Thus the activities are quite diverse. In Sweden there is generally a strong collaborative spirit that is fueled by this funding program. The international collaboration is extremely diverse including groups in leading universities and major research centres in the world. Also European networking is intensive as EpiKi is participating in 12 EU framework projects and 11 large disease consortia.

EpiKi has several contracts with industry, mainly with pharmaceutical companies. They also collaborate intensively with public institutions involved in prevention and health care as mentioned earlier.

The case study is concerned with analyzing how early life is contributing to life expectancy. It uses a multidisciplinary approach involving basic researchers, policy makers, clinicians and several organizations, which are active in this field. The results have initiated demonstrated collaborations also with several non-academic partners and have implications for disease prevention. Thus, it serves its purpose well. However, as it was launched only four years ago (year 2010) it is too early to state whether the research has had any real impact on the Swedish society.

Integration with education

The overall grading of integration with education of EpiKi in an international perspective is *developed with international high standards.*

EpiKI has put extensive effort on education and is engaged in education at all levels starting from Bachelor's programs to MD education. Educational efforts have been especially targeted to statisticians, data base managers as well as PhD-students, postdocs and researchers within the epidemiology field. This has obviously stimulated networking and promoted collaboration between the epidemiologists. EpiKi has also started a PhD program and are launching a research school in advanced epidemiology. This will be an important contribution of the SRA because this field is of great strategic value for the Swedish society.

Management

The overall grading of management of EpiKI in an international perspective is *on target and is developing with high standard.*

The management of EpiKi consists of the senior faculty, having an executive committee of 3 members. The executive group expedites the decisions made by the management committee. They also have a coordinator / information officer as the administrator for the program. Altogether, the structure seems efficient and the gender balance is satisfactory.

EpiKi made a strategic decision in formulating their program to provide project support for 6 junior faculty members that had young scholar awards. Two of the original awardees have now been promoted to Professors at KI. In 2013, 8 postdoc positions became available through the funding program. Altogether, this strategy was a wise decision considering that the funding of EpiKi was smaller than many other SFOs in biology and medicine and the general difficulties for younger investigators to become independent group leaders.

The research program has on whole been successful and since the research is directed to the needs of the Swedish society, the management has done its job well.

Evaluation Report for NeuroKi, KI
(Cognitive and motor functions in Health and Disease dureing lifespam – StratNeuro)

Research output

The overall grading for research output for StratNeuroKi in an international perspective is *on the frontline.*

StratNeuro constitutes an impressive group of international researchers across a broad platform of neuropsychiatric diseases and research areas. The programme spans a vast area of neuroscience conducted at the Karolinska Institute and Umea University with the majority at the KI. This is an ambitious programme, which at first glance appears rather contrived and diffuse – more of a who's who of Swedish neuroscientists than a real grouping of collaborative scientists. However, having said this, they do argue fairly well the advantages of grouping such research areas together and funding infrastructure platforms to benefit the whole community within StratNeuro. It is also true that bringing these multidisciplinary communities can add significant value if managed well. The scientific objectives are detailed and well defined.

The ten principle investigators in this large research environment are highly productive, some more than others. Prof. Winblad is highly productive in the area of Alzheimer research. Several of the PIs' publications are in high impact journals and are highly cited resulting in high H indices. The use of neuroimaging and biomarker development is well recognized in the literature.

The research focus of this group of investigators is wide ranging in multiple neuropsychiatric and developmental disorders with both motor and cognitive impairments. Because of the disease areas of research and the high quality of the work being done, the scientific impact is excellent. The work on Alzheimer's disease in particular is impactful. This group is more interested in biomarkers and early detection of disease and less focused on therapeutic development, although efforts are being made in that direction as well. Their strengths in neuroimaging and the clinical trial infrastructure are also used by pharmaceutical companies to test their drugs. The large brain bank is a significant asset. The impact of this group on training young investigators is also laudable. However, the wide range of disease areas that are being tackled in this environment is also viewed as somewhat lacking focus and not enough collaboration among the different PIs. The environment appears to consider its neuroimaging infrastructure and its strengths in clinical trials as the glue to bring the different PIs together and utilize the common resources.

Utilization and benefits

The overall grading for utilization and benefits for StratNeuroKi in an international perspective *has developed satisfactorily.*

The programme establishes a translational programme across the whole platform which will have societal benefits. The cross over between the areas may lead to some new approaches, which form platforms across the diseases. The capacity to transfer research results for utilization has developed satisfactorily. StratNeuro scientists are committed to spreading their new knowledge internationally. They view their animal imaging capabilities as a resource not only for their own research projects, but for the pharmaceutical industry and collaborators as well.

Stakeholder engagement in problem formulation and implementation has also developed satisfactorily. Several members of this environment have some relationship with industry and patient advocacy groups.

The impact on society or business of the research has developed satisfactorily. The group lists 4 and potentially a 5th spin-off company as a result of their research output. One is a genetically modified mouse, three are assessment tools, and the 5th is a potential treatment for glioblastoma. The other impact on business is the imaging and clinical trial resources that industry can use. No major therapeutic contributions are noted in this environment. The Karolinska Institute has an interesting business model to advance its discoveries. It owns KI Holding AB, which has in its portfolio corporations and an investment company. This is a very useful model that other academic and research institutions can emulate. It clearly contributes to business and economic

development in Sweden and the region. The capacity of this program to provide qualified personnel or new knowledge has developed with great satisfaction. Senior investigators in this group have trained a large number of highly qualified and creative young scientists. Following recommendations of their International Advisory Board, they have made an effort to have more inclusive and international trainees.

Collaboration

The overall grading of collaboration for StartNeuroKi in an international perspective is *effective in several dimensions.*

The collaboration with Umea works well and there are existing interactions between the groups. Both groups at the two Universities have extensive international collaborations and joint publications. Collaboration with industrial partners are identified as well as partner hospitals. These interactions are well established and will provide a strong foundation for the research to translate into the clinic. The main activities in StratNeuro happen at KI and small portion takes place at Umea. The self assessment acknowledges challenges in achieving full and close collaborations due to distance, cultural and administrative differences. One of the activities they do among the co-applicant universities is an annual retreat, which is not frequent enough to foster ongoing collaboration. This aspect needs to be enhanced.

Additionally, the extent of collaboration among the ten PIs within StratNeuro is not clear. Each appears to be doing their own research. Also, since 2009, they have opened their exclusive ten PI network to other investigators and collaborations. This should be enhanced and encouraged.

The collaboration with other SRA's is effective in several dimensions with respect to the further advancement of the environment's international standing. StratNeuro has growing collaborations with several other research initiatives within KI that are effective. The main goal of StratNeuro, which is stated repeatedly, is to develop an infrastructure of imaging. Other goals include translational research and training young researchers.

Several collaborative arrangements are stated mostly within Europe in both academia and industry. The use of strategic collaborations outside academia is also effective in several dimensions. Several partnerships with industry are described.

The strategic collaborations described in the case study demonstrate to be effective in several dimensions. The case study describes efforts to build the infrastructure for multi-modal imaging facilities with the support of AstraZeneca. This resource is used for projects initiated by StratNeuro PIs, collaborators and industry. While this is a useful resource, it is not considered as a major innovative accomplishment.

KI has an effective network of collaborating centres, institutes and core facilities and programs such as clinical trial unit, and transgenic mouse facility that are utilized effectively.

Integration with education

The overall grading of integration with education for StratNeuroKi in an international perspective *has developed with internationally high standards.*

Many new training ideas – a new neuroscience research training programme and student network will be established. Early young investigator mentor programmes and other postdoctoral programmes have been put forward for improving the community as well as foundational training in methodology for the platforms which exist and are planned. This aspect has been covered well by this proposal with clear plans and a good vision of how to add value onto the community.

StratNeuro provides an excellent environment for training mostly in neuroimaging and clinical research, but also translational research by some of the PIs. The launch of an international PhD program upon the urging of their International Advisory Board is noted.

Management

The overall grading of management for StratNeuroKi in an international perspective is *on target and developing with high standard.*

StratNeuro is an effective research environment that adds value by placing money into defined programmes rather than vague numbers of poorly defined staffing. Key infrastructure investments include the Brain Bank, the rodent behaviour lab, imaging and neuroinformatics lab. All of the infrastructure requests are well justified and a clear benefit to the grouping has been identified.

The management of the research environment is *on target and developing with high standard* with respect to the further advancement of the environment's international standing. The self-assessment of this element is mostly about recruitment and training. There is no plan about leadership, conflict resolution or succession.

As mentioned above, recruitment of trainees and junior and mid-level faculty is acceptable. The recent emphasis to attract international trainees is helpful. The fact that several of the PIs in StratNeuro are highly productive scientifically and widely recognized internationally in major disease areas of great societal need such as Alzheimer's disease is laudable. Unfortunately, the self-assessment and the case study did not do justice to those outstanding PIs in the group. The statement that one of the purposes of the environment is 'needs-driven research' according to what collaborators or industry present with medical problems is not inspiring. It implies that StratNeuro and its resources are available to provide service rather than perform investigator initiated innovative research based on what they perceive to be important problems in society.

In summary, although at first this application reads as too broad and disparate in scope to succeed or add benefit over single focused programmes, the program is reasonably well managed, ideas for funding are excellent and highly productive investigators in major disease areas add clear value. The self-assessment and case study could not highlight the true strengths of the programme.

Evaluation Report for StamKi, KI (Centre for regenerative Medicine)

Research output

The overall grading of the research output for StamKi in an international perspective *is on the frontline.*

The Stamki project is clearly generating an output of international quality with many examples of world leading findings. Although from the information provided it is difficult to assess how many of these are directly attributable to the funding received, researchers in the Stamki project have published over the time period of the programme total of 340 papers since 2010, including 37 publications in top journals such as Cell, Nature and Science. Importantly, Junior PIs have contributed with publications in Science, Nature Methods, Dev Cell, Nature Methods etc, reflecting positively on the Stamki policy of recruiting and supporting young PIs.

Several of the published papers by Stamki members had important impact in the field. Thus, ground-breaking contributions included: 1. A novel Carbon-14-based technology for understanding cell turnover, enabling insights into rates of cellular renewal in health and disease; 2. The first transplantation of biosynthetic organ (trachea); 3. New insights into neuronal differentiation, of potential relevance for Parkinson's disease and spinal cord injury; 4. Culture of ES with chemically defined reagents, without animal components; 5. Cell lineage analysis in the blood system, and improvements on bone marrow transplantation; 6. Novel RNA sequencing approaches for single cells and a novel technology for controlling gene expression in vivo.

Utilization and benefits

The overall grading of utilization and benefits for StamKi in an international perspective has *developed with great satisfaction.*

The consortium is collaborating with the Department of Innovation of the KI, accelerating collaboration with industry. Stamki is involved in several fruitful collaborations with pharmaceutical companies and SMEs, as evidenced by 23 utilizations of Stamki-developed methods, goods and services, by introduction in the market of new or improved products in 2010/2011 and by 6 applications for immaterial property rights.

Scientists from Stamki are addressing unmet needs in health care that may have immediate benefit for patients. Thus, they are engaged in improving bone marrow transplantation, finding novel solutions for the lethal problem of graft-versus-host-disease, and developing a biosynthetic trachea for transplantation, a lifesaving procedure. Several of their approaches are being translated by pharmaceutical companies and SMEs (see above) into new products.

Stamki has a very well defined structure to foster research, supported by 4 key platforms, namely the Zebrafish core facility, Mouse core facility, Cellular reprogramming core facility and GMP core facility. This, and a well-defined, integrated and logical research plan provides the adequate environment for the advancement of regenerative medicine at the KI.

Collaboration

The overall grading for collaboration for StamKi in an international perspective is *effective in several dimensions.*

Stamki is developed at a single University. There seems to be a good interaction between the PIs and with the directors of the Core Facilities. It would be important, however, that future reports include a list of joint publications between the PIs, and provide clear information regarding the use of the Core Facilities by members of Stamki. This may allow re-directing priorities and funding between the Core Facilities.

Stamki is presently collaborating the SRAs StemTherapy and MultiPark, and with the SciLifeLab. StratRegen and StratNeuro jointly support the iPS core facility at KI. Stamki has developed a strategic collaboration with Harvard Department of Stem Cell & Regenerative Biology, and with leading laboratories in Shangai (SIBS and SCMC) and Hong Kong. They have also constituted an Advisory Board with international top scientists in the field. It should be provided, however, more detailed information on how is the Advisory

Board supporting the project. Did the members attend meetings of the project? Did they provide any written feedback?

Stamki is collaborating with several pharmaceutical companies, especially AstraZeneca, in the area of gene delivery technologies, NeuroNova on activation of endogenous adult stem cells, and BioLamina on xenofree culturing of human stem cells. There is a clear cross-fertilization between Stamki and these companies in the identification of unmet health care areas that may benefit from novel inputs based on stem cells and regenerative medicine.

The case study described the formation of the KI/AZ Integrated Cardio Metabolic Centre. This unique structure, supported by AstraZeneca and the KI, includes 6–10 research groups working in an industrial research centre integrated in an academic environment. The centre has a strong focus on regenerative therapies, and will have half of the research groups employed by AstraZeneca and half by KI. They will work under the same roof and share integrated activities. An important factor to convince AstraZeneca to localize at the KI was the recruitment of Prof. Ken Chien from Harvard to KI, indicating that Stamki is developing a successful strategy to recruit top scientists. The major investment to be done by AstraZeneca in the Centre will facilitate recruitment of additional leading scientists in the field, and additional improvements in higher education.

Integration with education

The overall grading for integration with education for StamKi in an international perspective is *developed with internationally high standards.*

Stamki/StratRegen has a very active role in fostering education in stem cell biology and regenerative medicine. They have developed courses on the Stem cell/Regenerative medicine fields at the Master, PhD and postdoc levels, organized a Summer School where PhD students and post-doctoral fellows interacted with international scientists, and organized activities for the general public to disseminate knowledge about stem cells and regenerative medicine.

Management

The overall grading of management for StamKI in an international perspective is *moving beyond set goals.*

This is an excellent project, logic and well structured, which is already bringing major advances to the field. The management is based on a skilled director and deputy director, and a stable executive board. For future reports, however, it would be important to include information on the frequency of meetings between the PIs, eventual annual or bi-annual retreats by all members etc.

The strategy of recruitment focused mostly on attracting top level senior scientists and in supporting the most promising junior scientists in the transition from early to mid-level career, a difficult moment for many young PIs. Both strategies are working very well, as exemplified by the engagement of Prof. Chien, apparently decisive to establish a major collaborative project with AstraZeneca, and by the fact that several of the selected junior scientists are publishing excellent papers and obtaining very competitive external funding (e.g. ERC starting grants). Stamki opted for not recruiting new junior group leaders, based on the fact that these young colleagues could be supported by other ongoing initiatives developed in parallel in Sweden or Europe. This seems to have been a good decision, since some of their prospective candidates obtained positions from these other sources, and are contributing to the project.

The research environment is composed of 10 research groups and four core facilities. It is working very well, and has already provided both scientific advances with direct impact on clinical management (see above) and fruitful collaboration with pharmaceutical industries and SMEs.

Evaluation Report for VardKi, KI (Bridging research and practice for better health)

Research output

The overall grading of research output for VardKi in an international perspective is *reaching international standards.*

The output measured in terms of publications has been substantial and is steadily increasing over time. Most of the publications are articles and conference papers and a few books/book chapters. The increased number of 'other' publication in 2013 (there are 102) raises a question what these publications are and who the target audiences are, and why the proportion of outputs in journals is comparatively modest (58% in most recent year). The quality of the output in terms of international co-authorship is around international average. The high number of total publications reflects the huge number of people participating in VardKi, with at least 10% of their time attributed to the research centre. It is therefore difficult to evaluate the volume of output in relation to the number of participants. Also it would be interesting to know how much of the participant's research reflected in the outputs, was undertaken before they entered VardKI, because publication takes several years.

The three work packages cover many research areas and involve extensive collaboration with clinicians, so naturally many researchers will be participating and contributing to the large number of articles. It could be said that the research seems to lie close to clinical research, which makes one wonder how easy it will be for these research *results* to bridge the gap. However, collaboration *per se* might be a mechanism for bridging a gap, and this may well be what they intend.

The scientific impact of VardKI is probably significant. KI was earlier ranked by an international panel as being the only university in Sweden that is world leading in care science research. Also the brief details provided about some methodological advances suggest good impact. The many EU-projects also are strong indication that VardKI is a strong and leading research environment. The case study is an EU funded project involving 16 countries which is very policy relevant and has published results in good quality journals with impact.

Utilization and benefits

The overall grading of utilization and benefits for VardKi in an international perspective *has developed satisfactorily.*

The nature of the collaborations with health and social care providers, the settings in which research is undertaken and the dual appointments, all help to create an environment in which research is co-produced and likely to be used in clinical setting. However, relatively few activities seem to be aimed at impacting the policy area. This may reflect lack of reporting in the self-evaluation or that broad dissemination of results is not very focused. The involvement of many researchers in teaching activities will hopefully be a channel for dissemination of results to users.

The research has indeed been targeted at areas of concern to national government as expressed through a Government Bill. The degree to which governmental agencies contribute to research problem formulation, however, is not that clear. One may wonder if the input from the governmental bodies is more to turn the research in strategic directions, as VardKi has been very successful in getting research money. The future plans for the 'Resource Centre for Care' are good if they develop as indicated although one might have expected that development to have progressed further by this stage.

Engagement of other stakeholders is hard to comment on and it is not easy to grade. However, the case study does illustrate the involvement of non-academic stakeholders in the work and a reference group is being used to ensure involvement. There seems to be a genuine commitment to transferring research to clinical practice, with consequent gains for society, this is reflected in the high grading for societal and practical value received from the SRC evaluation. There are some examples on influence on business and the private sector, including

establishment of consultancy companies. However if 'bridging the gap' is a major topic of the research enterprise, one would have liked that activity to be more prominent.

The number of participating researchers and PhD-students and postdocs provides a promising signal for future research within care science. Many students are from abroad, suggesting that the research environment is attractive to students and researchers. The capacity to supervise such a huge number of PhD students is feasible because of the large number of participants, but might be a challenge. The possibility for students to form groups covering similar projects could have been more apparent.

Collaboration

The overall grading of collaboration of VardKi in an international perspective is *effective in all dimensions.*

Collaboration with Umeå University is reasonable and efforts are being made to overcome cultural and distance problems. It is a little surprising though that only recently has attention been given to certain activities that would benefit from a 'joint' approach eg, shared training, mentorship schemes, seed money for joint work etc. These are being actively considered now, but after a long lag. In describing the intention to create a Resource Centre for Care with various stakeholders, only those in Stockholm appear to have been identified whilst Umeå-partners will be offered the opportunity to join the Centre. One gets the impression that KI is more at the forefront than Umeå and wonders whether Umeå is regarded as an equal partner by KI?

There is little exchange of knowledge and researchers with the two other SRAs undertaking care science research, but perhaps the research differs too much to be of benefit for KI. There are joint projects with three other SRAs within KI and one with another University. The research outputs have been relevant to other research areas, especially in the clinical area.

International collaboration and recruitment of personnel are highlighted and impressive, with many universities outside Sweden being affiliated, but it is not clear what the 'ties' mean in practice. Ties may be reported because they once visited and gave a presentation which is rather less substantial than collaborative, funded work of an enduring nature. The many EU-funded projects clearly indicate much international collaboration. The evaluation notes the very good outcome of the SRC evaluation in 2011 in terms of the rating of their international standing, also related to collaboration.

There are various fora in which non-academics – mainly provider organizations and patients – are brought together. It would be interesting to know who the other external partners are and how this works. The case study relates to recruitment of nurses and their organization and they seem to be drawn well into the research. The case illustrates a focus on targeted collaboration. In addition, a reference group with members from national healthcare employer association and the Swedish Forum for Healthcare Quality was formed. The collaboration was used to disseminate results.

Integration with education

The overall grading of integration with education for VardKi in an international perspective is *under satisfactory development.*

The researchers, who often have an affiliation to the two universities/medical schools, are involved in education and in several courses, both at graduate and postgraduate level, but it is not clear if mid-career researchers are also involved. Furthermore, at KI and especially at the graduate level, this contribution seems mainly to already existing courses and curriculum, and not to developing new courses. It might be that new perspectives are taken into the 'old' curriculum, but that is not so clear. Thus it is difficult to see to what extent VardKI has contributed to new competence for future health personnel and how much the specific research is drawn into courses and programs.

Within postgraduate education, the contribution seems more explicit and substantial. KI and UU are actively contributing to the National Doctoral School in Health Care Science, both as teachers giving new PhD courses and with many PhD-students. Three international master programs are directed by STO-V researchers and many international students are recruited. So when it comes to international recruitments and to an

international contribution to competence building both at graduate and postgraduate level, KI is performing very well.

Management

The overall grading of management of the VardKi in an international perspective is *on target and developing with high standard.*

This research strategy is a huge task, with both national and international collaboration across disciplines and institutions/places. The researchers are working in many different institutions within their own local management structures. Thus, to manage VardKI as a distinct entity with a common identity must be almost impossible across all administrative boundaries. This will mean that the five programs (working packages) and the many projects may well be developing independent of the overall goal. It would have been more satisfying if there had been an overall scientific lead that could put VardKI more firmly together, creating a common perspective and identity. It is hard to see what management system VardKI has established and the management seems rather weak. If the VardKI is meant to be a network aiming mostly at international publications of research, the weak management is less of a problem. The intention of forming a Centre indicates that VardKi is aware of the managerial challenges.

There has been a good recruitment of personnel, mostly female, also from abroad. Some defended their thesis already in 2010 and 2011 and this makes it hard to evaluate the impact of the grant from SRA. It is also hard to know the balance between new researchers and opportunities for the mid-career people. There is a balance between refreshing and renewing and allowing people to advance. That balance might be too much in favor of recruitment of younger researchers.

Evaluation Report for MatLiU, LiU (International interdisciplinary Materials Science Laboratory for Advanced Functional Materials (AFM)

Research output

The overall grading of research output in an international perspective for MatLiU is *on the frontline*.

The centre averages 250 publications per year. All of LiU published of the order 6,000 papers with 30,000 citations, with 21% of the citations being for AFM, thus demonstrating the high impact of the SRA. Several publications have appeared in high profile journals such as *Science* and specialized *Nature* journals. The centre has many notable achievements in a select set of fields. In particular, the work on efficient thermoelectrics based on PEDOT, metal nano-composite coatings, wide band-gap semiconductors—SiC, ZnO, InGaN quantum dots, and hexagonal GaN, CNX thin films, and anti-perovskite compounds is highly acknowledged. The centre has leveraged two ERC Advanced Grants and three ERC Starting Grants.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for MatLiU is *developed satisfactorily*.

A significant focus of the centre is to tackle those problems that have direct impact on Swedish industry. For example, the work on extending tool life beyond the typical five years, efforts to realize the next generation of LEDs, and large scale organic electronics all indicate the proclivity of the institution toward technology transfer. AFM has a vibrant interface to industries, ranging from long-term collaboration with several established companies to half a dozen spin-off companies in the materials area. There is an Industry Reference Panel advising AFM. Moreover, the centre has several mechanisms to mediate two-way communication between industry and academia. In particular, LiU uses industry mentors for students, dual appointments between industry and academia, the encouragement of industry-leasers to become Docents, and a variety of workshops and conferences to promote dialogue.

The impact on society or business of the research has developed with great satisfaction. The centre is very well integrated with the business sector and is sensitive to the needs of modern society. Many of the LiU facilities, especially the vapor deposition tools, the laboratory for organic electronics, and the soft-lithography infrastructure, are key resources for industrial products. In addition, computing resources are also used by SAAB AB and SMHI. The number of patents generated is very large, and there is an active effort to license LiU technology, indicating its high degree of relevance.

The centre has 240 researchers and boasts 3000 graduates, many of whom hold key positions in well-known businesses and academia. Moreover, the effort produces the full range of technical personnel from industrialists to university rectors. In particular, AFM trains and graduates qualified personnel well received and appreciated by the industrial environment. An example of this is that 60% of graduated PhDs choose industry/spin-off companies as their first employer. AFM also generates patents and other IPR assets in a remarkable way.

Collaboration

The overall grading of collaboration in an international perspective for MatLiU is *effective in several dimensions*.

There are no co-applicants on this submission, but the centre does interact with Chalmers MatCth on Graphene and with researchers at LU via the nanometer structure consortium. Computational work is supported by SERC, an e-science research consortium. Additionally, the centre is participating in a large number of collaborative projects, as evidenced by the number of co-authored publications (58%) in the bibliometric analysis, and by the large number of external grants, including many from the ERC. The centre active works with UI and Drexel University. These collaborations bring added value to LiU with the exchange and

development of new ideas—the development of nanolaminated Mn+1AXn-phases after the sabbatical visit of Prof. Michel Barsoum from Drexel is case in point.

The centre very effectively leverages industrial collaboration in several areas (SiC, conducting polymers, printed electronics, hard coatings) by taking an active role in product development – both at the conceptual and applied levels, and by encouraging the sharing of human resources. These techniques have effectively channeled capital investment into the institution, provided a sound post-career path for graduates, and have kept the research topics current, and highly relevant.

The PEDOT effort at LiU is impressive and very interesting in that the university partner has strategically invested to maintain a dominant position with respect to this technology. LiU funds a significant part of the research to guide product development and to cover technology gaps ranging from design to large scale synthesis. This approach as allowed LiU to reap the benefits of high profile applications with multiple companies, primarily Acreo in this instance.

Integration with education

The overall grading of integration with education in an international perspective for MatLiU is *under satisfactorily development*.

The centre is vibrant with many Master's and doctoral programs, and work is under way for a new degree structure and curriculum. Graduates are encouraged and supported with respect to obtaining international postdoctoral positions to broaden their horizons. The effort, however, for encouraging undergraduate students is not clear.

Management

The overall grading of management in an international perspective for MatLiU is *on target and developing with high standard.*

The effort appears to have an active management model which carefully focuses and directs the specific research activity to maintain dominance in a select set of fields. This approach has apparently been very successful in maximizing impact as opposed to simply hosting an extremely broad range of research activities which potentially cannot be developed to the extent needed to transition technology to the masses.

The centre is actively seeking many high level researchers to maintain research strengths. It is also adding new research directions with positions being actively filled. The centre appears very dynamic, and targets the fundamental atomic/molecular science that fuels the development of modern materials. What is very impressive is that the centre is able to take a new science development, gauge its implications for a broad spectrum of fields, and then capitalize on many of them. The result being a centre that is at the forefront of timely topics – solar cells, batteries, coatings, LEDs to name a few.

Evaluation Report for ITKLiU, LIU (eLLIIT – The Linköping – Lund Initiative on IT and Mobile Communication)

Research output

The overall grading of research output in an international perspective for eLLIIT is *reaching international standards*.

The research environment includes internationally known institutions. There are a considerable number of respectable researchers involved in the eLLIIT research environment with an excellent publication and research track record. Researchers of the environment received prestigious grants and awards (e.g., ERC advanced grant). Several members are editors of journals or publication chairs of prestigious conferences. It is fair to say that this SRA gathers some very visible individuals developing excellent research – so, in any case it is totally appropriate to fund them well.

The publication list includes a large number of well-cited references (more than 32 publications with more than 50 citations since 2010) and two textbooks. The bibliometric analysis shows that publications in total are well cited above average (1,34). The proportion of top 10% and top 1% publications is a bit below average. The proportion of publications based on international collaboration is with 53% quite high. One should insist that the interpretation of such indexes can be questioned. Of course, it would be hard to say that the publication profile is not convincing since this SRA gathers a number of frontline researchers, highly visible internationally. The weaker 10% and 1% publication scores may be an indication that, behind these top level researchers, the situation is slightly less satisfactory. Altogether, the publication numbers as reported in the self-evaluation are impressive, with a clear upward tendency.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for eLLIIT has *developed with great satisfaction*.

Utilization of methods, good services and processes was in total 0 in 2010, 9 in 2011, 24 in 2012, 12 in 2013. Over the years 10 spin-off companies and 19 immaterial property rights applications resulted, which seem quite healthy numbers; these scores are indeed the best of Benveniste's panel. There have been many organizations that have been impacted by the research in the environment (9,8,30,36). Also the activities aimed at impacting policy have significantly increased over the years with peaking at 29 in 2013. Quite remarkable is the Visualization Centre C in Norrköping with appr. 100.000 visitors annually. eLLIIT has an industrial board with representatives from Ericsson, ABB, Scania and SAAB. Many projects have been defined in close cooperation with company partners. The group of labs involved in eLLIIT collects a number of excellent to outstanding teams having ongoing tradition of collaboration, both internationally and with industry.

It is, however, unclear what is the actual responsibility of eLLIIT in getting those excellent results. The 'Massive MIMO' collaboration case is an excellent collaboration, but it only concerns a small fraction of the SRA forces so it hardly can be considered representative of the effect of the SRA. This collaboration rather seems born from other reasons.

The eLLIIT research topics are clearly in areas with a strong potential impact on society and business. Examples include: eHealth (medical implants with very low power consumption), smart buildings, streaming multimedia applications, automotive applications (platooning). There have been many industry collaborations with well-known companies like Ericsson and Intel USA. A sizable number of people from industry and other organizations have been involved. Several spin-offs resulted from the eLLIIT environment (SenionLab, Coresonic, Lund Medical AB, Modelon, HMS Industrial Network). The virtual autopsy table is successfully showcased at the British Museum. The environment has produced various outreach activities (popular-science lectures, …). Several patents were acquired by industrial partner. OpenModelica is distributed with Wolfram MathCore's System Modeler und used by large companies.

Still, what is this SRA really the cause of? It is not clear. It rather looks like we have here top quality teams doing their business as usual (that is, at an excellent level).

The number of doctoral and licentiate degrees for the years 2010–2013 has been 0, 25, 33, 31. These are very good numbers. Over the years 34 researchers from eLLIIT have been employed by industry with ab peak of 15 in 2013. The report says: *Our PhD courses are continuously developed in an agile fashion to meet the needs from ongoing projects with the curricula more tightly connected to Security Link. Our courses are open for free for participation from industry, and it is common with several participants from companies*. This is as an excellent way to develop qualified personnel.

Collaboration

The overall grading of collaboration in an international perspective for eLLIIT is *effective in all dimensions.*

New cooperative grants resulted with at least two eLLIIT partners (more than 76 MSEK). Long term collaboration is also based on long term inter-site projects (EASE, HIPEC, DISTRANT, MAMMOET) and several collaborations between LiU and LU, and LU and HH. It looks like that these collaborations would have and will happen irrespective of eLLIIT, but this research environment has strengthened these efforts. Large number of cooperation fields results in quite a heterogeneous setup with small projects. It seems that the SRA reports difficulties in having all its partners committed at the best level. The explanation is probably that the SRA had limited impact on the smaller partners.

eLLIIT researchers collaborate with ICT TNG at KTH and jointly organize conferences. There are further cooperations involving eSSENCE and SeRC, that is, there are common people participating to more than one SRA in the panel I reviewed. This, of course, facilitates the cross-fertilization. This is explicitly recalled in the report. There seems to be no particular effort made to collaborate with a particular SRA.

eLLIIT has a high number of visiting researchers and research visits (2010:50, 2011:31, 2012:58, 2013:46). The number of arranged conferences, i.e., 59, for 2013 seems very high. Given that 250 people (not fulltime equivalents) participated in the environment, this means that basically every fourth person was arranging a conference in 2013, International guest professorships are handled as joint initiatives from university and strategic industrial partners. In 2013 60 international collaborations were reported, 18 of those are industrial. Members of the eLLIIT environment have been involved in almost 30 granted EU proposals (7 of those as coordinator).

Some faculty are working part-time for industrial partners. Also adjunct positions for researchers from industry partners have been announced. To summarize, the scores regarding the industrial impact are outstanding. There is a long tradition of collaboration between several of the teams involved in this SRA and their industrial environment, both in joint research, transfer of research results, and hiring of students by the companies. The only facet missing is that there is no mention of any significant joint industry-academia effort at establishing longer term vision of what research should be done.

The massive MIMO is a high profile case study on the forefront of 5G technology development. The project has led to many co-authored and well cited papers. A highly ranked FP7 project (MAMMOET) resulted. This collaboration case is an excellent collaboration, but it only concerns a small fraction of the SRA forces so it hardly can be considered representative of the effect of the SRA. This collaboration rather seems born from other reasons.

Integration with education

The overall grading of integration with education in an international perspective for eLLIIT is *developed with internationally high standards.*

There have been several clients (2,4,2,1) for which contract education was performed. The environment's research topics are well presented in various education programs at LiU, LU, BTH, HH. On the PhD level LiU and LU participate at various topic-related graduate schools. At HH an industrial graduate school (EISIGS) has been developed. New courses on PhD and MSc levels have been developed at LiU and LU. eLLIIT scientists

have leading positions in curriculum development at their institutions. The environment had direct influence on a new five year MSE program at LiU for example. Joint PhD courses have been created.

On the more negative side, there does not seem to be a comprehensive curriculum devoted to the main industrial sectors covered by the SRA (IT and Mobile communication). No mention of e-courses (MOOC).

Management

The overall grading of management in an international perspective for eLLIIT is *on target and developing with high standard.*

LiU as responsible university has appointed a Managing Board with a centre director from LiU and a deputy centre director from LU. Industry involvement is assured through an Industrial Board. There are six research areas, each headed by two senior researchers from two different organizations of eLLIIT. The eLLIIT board issued several internal calls for proposal. In 2012 a project evaluation with industry participation was performed. Within eLLIIT 10 professorships at the different universities were created. Long-term industrial need and potential impact on Swedish industry and society have been important criteria in the decision process. Positively, faculty positions created in eLLIIT are tenure-track. PhD students are recurrently and PostDocs normally recruited from abroad. Through eLLIIT 11 tenured or tenure-track high profile faculty has been hired.

The explanation of situation and difficulties is a good sign that the management was top level (not a surprise to us). However, no finding of any particular innovation in the way the management was performed.

In general, this SRA can be seen as a collection of highest standard individuals, worth supporting at an exceptional level. The successes made by the corresponding teams result from their own quality, standard, and ability to attract various resources at a high level, both nationwide and EU wide. The added value of this SRA is achieving this is not totally obvious to us, beyond the benefit of funding well the best people, which is not a bad policy (but would deserve a more light weight process…).

This is clearly a successful research environment that has made good use of the acquired funding. On the other hand the involved organizations already had very close collaborations beforehand and were successfully continuing what they already did in the past. Negatively formulated one could say 'more of the same' (though successfully). What would be the usps (unique selling points) which would not exist without eLLIIT? Positively formulated: an existing well-working network has been reinforced by the additional funding
It is quite remarkable that from 2012 to 2013, 31(!) Industry collaborative partners could be added.

Evaluation Report for SäkLiu, LiU (Security Link)

Research output

The overall grading of research output for SäkLiu in an international perspective *is reaching international standards.*

Publications and mainly with national cooperation; the score of 10% best is the best of my panel of SRAs; the score of best 1% is good.

The very rigid format of the report is not favourable for the authors to highlight what they have done outstanding. This format rather favours 'standard answers' (we call it 'langue de bois' in French). This being said, this SRA was the most convincing within my panel at showing clearly some highlights. This SRA has clearly contributed to strengthen a community on crisis management systems. Indeed, this is more visible through the creation of a spin-off company and new products by Ericsson associate partner than via pure academic facts. The 2013 Ph. D. thesis by Jonas Callmer is a strong contribution.

The Security Link groups have a strong background in multisensory and information fusion, and robust wireless communication. Alternate solutions to GPS positioning in the presence of jamming should be high priority research area.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for Security Link *has developed with great satisfaction*.

Commercialization of research by Security Link has led to formation of a number of startup companies. LiU has demonstrated a strong track record in transferring advanced scientific research to form spin-off companies in the sensor area such as Biacore Technology, Adixen Sensistor AB, AppliedSensor, and Senset.

A number of startup companies have been founded based on research from the Security Link research groups (six from LiU, four from FOI, and one from Chalmers). This is a good sign that of the research at Security Link is effective in creating new business. It will be useful to know how the research products from these companies have been used in emergency and crisis management, security, and infrastructure protection. What are the annual revenues of the companies since they were founded? Specific benefits to the society should be spelled out clearly. 'Involvement of the general public, for instance through citizen's panels and contacts with stakeholders, will be sought in order to ensure that the chosen solutions can gain social acceptance. The KTH group will work specifically with public participation, and will involve the other groups in this work. A website for public access and a centre portal for stakeholder access will be established.' This information seems to be outdated. At this stage, it would have been appropriate to describe what has been accomplished.

The research environment Security Link has an outstanding group of researchers from LiU, FOI, KTH, and Chalmers. The establishment of Forum Securitatis, CARER, KMC, and FOCUS is a good indicator of strong research related to the environment. Persistent surveillance of urban areas using radar and video sensors on UAVs requires experts on video processing and multitarget tracking. I recommend including well-known experts from Sweden in these fields.

Collaboration

The overall grading of collaboration in an international perspective for Security Link *is effective in several dimensions.*

Collaboration between LiU and FOI in UAV, emergency and crisis management, and command and control is clearly described. It is difficult to see any collaboration of KTH and Chalmers with other institutions. Uppsala University works on the 'Security and emergency management,' the Research Environment being 'Natural-Disaster Science.'Similarly, Karolinska Institutet works on the Epidemiology' the Research Environment being' Epidemiology: from mechanism to prevention, from surveillance to safety.' There are no

signs of any collaboration of Security Link with these two related Research Environments. Collaboration in relevant EU projects is noteworthy. International collaboration with well-known researchers in the US, UK, and Australia seems weak (see sample list of publications).

Integration with education

The overall grading of integration with education for Security Link *is under satisfactory development*.

The plan described by Security Link for relevant advanced M.Sc., Ph.D., and post-doc education seems reasonable. Courses on advanced video processing, multitarget video tracking, sensor management, sequential Monte Carlo methods, spectral estimation, chemical identification, high performance computing (HPC), and big data required for persistent video surveillance, Raman sensors, plume propagation, and video tracking would have been useful. High quality open courses as offered at MIT and Stanford would have been beneficial.

Management

The overall grading of management for Security Link *is on target and developing with high standard.*

The structure of the management group seems reasonable. It is a good idea to include a dedicated person like Dr. Sara Wallin to ensure that the research is relevant for the application areas. There are some ambiguities regarding names of the Deputy Centre Director and the head of the Forum Securitatis. The names of the three international experts and two representatives from industry and public stakeholders in the scientific advisory board should be mentioned. All information should be transparent. How regularly does the management group meet? A meeting report should be written after each meeting and action items should be specified to be reviewed at the next meeting.

During 2010–2013, only four postdoctoral researchers/assistant professors were recruited in 2013. There should have been recruitments in 2011 and 2012. No information is available on 2014 recruitment.

It is not clear how Security Link technology products at airports, ports, national border, nuclear power plants and sports arenas are used by the end users and service providers. This should be clearly specified.

Evaluation Report for HållLtu, LTU (Sustainable Use of Mineral resources – securing the future)

Research output

The overall grading of research output for HållLtu in an international perspective is *reaching international standards.*

The number of journal publications has a strong upwards trajectory over the evaluation period and this can certainly be considered a successful outcome of the research environment. However, the mean citation rate in the bibliometric analysis is low (0.22) and there are no publications in the top citation ranges. It is difficult to justify this result given the high reputation and competence of LTU and MEFOS in mining and metallurgy. The number and variety of publications seem to vary depending on the work package (according to the self-evaluation) and low citations are not unusual in applied science and engineering areas. Nevertheless, since there is also a low proportion of publications in journals included in Web of Science, an obvious next step should be a focused strategy to aim for the highest quality journal publications in order to make the publications profile more convincing. The self-evaluation comment that some leading journals are not listed in Web of Science is noted but most leading journals *are* listed. The tradition of publication mainly at high level conferences is slowly changing and although conferences are still an effective way of meeting/reaching industry, the aim should be to publish research results in high impact international journals.

The research environment has good evidence of applying for patents (4 in 2013) and established new products and processes. It seems strange that the sources of income table lists no industry funding, even though there is evidence of many industry links and collaborations in the application and descriptions.

The PhD profile has a strong upwards trajectory; 10 PhDs and 5 Licentiates in 2013 is a good number. The unit appears active, with a few conferences organized, visiting researchers (8 in 2013) and occasional research visits. Given this increase, the scientific output should increase accordingly in the next few years.

Utilization and benefits

The overall grading of utilization and benefits for HållLtu in an international perspective *is that it has developed satisfactorily.*

The number of businesses and other organizations that have utilized results and competence from the research environment is small compared to the total number of collaborations: only 3 businesses in 2013 and 18 over the whole time period. The table of collaborations however has more collaborators and a trajectory of an increasing number of partners, with industry partners rising from 6 in 2011 to 21 in 2013, so this should pay off with more results transferred to industry in the medium to longer term.

The engagement with industry stakeholders via the industry-funded Bergforsk foundation is exemplary (on the frontline) and appears to have high impact in producing highly relevant and forward-looking research programmes. It is not clear however how the CAMM initiative itself has improved this further, except by the individual project links. MEFOS with its ownership structure is very close to industry and with the strengthened tie between MEFOS and LTU Process Metallurgy, PhD's and masters have an excellent starting point for industry engagement in PhD research.

LTU has for many years been well funded by industry. With the establishment of CAMM, it seems that the activity visibility has increased in society as evidenced by support from the ministry of trade and industry as well as interaction with other public organisations. Certainly, a more intensified research activity benefits the businesses involved positively in terms of research results and graduation of scientists and engineers who can be recruited. A developed satisfactorily phrase has been used but it is not clear from the information provided how much additional impact has come from the establishment of CAMM and how much would have already flowed from the activities at LTU. No new information was added to the follow up questions in 2012 or 2013. Qualified personnel are being produced and used in the Swedish mining industry. The numbers of more highly qualified licentiate and PhD students are increasing.

Collaboration

The overall grading of collaboration for HållLtu in an international perspective is *that it is effective in several dimensions.*

There is no other co-applicant University. Collaboration with MEFOS (partner in raw materials for the future iron- and steelmaking section of programme) has taken place as planned and a MEFOS-led project is used as the case study.

The collaboration with the Bio4Energy SRA reads well and interaction has extended to several research areas: use of zeolite membranes in gas separation and also separate interaction on remediation of mine waste using paper and pulp industry residues, and recycling of metallurgical residues. These are good examples of interesting industrial and research synergies that could, with advantage, be expanded to other groups/SRAs outside LTU. However, although collaboration with companies internationally seems extensive, only a few University collaborations are discussed in any detail. Since the bibliometric study lists joint publications from international collaboration, this could have been described better in the self-assessment.

The CAMM centre has attracted a number of visiting scientists but fewer researchers from CAMM have spent time outside the centre. More outgoing exchange of both personnel and students should be encouraged. The ProMinNet geometallurgy collaboration with institutes in Germany, Finland and Norway and participation in a number of European multi-team projects funded by FP7 and the European Fund for Coal and Steel are good examples of international academic collaboration.

The selected case study, an EU research fund for coal and steel project coordinated by MEFOS, involved two PhD students at LTU in measurement campaigns and has resulted in two new projects. Further participation in the EU SPIRE program is anticipated. The collaboration seems effective but it is unclear if MEFOS and LTU will go together into, for example, SPIRE applications with industry?

Integration with education

The overall grading of integration with education for HållLtu in an international perspective is *that it has developed with internationally high standards.*

The research environment is carrying out education activities at various levels including MSc and PhD. The CAMM activities and additional expertise added by recruitment of new staff have been used well to produce new masters level courses and courses for industry participants. These include the EMERALD Erasmus Mundus master's programme with international collaborators and a Nordic Master's program.

Management

The overall grading of management of HållLtu in an international perspective is *that it is on target and developing with high standard.*

There are strong links with the European Union's Raw Materials Initiative and European Innovation Platform on Raw materials that make CAMM well placed to take advantage of international funding for research. LTU has a strong and improving international reputation in the subject area.

Although LTU is involved in several EU projects, few are coordinated by LTU and there is little evidence of LTU personnel other than the director of the CAMM centre taking the lead in European projects and, as such, increasing the visibility and international reputation of the research environment.

There is a strong link to joint industry-academic strategy (Bergforsk foundation) and given that Sweden is one the most active European countries in terms of exploration and mining activity, this is likely to help keep CAMM at the forefront on international activities. There is senior university representation on the management board. It can be very difficult to recruit academics in the extractive industries subjects, especially mining engineering and minerals engineering. CAMM has used a variety of strategies to overcome this and has achieved recruitment of new academics successfully, as proposed. These personnel are now making a substantial research impact. It is notable that there is movement from industry to CAMM as well as vice versa, which will encourage exchange of cultures and ideas and help in developing applied research.

PhD and post-doctoral opportunities are also advertised internationally and, according to the self- evaluation, the majority of PhD students are from outside Sweden. This will result in additional international research links and industry opportunities in the future. It would be good to see more evidence of an aggressive recruitment program nationally or in the Nordic countries to secure societal future needs. It is pleasing to see that the number of female licentiate and PhD students has increased over the period to almost 50:50 and there could now be a clearer strategy to encourage these personnel to pursue careers in the mining industry.

Evaluation Report for CancerLu, LU (BioCARE – Biomarkers in cancer medicine improving Health care, Education and Innovation)

Research output

The overall grading of research output in an international perspective for CancerLU is *reaching international standard.*

The publication output has been high: number of the publications in the bibliometric study is 977. The publications include papers in top journals but based on quality measurements and citations the numbers are just at the level of international average.

The consortium has concentrated on translational research and from this area the consortium lists several scientific impacts including identifications of new drug targets, evaluation of the importance of screening of prostate cancer by PSA testing, explanation of the anti-oxidant paradox in treating cancer. Thus, the scientific impact has been significant and diverse.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for CancerLU has *developed with great satisfaction.*

As the focus of BioCARE is to identify biomarkers of diagnostic, prognostic and therapeutic relevance in cancer, BioCARE has formed strategic alliances with both the health-care sector and industrial partners. The industrial partners include AstraZeneca, BioInvent, Qlucore AB, WntResearch. The connections are essential to get the findings from the bench to bedside. It is expected that especially with diagnostics it may take place rather fast.

BioCARE is engaging stakeholders both in industry and in the public sector. BioCARE Research School is also organizing biannual symposia with invitations to health-care and industrial collaborators to stimulate exchange. Both the health-care sector and the industry are involved in problem formulation and implementation.

As BioCARE is tackling important and increasing health problem – cancer, its potential impact on society is expected to be huge. The impact on business, especially on biotech and pharmaceutical industry, has already realized to certain extent, which can be seen in collaborative projects aiming at launching new drugs and diagnostics. For example, BioCARE-supported projects have identified and refined new treatment targets, some of which are now in phase 1 to 3 clinical trials. As these projects are still under development (inherently long-lasting in this sector of industry), their clinical value remains to be seen in the future.

BioCARE has produced a respectable number of doctors during its existence, some of which have entered industry. Importantly, new companies have been formed to exploit discoveries made by BioCARE researchers. This clearly shows that BioCARE has been able to provide important research based knowledge that may benefit patients, health-care and economy.

Collaboration

The overall grading of collaboration in an international perspective for CancerLU is *effective in several dimensions.*

The host universities (LU and GU) have established a joint Research School for PhD students and young Postdocs. BioCARE has also organized yearly retreats with PIs and co-PIs from LU and GU. Thus, BioCARE has established a network between scientists at all levels in both universities. There is also shared supervision of PhD students, and some of these projects have been funded by both BioCARE-LU and BioCARE-GU. As BioCARE is focusing to translational cancer projects and clinical trials play an important part in these, both universities promote those trials and jointly recruit patients to these trials. Sweden has long and successful

traditions in pharmaceutical industry and the existing collaboration between the host universities will help to create new success in the field.

BioCAREs collaboration partners are Nanometer Structure Consortium, and discussions are ongoing with the diabetes program (EXODIAB) at LU. BioCARE has organized Cancer Research Meetings. These meetings have solidified established collaborations and catalyzed new joint projects between Swedish universities. How much this will increase BioCAREs international standing will remain open.

BioCARE researchers have fruitful collaborations with many different foreign universities that are leading in their field of research. Fruitful collaborations can be verified from the significant number of joint publications together with international groups. As mentioned earlier, BioCARE has very extensive collaborations with several SMEs and big Pharma. This collaboration clearly has potential to increase BioCAREs international standing, if even a portion of the collaborative projects is successful. BioCARE has close contacts and collaborative projects with several pharmaceutical and biotech companies. Its discoveries are exploited further outside academia that is mandatory to get any products to the market.

The case study elucidates IL1RAP as a biomarker and therapeutic target in human leukemia. The period for the study was 2010–2014. The study was based on the finding that this molecule is up-regulated on leukemic stem cells. A company, Cantargia AB, producing humanized antibodies was founded through the LU innovation system. BioCARE supported this project at the proof-of-concept stage. The future will show the value of this therapy in the clinic. However, it demonstrates that strategic collaborations have potential to create new industry.

Integration with education

The overall grading of integration with education in an international perspective for CancerLU *is under satisfactory development.*

BioCARE has been involved in modernizing the cancer biology teaching at medical school in both universities. In addition, BioCARE is funding and supporting BioCARE Research School for PhD students and young postdocs and is making an effort (also financially) to courage medical students to do cancer related research.

Management

The overall grading of management in an international perspective for CancerLU is *on target and developing with high standard.*

BioCARE is headed by a joint board from both universities (11 members) and local boards of 7 persons at each university. Importantly, continuation and the generation shift have been taken care of by enrolling three young scientists as adjunct members in the main and internal boards. BioCAREs policy has been to recruit internationally recognized scientists – something that every organization is aiming at. Unfortunately, the SRAs are not able to establish tenure track systems due to the limited time and this remains to be the responsibility of the host universities. Despite this, BioCARE has been able to recruit promising young group leaders.

The management has been able to lead the consortium well that can be seen especially from the successful alliances with health-care and pharmaceutical industry. These alliances are fundamental to meet the societal needs caused by cancer.

Evaluation Report for DiabetesLu, LU (Excellence of Diabetes Research in Sweden – EXODIAB)

Research output

The overall grading of research output for EXODIAB in an international perspective *is on the frontline.*

Scientists from EXODIAB have published a large number of scientific articles since 2010, many of them in top international journals such as Nature Genet, Nature, Cell Metab, Cell, PLoS Med, PLoS Genet etc. Importantly, several of these studies were groundbreaking, providing novel and very relevant information for the understanding of the pathogenesis of diabetes. Key areas where important papers were published by EXODIAB include human pancreatic islet biology, human genetics of type 2 diabetes, systems genetics, transplantation etc. Of note, there is a progressive increase in the number of publications from 2010 to 2013, with preservation of quality. In total the unit published 949 publications, with an estimated coverage in the WoS of 95%. The proportion of these being of national and international collaboration is 55% and 64%, respectively. The proportion of publications in the top 10% and top 1% is 12.8 and 0.6%, respectively. Since the first exceeds the 10% value, this indicates that a greater than expected number of the unit's publications are amongst the best in the world for this field in the top 10% level journals. The bibliometric analysis shows a mean citation rate of 1.37, indicating that the unit's publications are cited above the world average by 37%. Their established website 'diabetesportalen' has reached 25,000 monthly visitors as of November 2013.

The EXODIAB teams are international leaders in diabetes research, particularly on the pathogenesis of type 2 diabetes and systems genetics. They have published breakthrough articles in the field, and the PIs of the project have been recognized internationally, as evidenced by several international awards and the increasing invitations to deliver keynote lectures in international meetings.

The Lund University Diabetes Centre is certainly one of the top three diabetes research centres in the world. This is due to the logical integration between basic and clinical research and an intelligent structure, leading to groundbreaking findings on different aspects of diabetes pathophysiology. The integration between the research centres in Lund and Uppsala in EXODIAB has had a clear added value, particularly via the biobanks with human islets of Langerhans developed in Uppsala. These two Universities bring complementary expertise, and their successful integration in the context of EXODIAB is a clear plus for diabetes research in Sweden and Europe in general. In short, EXODIAB is fostering research at the top international level, and it is to be expected that novel and very valuable findings will be generated by EXODIAB scientists in the coming years.

Utilization and benefits

The overall grading of utilization and benefits for EXODIAB in an international perspective *has developed with great satisfaction.*

EXODIAB is systematically addressing the unmet needs for diabetes management. They created the EXODIAB Human Tissue Lab, which provides national access to rare human tissues and have access to the unique clinical cohorts ANDIS and ANDIU. Furthermore, they have created a company, Diabridge, with the aim to mature EXODIAB projects with a commercial potential. A total of 12 immaterial property rights have been filed and 1 company founded (Diabridge). Diabridge is designed to mature the EXODIAB projects with commercial potential. The EXODIAB Human tissue lab is in progress to become a biobank of use by academia and industry.

The ANDIUS/ANDIU cohorts are being used to identify the various subgroups of diabetes and enable the development of personalized therapies. EXODIAB has developed an excellent website, providing information to both scientists and laypersons, and are engaging in a positive dialogue with key stakeholders.

The inclusion of innovation management in EXODIAB is allowing very fruitful interactions with potential industrial partners at all levels, from round table discussions to identify unmet needs of common interest to actual collaborative projects. The unit has participated in 267 activities (news articles, radio, TV) by the unit with the public since 2010. The unit has impacted policy in 3 ways: (1) establishing new recommendations for

food intake for diabetes patients, (2) for new Nordic guidelines in prevention of diabetes, and (3) for new procedures for organ donation and transplantation.

There is an important effort by EXODIAB to train MD/PhD students, able to drive forward top quality translational research. There were 11 PhD degrees awarded in 2013, similar to those at the start in 2010. In 2013, the Innovation Office at the Medical Faculty, Lund, created a new PhD course in Innovation, besides developing a very interesting series of seminars on the subject. There has also been a fruitful effort to improve and extend the training of scientists qualified in Bioinformatics, viewed as a key point for the success of the project, plus the development of an educational exchange program with the Broad Institute in Boston and a postgraduate course in diabetology.

Over 50 conferences were held, and it is noted that at least 30 visiting researchers came to the unit; it was also noted that established researchers coming to EXODIAB for sabbaticals.

Collaboration is effective on all dimensions

The overall grading of collaboration for EXODIAB in an international perspective *is effective in all dimensions*.

There is an excellent integration between Lund and Uppsala Universities in the project, which each providing complementary and crucial expertise, for instance in the preparation of human islets of top quality in Uppsala and use of this material for advanced omics studies in Lund. Lund and Uppsala Universities share responsibilities between Boards, with three meetings per year at alternating locations at the universities. Additional phone conferences are held at least monthly. The Human Tissue Lab was prioritized to include more tissues of relevance to diabetes (beyond islets). Clinical cohorts (named ANDIS/ANDIU) recruit new diabetics that are closely followed.

EXODIAB has functioned as a catalyst for new international collaborations, including several EC-funded projects, one IMI project directed by Prof. Leif Groop and the outstanding NIH-funded project TEDDY, led by Prof. Ake Lernmark.

EXODIAB has a clear plan on how to translate their findings via effective collaborations outside academia. This is driven by their newly created Innovation Office and Diabridge, created to mature EXODIAB projects with a commercial potential.

In 2013 there were 4 collaborations with other SRAs, 11 total since 2011 with research institutes. EXODIAB cites working groups with BioCARE, EpiHealth, MultiPark and StemTherapy.

There are 111 reportedly unique collaborations. The largest portion of these are in academia (~50%), up from ~30% in 2011. EXODIAB investments in biological infrastructures such as the Human Tissue lab and ANDIS/ANDIU have resulted in international interest, as exemplified by EXODIAB being approached for new scientific collaborations with EXODIAB members. Further, EU collaborations have yielded new funding, from the British Heart Foundation, Novo Nordisk Foundation and the Eur. Foundation for the Study of Diabetes.

Integration with education

The overall grading of integration with education for EXODIAB in an international perspective has *developed with internationally high standards.*

EXODIAB has a coherent and well-developed educational program, aiming at: 1. Stimulate formation of MDs/PhDs, capable of driving translational research; 2. Develop bioinformatics capabilities; 3. Stimulate innovation and application of research findings. These are important components for the success of the program, and they are been addressed by dedicated courses and series of seminars.

For the 2010–2013 period 47 PhD degrees were awarded. New courses were developed to provide training in Innovation, besides the establishment of an Innovation seminar series as well as an Advanced Study Group in Bioinformatics. Medical students are offered research opportunities in summer with EXODIAB researchers. The existing Master's program in bioinformatics at Lund has been strengthened by EXODIAB to incorporate diabetes in the program. An educational exchange program BLUE ScY builds exchanges with Harvard, Lund and Umea to facilitate learning and student/postdoc mobility.

Management

The overall grading of management of EXODIAB in an international perspective *is moving beyond set goals.*

EXODIAB has an excellent management of the research environment, facilitating integration between research teams and maximum utilization of top resources such as human islets in the tissue biobank. This enables a continuous and logical integration between, for instance, basic research findings in human islets and prospective studies in human cohorts. Of particular interest is the 'activity groups' put in place by the LUDC, which allows the rapid concentration of persons and resources on novel and path breaking research.

EXODIAB researchers have successfully garnered funding: 11 EU funded applications are cited, spanning the 2010–2013 timeframe for start dates. Two innovative medicine initiatives (IMI) are listed, joint projects between EU and pharmaceutical industry association. Two ERC grants are cited. Applications are being filed for Horizon 2020. Six additional grants to EXODIAB members are cited, from Novo Nordisk, Wallenberg academy fellowship, etc. In total, 21 awards are mentioned.

The recruitment of scientists to participate in EXODIAB is in line with the best international standards, and is based on international announcement of the positions and a careful evaluation process. Several young and talented scientists have been added to the group. Importantly, EXODIAB has in place a very good program for mentoring young scientists and for the broad training of young PIs, aiming to qualify them for the different aspects of leading a research group. Specifically, EXODIAB carefully and strategically selected young promising scholars at the new instructor or new professor (or more junior) levels as group leaders. Five are recognized as future research leaders now.

EXODIAB is doing a great effort to develop the required basic and clinical research to solve unmet needs in diabetes research. There is a clear interest in translate these findings to meet societal needs, and the rights tools to do this are now in place.

Of note, there was a leadership change, with now Erik Renstrom at the helm, taking over for Leif Groop who remains in the directive board of EXODIAB. There is a 12 member board that meets regularly to assess fiscal and developmental goals of the SRA. A researcher-owned company was formed and the Human Tissue bank developed, along with further accomplishments including joint grants and new collaborations with academia and with industry both nationally an internationally.

Evaluation Report for EffnatLu, LU (Biodiversity and Ecosystems services in a changing climate – BECC)

Research output

The overall grading of research output for EffnatLu in an international perspective is *on the frontline.*

The number (707 in three years) and quality of publications is impressive, with 14.1% in the top 10% and 1.6% in the top 1% according WoS. These papers address precisely the needs of society both internationally and in Sweden. The publications include development of mechanistic models for predicting climate change interactions with ecosystems, models for predicting climate change impacts on biogeochemical cycling, models and knowledge of species diversity and distributions with climate change, understanding of agriculture and forestry impacts on ecosystems, and evaluations of institutions and programs on public discourse on climate change. The number of book chapters (30) and journal articles (165) in the first year (165), and books (6 books after two years) is a rapid start, undoubtedly arising from earlier work that was the foundation of this research environment. Even though the applicants may be inflating their start-up productivity from this grant in the self-evaluation report, the steady increase in the number and quality of publications is impressive by international standards. Several publications in leading journals like Science, Nature, PNAS and Ecology Letters show the excellence achieved in this environment. The formation of a stakeholder panel to oversee and guide the research program provided a strong model for research impact. The development of a communication office has helped facilitate the translation of the science for the publics, which is exemplary as communication of science is often the biggest barrier to impact.

Utilization and benefits

The overall grading of utilization and benefits for EffnatLu in an international perspective has *developed with great satisfaction.*

The early establishment of a communications office and early integration of the research with teaching and policy were strong strategies for increasing the capacity to transfer of results for utilization. Stakeholders have been engaged from the outset of the program through the steering committee, Action Groups, workshops and communication of results vis a vis the publications, tools and models. There is evidence of engagement with business and society on the ground with agriculturalists and foresters, science and technology in industry, government and industrial sectors, and at the other end of the management hierarchy, with international bodies tasked at creating and implementing global agreements on the environment (e.g., Kyoto, IPCC, REDD, BD, LRTAP, EEA). The flow of information back to global institutions is good indicators of the relevance of the science to global change, its credibility, and its implementation at higher levels. There is a self-report 50% impact on current policy. The development of methods and tools for interfacing science with policy makers and stakeholder users is also excellent, and could be further evaluated for their effectiveness, and extended for the public. The development of a graduate training program that links LUND and GOTT, including the development of graduate courses focused on the themes and outcomes of this program, is excellent and expands the capacity to transfer to the world stage. The content of courses has been structured to increase awareness in students at the undergraduate and graduate levels.

The program is also highly engaged with society and business. The impact on business is more tangible and supported by historically strong relationships between academia and the fields of forestry and agriculture. The program has recruited and trained a large number of Masters and PhD students, and PDFs over the four year period. The attractiveness of the program to high quality students has been increased with the development of the joint research school (CLIMBEco), the development and teaching of cross-disciplinary and specialist courses for the graduate program by BECC researchers, and the inclusion of new research and communication skills in these courses. BECC scientists have also helped raise the profile of other existing environmental studies programs at Lund and GOTT through content and assistance with teaching. The students in the

programs also greatly benefit from research that is integrated with stakeholders, internships and mentoring programs that provide them with professional contacts and skills that other graduate programs would not get.

Collaboration

The overall grading of collaboration for EffnatLu in an international perspective has been *effective in several dimensions.*

The initial start-up issues can be considered standard for separate collaborating institutions, and the team is to be commended for establishing several strategies to overcome the difficulties, and foster excitement in the collaboration. These include establishment of strategic committees, a board with external experts, regular joint events like seminars and meetings, establishment of the research school, and establishment of research clusters that cross institutions. Moreover, the cross-institutional engagement in action groups that address national and international issues, and the participation in international agreements and committees like IPCC, have important visibility for the environment's international standing. There has been good collaboration with two other SRA environments, particularly MERGE and to a lesser extent e-Science SRA eSSENCE. The international collaboration has been excellent within the EU and with the scientists holding key positions or having communications with international committees like IPCC and REDD. The linkages with collaborators outside of the EU are not obvious, and this is an area that should be fostered since global change is a global problem. This is partially addressed by training a large component of international graduate students. Incentives could be developed to place staff with international collaborators on sabbaticals or early career development visits both in academia and in a policy environment. Engagement with the industry, management and policy institutions are particularly strong.

The case study, Managing Ecosystem Services for Sustainable Agriculture, stands out because of its strong cross-scale collaborations with a wide range of collaborators and end-users of the science from the local to the European level. Stakeholder engagement was strong with an advisory board to help direct the work planned and identify critical gaps. It involves development of modeling tools that provide quantitative feedbacks between policy and practices (management and land use patterns) and ecological processes for better resource management in agriculture. These are integrated with economic models for driving decision-making. This integration between science, resource management and the economy is crucial for managing ecosystem services and is missing or inadequate in most sectors. The strategic collaborations at practical and scientific levels from local to EU levels are important in making this an effective case study.

Integration with education

The overall grading of integration with education for EffnatLu in an international perspective has *developed with internationally high standards.*

There is clear evidence the environment is integrated at the Masters, PhD and Post-doctoral levels. This is fostered through development of the CLIMBEco school, development and teaching of courses by the environment's scientists, integration with existing courses, training programs and SRAs like MERGE, mentorship programs, and integration of student research with stakeholder groups. The initiative to offer staff in other departments awareness training on issues related to sustainability is good and will foster greater cross disciplinarily in teaching and research. The graduate students and PDFs appear to be placing inside and outside of Sweden with relevant end-users and in international positions or advancing their studies. Students are publishing their work in high impact journals, all indicators that the educational opportunities and resources meet high international standards.

Management

The overall grading of management for EffnatLu in an international perspective is *on target and developing with high standard.*

This is a very dynamic research environment that is at the forefront of addressing a wide variety of societal needs from a national to international level. The hallmarks of this program are excellent science, excellent

training, inter-disciplinarily and cross-collaborations from local to international levels. The program is well organized with a solid management framework and infrastructure for effective development, delivery and communication of the goals and products. The success of the program reflects excellent collaborations among the leader, scientific, steering and advisory committees. The program is also innovative and positive, providing opportunities for emergent fields from cross-disciplinary work involving traditional and novel tools and ideas. The opportunity for interactions nationally and internationally are high, provided by the research clusters, action groups, international committee membership, mentoring programs, and exchanges, including the Leopold Leadership opportunity. There is a clear recognition of the need to recruit strategically across a range of levels. The appointment of shared positions between the collaborative institutions shows real and meaningful commitment to collaboration and the organization has been very successful in attracting high quality researchers (14 PDFs), including 50% females, into a variety of positions.

Evaluation Report for EpiLu, LU (Epidemiology for Health: EpiHealth)

Research output

The overall grading of research output in an international perspective for EpiLu is *on the frontline.*

The publication output has been enormous: Numbers from the bibliometric study (2074) and their own number (2787) differ but are extremely high anyway. One asks why so many papers? The quality is over the world average but EpiKi has far better numbers regarding the citations and percentage of the papers in the top journals.

The fact that several of their papers have been published in the top-most journals attests to the scientific impact of the research environment. Important is also that the broad scope of EpiLu promotes inter-disciplinarity and this is reflected in their output. It should be however, noted that in the field of epidemiology it is usual to have joint publications of large consortia with tens of authors in the top journals and it is extremely difficult to pinpoint the contribution of individual scientists or groups to the work.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for EpiLu *has developed satisfactorily.*

The SRA has initiated several contacts with industry both with AstraZeneca and several SMEs. In addition they are in close contact with county councils in their region and in Stockholm. As examples from the societal sector the effects of advice from EpiHealth, based on data from the Medical Birth Register, has helped Stockholm´s County Council to revise its recommendation for induction of labor in pregnant women and mapping of environmental health hazards has been of importance to local county council authorities in Region Skåne. Thus, certain transfer of the results for utilization has taken place, and based on the existing contacts much more is expected to happen in the future.

The SRA is engaging stakeholders both in industry and in the public sector. They are also organizing EpiHealth symposia to stimulate exchange.

EpiLu is tackling important societal problems such as obesity, healthy food, diabetes type 2 and cardiovascular disease. So their potential impact on society could be huge. But because they have such widespread interests, it is not easy to assess how successful they are. It is probably too early anyway to see the results of their efforts in this respect and they remain to be seen.

The SRA is engaged through its members in educational programs in their host universities, but whether there is real added value through the SRA funding is not clear from the material presented. One gets the impression that the SRA funding was especially directed to start the Epi-Health cohort of 15 000 individuals including bio-banking and building infrastructure. Exchange of personnel between academia and industry has been limited.

Collaboration

The overall grading of collaboration in an international perspective for EpiLu *is effective in several dimensions.*

The two host universities are pooling their resources in epidemiology but how this is done is vaguely described. Activities like PhD retreats seem to be organized separately. However, their international standing is high because of the great advantages of doing epidemiology in Sweden with access to outstanding documentation of the Swedish population. The SRA collaborated most intensively with EXODIAB in the diabetes field that is highly valuable because of the common interest. Collaborations with other SRAs contacts are nurtured: ESSENCE and MULTIPARK. They are also using the infrastructure facilities of SciLife.

The SRA has fruitful collaborations with many different foreign universities that are leading in their field of research, attesting to their strong international standing. Danish-Swedish and further European networking are funded via the EU instruments. Their most intensive contact is with AstraZeneca and with local SMEs.

Contacts with AstraZeneca have led to a project on prevalence of knee symptoms in the population. The aim is to create an epidemiological basis to quantify unmet needs in the population.

The case study involves the relationship between genes, nutrition and the gut microbiota. There are several Swedish and international partners, forming a strong network. Food industry and biotech SMEs are also involved. The planned period for the project is 2010–2020. This is thus a long-term commitment with the final goal to have better and healthier food for public. The outcome so far would have been interesting to know better, but it is not well documented.

Integration with education

The overall grading of integration with education in an international perspective for EpiLu is *under satisfactory development.*

So far the education is integrated into the teaching programs of the 2 host universities. There is no documented integration of teaching between the 2 universities except an annual course for 'Advanced epidemiology' that has been organized and is alternating between LU and UU. There is also an annual conference for tutors and PhD students together. At LU there is a new research school for gerontology and healthy aging supported by EpiHealth.

Management

The overall grading of management in an international perspective for EpiLu is *developing with high standard.*

The organization of EpiLu is based on a steering committee with representatives from both Lund and Uppsala with a smaller Executive Committee. EpiHealth has since the beginning been led by Peter Nilsson as a coordinator and Marju Orho-Melander as a deputy. One measure of the success of the management has been the successful application for EU funding. This certainly contributes to the international standing of EpiLU.

An important recruitment was the hiring of a new professor in Lund for Medical Epidemiology. The further recruitments of two other professors in epidemiological methods have strengthened the academic infrastructure both in Lund and Uppsala. EpiLu is active in areas that meet real societal needs. But in reality there is such a large spread of activities that it is difficult to judge what has been achieved so far. One also has to consider that with 32 million for the whole funding period, there is not much funds for each project undertaken. Naturally most of the funding comes from elsewhere, and the SRA funding has been mainly used for starting the Epi-Health cohort including bio-banking, Also with the SRA funding infrastructure both at LU and UU has been improved. Both these targets are important to help meeting the societal needs.

Evaluation Report for KlimLu, LU (ModElling the Regional and Global Earth system (MERGE)

Research Output

The overall grading of research output for MERGE in an international perspective is *reaching international standards*.

The Strategic Research Area ModElling the Regional and Global Earth system (MERGE) is led by Lund University and involves five other higher education institutions (HEIs) and the Swedish Meteorological and Hydrological Institute (SMHI). It is focused on multidisciplinary climate modelling with the objective to incorporate the terrestrial biosphere as an important climate system component. MERGE has produced an impressive publication record of more than 400 journal articles, averaging 2.7 per year per full–-time equivalent investigator. These articles have above average impact, but the frequency of very high impact articles suggests that the research is not yet among the internationally elite.

Dynamic vegetation modelling, well known internationally, has been among the key results. The SRA has achieved the first regional Earth system model coupling a dynamic vegetation model with an atmospheric model and supported the inclusion of vegetation in the EC–-Earth model. Another significant impact is advancing the understanding and projection of the consequences of regional climate change on air quality.

MERGE gathers expertise in climate modelling, ecosystem modelling, atmospheric chemistry, paleoclimatology and mathematics, allowing the accounting of chemical compound emissions in both ecosystem models and atmospheric chemistry components of climate models. Collaboration with SMHI has allowed the SRA to be engaged in global climate modelling and enhance its contribution to regional climate modelling. Research output related to some of the more peripheral objectives, such as such coastal impacts related to waves, coastal currents and erosion, has been less substantial.

Utilization and benefits

The overall grading of utilization and benefits of MERGE has *developed with great satisfaction.*

The main strategic utilization bringing benefits to society relates to the use of global and regional climate models for mitigation of and adaptation to climate change. Beneficiaries include both national and international policy communities. MERGE has already been successful in transferring research results and is well organized to provide this expertise and has done so through contributions to Intergovernmental Panel on Climate Change assessments, collaboration with SMHI and policy support to the Ministry of Environment, for example in linking climate to air quality, the role of short-lived gas in mitigation policy, and effective land use and carbon sequestration management.

Stakeholder engagement is a very strong point for MERGE, which has an impressive outreach capacity and has catalyzed the formation of transdisciplinary groups at Lund University to address issues related to climate change, biodiversity and ecosystem services. MERGE has used ecosystem models to inform regional decisions on climate and air quality and has been flexible in addressing emerging issues, such as the consequences of emissions from expanded shipping allowed by the reduction of Arctic sea ice. Its collaboration with SMHI has been particularly important in the timely and effective application of its research on the regional and national scale. MERGE could be more engaged in regional assessments on the European scale, as well as in other regions of the world.

Through its Masters and PhD programs, MERGE has helped build expertise in Sweden, not only for research, but also for the workforce in the public and private sectors. 65% of its Masters students conducted their thesis research in collaboration with private companies or regional and town councils. The ClimBEco research school that has been implemented engages 30 students for two-year periods, helping to build a broader cadre of broadly trained experts in Sweden.

Collaboration

The overall grading of collaboration for MERGE in an international perspective is is *effective in several dimensions*.

MERGE inherently and effectively engages multiple disciplines (particularly ecology, climate science, physics, chemistry, geology and mathematics) in advancing regional and global climate system models that have particular strength in atmosphere-biosphere interactions. Collaboration is taking place across departments and institutes at Lund University and also across the HEIs and the SMHI. The SRA requires expertise in laboratory and field measurements, environmental processes and model development. Although challenging, the collaboration seems to be progressing effectively and should raise the international standing of the Swedish universities (particularly Lund University) and of climate modelling that incorporates ecosystem dynamics, in general. The link with paleoclimate studies remains limited but should become more important as models are applied to simulate or reconstruct past climates.

MERGE collaborates with other SRAs, but this collaboration could be strengthened, particularly with KlimSu (the Bert Bolin Climate Centre), in particular with regard to studies of past climates. International collaboration is very good, with 70% of publications with international co-authors. This collaboration is particularly strong within Europe and MERGE modelling of ecosystem processes has been incorporated in the EC-Earth climate model. Contributions to European programs dealing with the carbon cycle, aerosol measurements and air quality are also noteworthy.

Collaboration outside of academia rests strongly on the effective relationship with SMHI where in MERGE can contribute to global and regional model development that supports governmental decision-making. The regional model is already used to assess the impact of land use and vegetation changes on climate in the Arctic and in Africa and allows the SRA to influence climate change impact scenarios for Sweden. Global modelling including terrestrial biosphere feedbacks will contribute to the next IPCC assessment.

Integration with education

The overall grading of integration with education for MERGE in an international perspective has developed with *international high standards*.

Of the 54 individuals awarded PhD degrees within the general framework of MERGE, 18 of the recipients had degrees from universities outside of Sweden. The ClimBEco research school is a very thoughtful innovation that fosters trans-disciplinary knowledge on climate, ecosystems, policy and governance issues, with mentorship of 30 students for a two-year program. The SRA has transformed the University of Goteborg's international masters on atmospheric sciences to include interactions with the biosphere.

The transdisciplinary approaches to graduate education that incorporates effective public communication and the use of science in public policy development, are particularly impressive.

Management

The overall grading of management for MERGE in an international perspective is *on target and developing with high standard*.

The SRA seems well organized, with effective leadership by a Coordinator, who has long experience managing a governmental research institute, and an engaged board representing the participating fields and organizations. The SRA has contributed to initiating and co-funding eight academic positions. MERGE seems to be effective in recruiting participants, particularly students, internationally. The program is also mindful of and working to address the traditional gender imbalance. The recruitment of faculty understandably is left to the participating departments and institutes, but MERGE seems to have influenced this recruitment, with the outcome being building the critical mass in Earth system science.

Evaluation Report for NanoLu, LU (the Nanometer Structure Consortium at Lund university)

Research output

The overall grading of research output for NanoLu in an international perspective is *on the frontline*.

The publication record is very strong with a very high mean citation index of 1,91. The overall number of publications is lower than other SRAs reviewed, but the quality of publications is very high with 20% of publications in the top-ten percentile. The overall volume has increased while maintaining quality, with several publications in high visibility journals. The centre is very prestigious and has a long history of high-quality research. An example of its impact is the five ERC Grants won by nmC@LU researchers. Moreover, nmC@LU was recently selected to represent Swedish nanoscience at a U.S. showcase event at the Swedish Embassy in Washington. One of the particular strengths of the nmC@LU is semiconductor nanowires. They have been able to produce and utilize high quality samples with significant impact in growth techniques, realization of solar cells, fundamental nanostructure characterization and transport measurements including those targeting Majorana fermions, and sensors for neuroscience. The team gives many invited presentations, with 50 in 2013 – 11 of which were plenaries.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for NanoLU is *developed with great satisfaction*.

There are several mechanisms in place to facilitate and accelerate technology and knowledge transfer from nmC@LU to the research community, industry and society at large. The centre has established QuNano to manage internal IP and has seen a significant increase in the number of patents filed, with holdings of order 50 in 2013. Plans are underway to establish a nanowire foundry which would further promote technology transfer on a larger scale. To keep research topics current and of high-relevance to industry and society at large, there is an External Advisory Board with representatives from industry, policy-making and academia. Joint workshops are held with research groups which potentially could make use of the nanoscience development in Lund. Additionally, the centre engages in industrial collaborations to further fundamental science. The establishment of a large wing to consider safety issues of nanotechnology is another means to keep the societal needs at the forefront.

The centre is well integrated with the business sector with many applied developments in nanowire based solar cells and appliances for medicine under development. Its LNL facilities are used by 30 companies which used account for 20% of the user base for that facility. The centre also is engaged in humanitarian efforts to help developing countries with energy production, tropical disease identification via chip-level assays, and UV emitting diodes for water purification.

The Nanolab component trains of order 100 students annually. In terms of graduates, at the undergraduate level the majority have joined advanced degree programs. PhD recipients, 43 over the three year period from 2010–2013, are divided equally between academic and industrial careers. Internship programs are launched to enhance industry-academia interaction and knowledge transfer.

Collaboration

The overall grading of *Collaboration* in an international perspective for NanoLU is *effective in several dimensions*.

There are no co-applicants in this proposal, but the centre does interact with other SRAs at Lund that are focused on diabetes and cancer research. Additionally, the centre organizes a joint summer school with the Chalmers Nanoscience SRA and shares facilities with MatLiu. In the international domain, the centre collaborates at the individual level with many high profile scientists at Harvard, UCSB, and RIKEN to prioritize research directions and promote collaboration. Such partnerships also involve serving on each other's

respective advisory boards. The nmC@LU also leads several EU research programs including NWs4Light (LEDs), ABACUS (biocomputation), LAPASO (microfluidics ITN), PhD4Energy (IDP on sustainable energy) and EPITARGET (antieleptogenesis).

In contrast, the use of strategic collaborations outside academia is not effective so far. The centre selectively collaborates with industry to complement its core strength areas and on problems of fundamental scientific significance. For example, a major Japanese semiconductor company keeps three staff members at LU to maintain constant discussions. Despite these specific examples of lively interactions, the evidence for significant strategic collaboration and co-publishing outside academia is relatively scarce. There is little specific description of international collaboration outside academia.

The nanowire based solar cell development at Sol Voltaics is a study of a LU developed technology that is being nurtured by a spin-off company. It is an impressive result, with the high throughput development of efficient solar cells. However, it should be noted that the effort is more of an internal technology transfer effort rather than a partnership with a major industrial organization.

Integration with education

The overall grading of *Integration with Education* in an international perspective for NanoLU is *under satisfactorily development*.

The undergraduate programs are in transition towards the Bologna model, and will emphasize the multidisciplinary character of nanoscience and technology. The PhD education is well established, and works towards including industry internships. There are regular seminar and colloquia series, and seminars/events geared towards scientists in other fields, as well as events open to the general public. The nmC@LU centre holds talks for local organizations such as Rotary club branches. Elementary and high school level engagement is also present via supervision of capstone research projects such as PRAO and gemstone. Additionally, there are training events for high school teachers such as 'Nanoscience for teachers.' The centre is also converting its temporary contribution to the technical museum at Malmo into a permanent display.

Management

The overall grading of *Management* in an international perspective for NanoLU is *on target and developing with high standard.*

The top-level leadership of the SRA is undergoing generation change. The management structure includes both junior and senior faculty. The scientific and resource focus areas are coordinated by pairs of senior/junior faculty. A Scientific Advisory Board supports the long-term development of the SRA. The recruitment of MSc and PhD students are systematic and successfully targets international and female candidates. nmC@LU attracts a large number of applicants worldwide. The SRA has identified three research areas relevant for societal needs (Energy, Medical devices, and Developing countries). Activities are aligned and managed to meet societal needs in the form of cross-disciplinary workshops, fostering start-up culture, and organizing joint industry-academia meetings and internships.

Evaluation Report for NeuroLu, LU (Mulitidisciplinary research focused on Parkinson's disease – MultiPark)

Research output

The overall grading for research output of NeuroLu in an international perspective is *on the frontline.*

MultiPark is focused on a translational pathway for Parkinson's disease (PD) and related disorders, spanning from basic research to patient based research. Societal implementation of novel findings is a major aim. In addition, a pharmacological approach has been included recognising the unmet medical need for improved therapies for Parkinson's disease.

Although the programme is focused on one disease for the most part, the research is broad covering multiple aspects of the disease in terms of novel biologics and pharmaceuticals new approaches to enhance targeted drug delivery improved brain imaging protocols effective regenerative therapies for neurological diseases development, modelling and evaluation of clinical trials development of assessment instruments to follow outcomes.

The publication profile and scientific impact of the research environment are on the frontline. The principle investigators in this large research environment, most of whom are at Lund University, are highly productive. Many of their publications are in high impact journals and are highly cited. Some of their published work is pioneering including their work with stem cell transplantation and the publication (simultaneous with another US group) of the first evidence for cell-to-cell propagation of the protein alpha-synuclein in transplanted fetal dopamine neurons in postmortem Parkinson disease brains.

This group's research has clear implications and impact on understanding the main target disease, namely Parkinson's disease, and potentially developing new therapies. This impact is also evident in the economic development of the country and the region since several group members are involved in start-up biopharmaceutical companies, and the advancement of a drug that could ameliorate treatment complications in Parkinson's disease through a phase 2 clinical trial. The third impact is training the next generation of scientists. The senior members of this environment have a remarkable track record in this mission, and many of their trainees are now principle investigators within this environment.

Overall, this is an excellent team with significant high impact publications in the field and a long standing world class reputation in neuroscience. There is a mixed cohort of younger and more senior researchers.

Utilization and benefits

The overall grading for utilization and benefits for NeuroLu in an international perspective *has developed with great satisfaction.*

The societal benefits for patients are significant if further advances in Parkinson's can be obtained. A strong part of the programme is linking all the way to patient based health services research. New cell based therapies and drug based therapies will also bring commercial and economic benefits. The links to partner companies are clear and multiple existing links should ensure uptake of new advances. There is a good translational pathway already established and tested at Lund, and this programme will enable cross over between the communities within MultiPark.

Thus, the overall utilization and benefits in an international perspective is developed with great satisfaction. MultiPark appears committed to advancing their discoveries to the marketplace. The group has appointed an innovation officer, has recruited Roger Olsson who has experience in the pharmaceutical industry to help advance discoveries in the lab to drugs to be tested in clinical trials, and instituted an internal granting opportunity for emerging promising innovations. Many members of this group have industry collaborations and some are involved in spin-off companies. They have also several innovation grants in drug development, gene therapy, diagnostics, medical devices and research tools. Senior members of this environment also serve on governmental and industry advisory panels. Another major stakeholders in this environment are Parkinson

disease patient groups. MultiPark leadership has made a formal agreement with the Chairperson of the Swedish Parkinson's Foundation. The output of the state-of-the-art research is impacting the regional society and beyond. With efforts to develop new therapies and technologies, MultiPark is positioned to improve the quality of life for patients with Parkinson's disease and other neurodegenerative disorders while at the same time boosting the economic development of Sweden and the region.

Senior investigators in this group have trained a large number of highly qualified and creative young scientists. They are cognizant of assuring gender equality and diversity in their workforce with the majority of their postdoctoral fellows being recruited from other countries. This diversity among trainees and students foster sense of collaboration, simulates novel ideas, and opens up future employment opportunities internationally in academia and industry.

Collaboration

The overall grading for collaboration for NeuroLu in an international perspective is *effective in several dimensions*.

The programme consists predominantly of the research teams in Lund with one group in Gotenburg, The collaboration with Gotenburg is mainly based around the drug development aspects of the application. Olsen has a long standing career in the pharmaceutical industry researching new drugs for Parkinson's disease. He is currently an Adjunct Professor at Gotenburg with the purpose to accelerate drug development. As this partner only gets 3% of the budget and Lund gets 97%, this is a very minor part of the project. Beyond these two institutions, Lund has a significant number of international collaborations, and the community works across networks as a whole. The collaborations in many cases are longstanding with evidence of joint publications in the CV profile of PIs. The collaboration between co-applicant universities is effective in several dimensions with respect to the further advancement of the environment's international standing.

MultiPark has teamed up in joint educational and communications projects with four other SRAs, StemTherapy, BioCare, EXODIAB and EpiHealth. The Lund University Neuroscience Graduate School has a close collaboration with the graduate schools of the SRA StemTherapy, and four of the SRAs are partners of the newly formed national graduate school on ageing and health. An example of research collaboration among the SRAs is that the new infrastructure in drug-discovery built by MultiPark is open to cooperation across LU. Currently, out of eleven ongoing projects, 10 are from other SRAs.

MultiPark has increased the international visibility of individual researchers and facilitated the initiation of collaborations with top universities internationally. One major example is with stem cell therapy for PD, where a global alliance is established with other major centres in the US and Japan. Several MultiPark members have been involved as PIs in additional EU funded project consortia helping forge an extensive network of collaborations with research sites across Europe, involving preclinical, clinical and/or health scientists.

The use of strategic collaborations outside academia is best demonstrated with multiple collaborations with pharmaceutical companies and foundations. The strategic collaborations described in the case study demonstrate their effectiveness in all dimensions. It demonstrates the efforts of the senior investigator at MultiPark, Andres Bjorklund, in bringing together clinicians at Skane University Hospital as well as investigators at Bordeaux University and the Karolinska Hospital in Stockholm to test a new drug for a major treatment complication of the standard therapy of PD, known as L-dopa induced dyskinesia. This also involved a US biotech firm PsychoGenics. They report that clinical results are positive and are considering further larger clinical trial.

Integration with education

The overall grading of integration with education for NeuroLu in an international perspective *has developed with internationally high standards.*

The integration of the research environment with different levels of education is developed with internationally high standards. The Lund University Neuroscience program provides high quality preclinical and clinical training with a multidisciplinary approach. The program offers trainees at every level from

graduate students to postdoctoral fellow's exposure to a robust curriculum and highly engaging accomplished research scientists. The success of the alums from these programs is testament to the effectiveness of the teaching environment.

Management

The overall grading for management of the NeuroLu in an international perspective *is on target and developing with high standards.*

There is a clear management plan, which will provide the necessary leadership, and a Director with the available time to run the programme has been identified. MultiPark has experienced senior investigators and has in place a Board. In 2012 the leadership of the Board was changed due to the departure of Prof. Patrik Brundin. And now a woman Prof Susanne Iwarsson is the coordinator of the board. The group is managed effectively and has made a number of strategic decisions and instituted a number of educational and research alliances with other academic and industry partners to expand its research horizons and international standing. The recruitment of Roger Olsson, who has experience in the pharmaceutical industry, signifies a serious emphasis on the discovery and development of new therapies that would have all the benefits described above. MultiPark is on target to meet its goals in making every effort to advance our knowledge about Parkinson's disease and come up with better therapies. The group has in place the critical mass of productive investigators on site with far reaching collaborations and ties with industry as well as a strong training program that would collectively maximize the yield of their efforts.

What is less well defined is the justification of the funding and clear evidence that the additional support will add value. The money is to be used for new academic staff, some infrastructure and consumables but no clarification of any new programmes to bring integration between the translational groups is identified or how these new individuals will be managed within the programme. The concept is that more people will bring success for the programme, although there is funding identified for PhDs and some postdocs to support existing members. There is no breakdown of what the funding for Gothenburg will provide. This criticism is likely more related to the retrospective nature of this review process.

In summary, this is a very strong group of academics with an excellent international profile in a focused disease specific programme, which has the potential to translate new findings to the clinic. The consortia within MultiPark will grow Swedish research building on an existing strong profile. The project could, however, have benefited from a better description in detail of what extra funding will provide to add value above existing funding within the group.

Evaluation Report for PolregLu, LU (The Middle East in the Contemporary World – MECW)

Research output

The overall grading for MECW in an international perspective is *on the frontline*.

The centre focuses on a number of important social science research areas, including minorities, Islam, and at risk youth in Sweden; gender dynamics in the middle east and among minority communities in Sweden; democracy, political upheaval, and human rights in the Middle East. This is an innovative mix of areas, which is likely to spark new insights and understandings of the area. In addition, there are scientific areas such as hydrology and water quality and access in the region, which are very much on the cutting edge of inter-disciplinary, regional work. Researchers in MECW are active publishers, with particular strengths in peer reviewed journal articles over the past three years as well as a high number of Ph.D. and M.A. theses related to the depth of post-graduate educational projects they have developed at Lund. Cross disciplinary workshops are a significant source of publication as well. These include a workshop titled '48 hours of Syria' that led to a high number of peer reviewed scholarly publications and engaged many members of the Swedish community. Major publication projects include a special issue of the journal Middle East Critique, hosted at MECW, focused on 'water and societal development in the Middle East' and an issue of the Hydrological Sciences Journal focused on water and peace building in the Middle East. The MECW has been particularly successful at crossing the science/social science divide in this respect.

The impact can be measured by a wide readership of the centre-hosted journal, Middle East Critique, as well as a Palgrave book series supported by the centre. However, this is a very promising proposal in scientific terms. Overall, we feel that this proposal has been developed carefully by a strong team of scholars, and has been designed to pre-empt comments and criticisms.

Utilization and benefits

The overall grading of utilisation and benefits for MECW in an international perspective *has developed with great satisfaction.*

MECW has been extremely effective in drawing on and disseminating knowledge widely. They report hundreds of media interventions in 2012 and 2013, which is impressive by any standard in academia. This public dissemination and education has become such an important component of their work that they were compelled to hire a fulltime communication officer. As they say, several scholars at MECW 'are today household names in Sweden.' Some are known further afield. Another academia-society project sponsored by MECW is 'Women for Sustainable Growth,' which links women in and between Scandinavian and Gulf countries interested in business, trade, but also independent non-profit projects. These are crucial contributions, often overlooked by more traditional regionally oriented work.

Collaboration

The overall grading of collaboration for MECW in an international perspective is between *effective in several dimensions* and *effective in all dimensions* with a closer tendency to effective in all dimensions.

The stakeholder engagement should be seen as probably formative for much of this proposal, which draws on long-standing research agendas and areas of expertise that have engaged scholar-activists and their subject areas. Given the above, such research has the potential to have significant impact on Swedish and Middle Eastern societies, once its findings have been developed.

MECW has established active collaborations with a number of research organizations abroad, including the Oxford Middle East Studies Centre, the Gulf Research Centre, Zayed University in the UAE, the American University in Beirut, Oslo University, Jordan University, Ben Gurion University, Gotenburg University, and the University of Venice. They also host many established academics at Lund, including from the United

States. These collaborations have facilitated intellectual exchange in the 'north' as well as between the north and south, certainly with the Middle East, which is crucial for the integrity of an area studies program.

The MECW also collaborates with the Swedish Organization for Individual Relief, the Swedish Migration organization, and the Swedish State Department (two ambassadors have been associated with the centre). It also provisions legal advice for business and financial interests. There appear to be strong linkages as well with nonprofit and non-governmental projects in the Middle East and in Sweden. The Centre has institutionalized a number of projects that connect faculty and students with the 'field' and community and have instituted many internship opportunities in Sweden and in the Middle East. In addition, they have established much collaboration with NGOs and public authorities. During Almadelen Week, they arrange lectures, debates, and seminars with staff and scholars and collaborate with Swedish companies on water management in arid areas based on expertise in this area.

The case study project primarily relates to hydro solidarity in the Nile Basin and was undertaken in alliance with Oxford University, focusing on the impact of water insecurity. However, it was unclear what the outcomes of the case study were.

Integration with education

The overall grading of integration with education for MECW in an international *perspective has developed with internationally high standards.*

MECW is active at every level of education, in fact this is probably the most successful dimension of the organization and it aims to build its capacity further by advancing undergraduate educational opportunities and developing a Ph.D. Program. The Centre works with many institutional units, including the Executive MA of Business Administration program at Lund U.

Management

The overall grading for management of the MECW in an international perspective is *on target and developing with high standard.*

This is a dynamic and multi-dimensional centre. Among other things it is noticeable the degree to which Centre scholars collaborate with other units abroad and actively apply for research and project grants in and outside of Sweden. The Centre has also actively included graduate students in agenda-setting and activities of the Centre. MECW has built tenure track and full time staff positions in order to build capacity and meet existing needs, and plans to hire more young scholars, especially women, and build a Ph.D. program. Its management is appropriate for an academic research focused programme.

Evaluation Report for StamLu, LU (National Initiative on Stem Cells for Regenerativ Therapy)

Research output

The overall grading for research output in an international perspective for StamLu *is reaching international standards.*

The research activity at StamLu (STEMTHERAPY) measured by quantity of published reports has remained on a the same level during the past four years while the number of participating personnel has increased by about 50 percent during the same time period. It is difficult to determine whether this is an increase in collaborative outputs or a reduction in output per head without a list of publications. In general this is an actively publishing grouping who is contributing significantly to the literature.

The environment is engaged in three areas of investigations on stem cells aiming at development of regenerative therapy of 1) Diabetes 2) Stroke and 3) Hematological disorders. The most impressive contributions that also reach the highest impact are derived from the hematological field. If evaluated separately the output of the hematological stem cell research is in the international frontline. The research on neuronal stem cells has a long-lasting tradition in Lund and is continuously making significant impact on the field. The contributions to the internationally highly competitive diabetes stem cells research have so far not reached the sharpest cutting edge. It is not evident how the collaboration across to the materials group in Uppsala is progressing ass no separate University outputs are included.

The hematology field have described and characterized a novel stem cell regulator Cripto that maintains stem cells in the bone marrow niche. By using iPS cell technology and hematopoietic assays a previously unknown epigenetic drift that could be reversed was discovered during ageing of hematopoietic stem cell. A novel druggable target for *ex vivo* stem cell expansion has also been described.

Researchers of the stroke field demonstrated that human skin-derived iPS xenotransplanted to rat brain did not form tumors but displayed extended in situ survival and differentiated into neuronal cells that formed synaptic contacts with the surrounding neural tissue. This is a promising new observation that may gain therapeutic applications. In the diabetes field the transcriptional regulation of beta-cell differentiation has been elucidated. The technology for synthetic chambers to facilitate survival of beta cell implants has been further developed but little data is given of advances beyond the current state of the art

Utilization and benefits

The overall grading for utilization and benefits in an international perspective for StamLu *has developed satisfactorily*.

With exception for hematopoietic stem cell therapy the clinical applications of therapy with neural and islet stem cells are still on an experimental stage. The development of the iPS technology as a core facility is laudable like the established collaboration with a US based company aiming at generation of therapeutically hematopoietic stem cells from iPS cells. The environment also supports a publicly available home page offering constantly updated information about the achievement ad activities in the field of stem cells and stem cell related-therapy indented for the large public. The PIs of the environment show alert awareness of the international development in the field and they have demonstrated flexibility in modifying the research strategy based on latest discoveries. A report by Huttner et al. that showed absent regeneration of cortical neurons in post stroke human brain changed the research direction to generate in vitro neurons for transplantation aimed at compensate for lost neural functions in stroke patients. The expanding demand for hematopoietic stem cell therapy has also guided the focus on characterization of molecules that stimulate ex vivo expansion of stem cells from cord blood with the ultimate goal to generate sufficient functional stem cells for replacement therapy of haematological malignancies.

In general though it is not clear how the new initiative has driven the research beyond a research driven path – there has been no investment in new initiatives into stakeholder programmes or end user groups.

The establishment of high-tech platform for generation of iPS cells reduces the need for human embryonic stem cells, and provides a good link to societal issues such as ethics. An example is the advanced protocol for differentiation of human iPS to hematopoietic progenitors has been further developed and converted to a commercial product in collaboration with Primotigin Biosciences in Wisconsin US. A group from the environment is involved in a company that develops devices for fractionation and analyses of cells based on acoustopheresis.

Groups from the Uppsala branch are involved in collaboration with companies like SOBI, Tikomed Corline and have been developing hyaluronan-based therapeutic materials for treatment of i.e. osteoarthritis. This has been a long term project with significant commercialisation. The interactions with these commercial ventures are not clear. The Lund environment is excellent with a significant group of early career researchers who are benefiting from the programme. Also the platforms will generate trained personnel in new technologies such as iPS and biomaterials.

Collaboration

The overall grading for Collaboration in an international perspective for StamLu *is effective in several dimensions.*

The original research proposal was made jointly between Lund's and Uppsala universities with Lund in the driver's seat. Uppsala is actively contributing to the diabetes field with long-standing expertise in isolation, culturing and transplantation of islets and beta cells in a translational setting. The UU team has also been active in developing encapsulation technology aiming at prolongation of the survival of engrafted cells/tissue. This competence combined with the extensive knowledge in Lund about regulation of stem cell differentiation of pancreatic progenitors provides an optimal setup for ground-breaking contributions to the field.

Four other SRA environments are listed in the self-assessment however without more detailed information about the extent of collaboration. It is not mentioned whether there is on-going collaboration or merely ad hoc contacts. This point can therefore not be reliably evaluated. There are no details of any outputs from any collaboration. STEMTHERAPY groups are involved in active collaboration with leading scientific organizations like Stanford University, the Weizmann Institute, and Oxford University. On-going scientific collaborations with EU-based consorts and networks is also listed but details about the extent of the activity are not given. There are eleven EU FP7 consortia with different stem-cell profiles that include Stem Therapy PIs. The STEMTHERAPY PIs have demonstrated creditable ability to attract highly competitive EU funding.

National collaboration includes the University Hospital and regional health organization (Region Skåne) In addition to the domestic companies mentioned above active international non-academia collaboration include NsGene InC NY involved development of encapsulated cell biodelivery, Primorigen Biosciences Inc. Wisconsin USA on protocols for differentiation of human stem cells to hematopoietic progenitor cells, the STEMTHERAPY founded AcuSort and Novo Nordisk for generation of beta-cells for transplantation

The presented story describes optimal transfer of results from basic research to a commercial environment. Despite a long geographical distance separating the two activities productive collaboration can be maintained with current Skype communication. The collaboration also includes an educational dimension with training of PhD students/post-docs.

Integration with education

The overall grading for Integration with education in an international perspective for StamLu *has developed with internationally high standards.*

STEMTHERAPY has together with the HematoLinne' research environment co-funded and manages The Lund Research School in Stem Cell Biology. StemLu is engaged in scientific education of PhD students and post-docs and also providing leadership courses for young PIs. The Uppsala-based branch of StemLu has also arranged courses in regenerative medicine and biomaterials together with the local Faculties of Medicine and Natural Sciences.

Recruitment of PhD students and post-docs are selected by external reviewing of applications obtained by international announcements. Resources have been allocated to support six (50%) PhD scholarships. This will undoubtedly increase both domestic and international attractiveness of the positions.

Many of the PhDs and post docs who have receive their training at Lund Research Scholl in Stem cell Biology have made successful careers both in academia and in the private sector as scientists in the pharmaceutical industry and in hospital environments.

Management

The overall grading for Management in an international perspective for StamLu *is on target and developing with high standard.*

STEMTHERAPY is continuously interacting with the SAB that includes world-leading scientists in their field. The practical every day management and implementation of strategic decisions is handed by a small administrative group of five persons. The PI group forms the decision-making body with responsibility for budgetary and strategic decisions. Newly recruited PIs are also immediately incorporated in the decision-making body. The environment has developed and maintains of strategically important core facilities that offers technical service and methodology at the cutting edge. Scientifically trained and dedicated personnel at PhD level that will ensure the quality of the offered service run these platforms.

The emerging picture is a well-organized and efficient environment. The environment has been successful in strategic recruitment of several internationally prominent researchers who will strengthen the competence and add diversification to the knowledge. Following recommendations by the SAB STEMTHERAPY also recruited a specialist in bioinformatics with extensive experience in analysing stem cell data. The overall successful recruitments reflect a scientific attractiveness of the environment. There has been number of early career researchers maintained at Lund or Uppsala through this programme.

The environment focuses on three major health problems, stroke, and diabetes a haematological disorder with the ultimate goal to develop novel diagnostic and therapeutic technology.

STEMTHERPY is actively promoting interaction between basic scientist and clinicians to facilitate translation of novel findings to practical medicine a thereby narrowing the gap between bench and bedside.

The environment has also been successful in educating researcher for the needs in different areas, academia, industry and health care.

Evaluation Report for ITKKth, KTH (ICT – the next generation)

Research output

The overall grading of research output for ITKKth in an international perspective is *reaching international standards*.

The publication numbers as reported in the self-evaluation are quite impressive. The environment has generated several award-winning papers at excellent international conferences. The bibliometric analysis shows that publications in total are slightly cited above average, the proportion of top 10% publication is at 6, 1% below average, but the proportion of top 1% publications is at 1, 2% way above average. Also the publications based on international collaborations are with 66% quite high. This SRA gathers a number of frontline researchers, highly visible internationally. Finally, one should insist that comments regarding this sort of indexes should be taken with care. One can say that the Kista cluster to which KTH participates is one of the most visible centres of gravity of telecom industry research in EU. The heading of EIT ICT Labs is a manifestation of this.

Utilization and benefits

The overall grading of utilization and benefits for ITKKth in an international perspective *has developed satisfactorily*.

Utilization of methods, good services and processes was in total 7 in 2010, 2 in 2011, 0 in 2012, and 4 in 2013. So this aspect was actually strongest at the beginning of the funding period. Only one Spin-off Company was initiated in 2013. The number of applications for immaterial property rights has increased over the years (0, 0, 1, and 7). There have been several organizations that have been impacted by the research in the environment (0, 1, 3,3). Also the activities aimed at impacting policy have significantly increased in 2012 and 2013. Two of the co-applicants (Acreo, SICS) are partly owned by industry which supports transferring research to practical use. Through well-established interactions with ICT Labs of EIT and company collaborations with industry (Spotify, Skype, Ericsson, ABB, Scania) the transfer of research knowledge to industry seems well designed. This SRA and more generally Kista provides an outstanding background to Ericsson as a major company in the sector. This synergy is certainly at the frontline.

On the negative side, there are very few spinoff companies reported. This may be the manifestation that collaboration is Ericsson focused.

A small number of people from industry and other organizations (1, 0, 2, 5) have been involved. One would expect that over the years researchers from the environment would move to industry and would be employed there. The follow-up document, item 8, gives zero for all the years 2010 to 2013. The self-evaluation document states that more than 100 PhD students have graduated from ICT TNG, with about 2/3 moving to industry or institutes. Remarkably 1/3 has academic positions. ICT TNG is engaging in outreach activities to the public (e.g., one-week open event at the Swedish National Museum). Industry collaborations are substantial for ICT TNG (total annual competitive external funding for the involved universities is approximately 60%, mostly EU projects).

On the negative side, there is no mentioning of the current move of the telecom sector toward cloud technology, both as a service offered to customers and as a technology for network and service management itself. This may reflect the lack of strategic vision building by the SRA, as a managing entity.

There has been a significant jump in 2013 in the number of doctoral and licentiate degrees. Over 100 PhD students graduated from ICT TNG so far. Several researchers of the environment have received ERC Starting and Consolidation Grants. ICT TNG is the largest Swedish environment for education in computer science, electrical engineering and information technology. Approximately 75 % of PhD students and most of PostDocs are from abroad. The EIT ICT Labs is a master tool in building qualified personnel and knowledge at the frontline of research.

Collaboration

The overall grading of collaboration for ITKKth in an international perspective is *effective in all dimensions.*

ITKKth has mechanisms to share recruited faculties through time-sharing and short-term mini-sabbatical leaves and created adjunct faculty positions. A mobility program between SICS/ACREO and KTH school of ICT has been put in place. There are a sizable number of joint papers between the co-applicants; this number has strongly increased over the years. For example, the longstanding collaboration between SICS and KTH has been strengthened through ICT TNG, with a strategic MoU in place. There are joint positions between the co-applicants at all hierarchy levels. A particularly strong point is the effort in developing and leading EIT ICT Labs.

There are common people participating to more than one SRA in the panel we reviewed. This, of course, facilitates the cross-fertilization. However, any particular effort is not reported through collaboration with a particular SRA.

There have been 11 visiting researchers and 5 research visits in 2013. Considering that in the environment there are 193 people participating, this means that about one out of 40 has done a research visit and there was a visiting researcher for about 18 participating members. This is good but not excellent. Nine conferences have been organized, which is on the same level as 2012 but lower than 2010 and 2011. There is a strategy to increase the faculty by also including EIT ICT-Labs as partners to share researchers. The ICT TNG involvement in the ICT-Labs provides a network of international collaboration with industry and academia. There is also an ICT Labs graduate school in place. Joint publications with many well-known international institutions have increased. The ICT TNG environment has been involved in 256 EU projects, where currently ICT TNG faculty members currently coordinate 12 EU projects. Probably the most outstanding fact is that the EIT ICT Labs effort strengthens the ties with the international community significantly.

There has been a large variation in the number of collaborative partners over the years (2011:7, 2012:27, 2013:9) with a peak in 2012 (including academia as well though). In 2013 an internship program with Ericsson, ABB, TeliaSonera and Scania has been established. There are also ongoing collaborations with SME's and startups. The total annual competitive external funding for the participating universities has significantly increased. To summarize, the industrial impact is excellent, except regarding spinoff companies.

Regarding the case study, ICT TNG is a key partner in METIS, an integrated project co-funded by the European Union. It is a large consortium of 29 partners coordinated by Ericsson Research. This case study is strong. But it rather looks like a collective continuing effort, for which the added value of the SRA in itself is not at all obvious.

Integration with education

The overall grading of integration with education for ITKKth in an international perspective is *developed with internationally high standards.*

There have been some clients (0, 2, 2, 1) for which contract education was performed. A new arena-oriented graduate school has been developed by the four co-applicants. PhD students are involved in the focus and industry projects. The environment has also been involved in the graduate program of ICT-Labs at the European Institute of Innovation and Technology (EIT). Another positive example is the ‘SRA TNG accelerated career workshop’ organized in 2013. All ICT TNG faculty members contribute to the supervision of PhD and MSc students. More than 300 PhD students are currently trained within the environment. Distance-based MSc programs have been launched and various courses on the environment's research topic launched.

Again, the main driver here is the EIT ICT Labs, a program that has strongest impact on education. Besides this, the development of teaching programs is at a very good level. but there is no mention of MOOCs being developed.

Management

The overall grading of management for ITKKth in an international perspective is *on target and developing with high standard.*

The management seems very classical, mostly aiming at distributing resources allocated to the SRA through adequate committees. This seems well done and the management team seems very committed. There is not any noticeable innovation in the way the SRA is managed, however. In fact, innovation in management is rather developed in the EIT ICT Labs.

There are several positive aspects in the recruiting policy: positions are driven by renewal and by going into new areas; faculty positions are for 'rising stars' (15 have been recruited) or in the form of startup grants; the research areas of the positions are loosely connected to the focus projects; the positions have been widely announced. Recruitments are also linked to the KTH tenure track program.

Evaluation Report for ProdKth, KTH (XPRES-initiative for excellence in production research)

Research output

The overall grading of research output for ProdKTH in an international perspective is *reaching international standards.*

The publication profile is ramping up with a good mix of journal and conference papers, conference papers allowing rapid exposure and discussion and an increase in the effort on journal papers reflecting international trends which are increasingly focusing on high impact journals and citations rather than solely on publication output numbers. The XPRES output is realistic and importantly the most significant publications can be reached via its website. This output however is not yet of international standards at less than 1 journal paper per researcher per year, but this is likely to be constrained by the requirement for confidentiality associated with some of the work with industry.

All research topics are relevant and important. It remains difficult, however, to recognize an overall architecture or focus which connects the 4 different sub-domains of XPRES of sustainable manufacturing, ICT-enabled intelligent manufacturing, high performance manufacturing and exploitation of new materials through manufacturing. The scientific impact, therefore, could be higher – XPRES should consider where it will be demonstrably *internationally leading* in the future. This is reflected by the disappointing numerical data on impact highlighting that there should be more focus on intellectual property for instance. However it is clear that XPRES has close relations with industry and has good technology transfer both via product and process technology and by people transfer.

Utilization and benefits

The overall grading of utilization and benefits for ProdKTH in an international perspective *has developed satisfactorily*.

The capacity in the partnership and researchers to transfer research results for use exists and has been raised steadily. The net outcome, however, has been low as shown by the data (perhaps because of the manner of reporting) and is disappointing! The XPRES partners do have a real potential to reach out to industry, science and society – and there are highlights presented such as the SENSEAIR alcohol sensor and the transfer of MDH faculty to Volvo. Also the additional collaborative research income reported by XPRES – for instance the FFI and EU funding – is unlikely to be secured by those who are not capable of results transfer. There is potential for a higher level of achievement driven by a deeper and more local determination of specific needs, this could be transformative.

Perhaps significantly the thrust of XPRES predominantly reflects the strategy and topics of the European FoF initiative. The documentation does not give evidence as yet that additional efforts within Sweden industry have delivered detailed problem formulation and implementation plans to address specific Swedish needs over and above the analysis of EFFRA. Examples like SENSEAIR, however, are promising and show potential for further opportunities which should be strongly encouraged. The manner of reporting does give confidence that there has been stakeholder involvement in environment in problem formulation and implementation direction, in particular the change in the topic of Focus Area 3. There have also been a number of changes in responsibility for the industry interface – this highlights that while there may have been issues with this, the team is working to get it right.

The research environment has an emphasis on working with some key industrial and business partners as well as a broader community and therefore showing an impact on business and society. There is clearly a good innovation network with partners such as Scania, Volvo and Sandvik. XPRRS is also working on societal issues and seeking societal impact – e.g. alcohol sensing using SenseAir– and including where the production engineering community can contribute to making healthcare delivery more efficient. It is less clear whether similar successes yet exist for sustainable manufacturing,

The environment has a capacity to provide qualified personnel and research based knowledge. The interest of industrial companies in internal PhD programs with XPRES personnel is evidence of its success. Given the Government support this has high potential. Further there is some evidence of employability of XPRES people externally and the engagement of more than 70 'outsiders' in XPRES research is good and gives good opportunities for knowledge transfer.

Collaboration

The overall grading of collaboration for ProdKTH in an international perspective *is effective in several dimensions.*

Collaboration between the co-applicants is sound. The institutions are to be working hard on collaboration and this is structured so that each collaborator is building on its strengths. There are also a high number of Category 2 collaborations. The SWEREA collaboration seems to 'glue' things together well.

No specific project level interactions with the other production SRA are apparent from the documentation – disappointingly the relation to the Gothenburg project is 'complementary' rather than leveraged. The most significant area in which the production engineering SRA's seem to be collaborating and working together is in national production research strategy and PhD programs in 'Produktion 2030'. This is an important activity and is to be encouraged especially to define Swedish specific drivers and the consequent actions. There appears to be no comment about working with SRA's outside production.

International collaboration is good. There are well established international collaborations via CIRP (International Academy of Production Research). Also PHD student exchange is in place with several international institutes / universities which should be built upon. XPRES is getting good traction with respect to EU funding and the output of projects (for instance the IDEAS project), and is also working strategically in significant areas (EFFRA, EMIRA, the EU Learning Factory and the KIC) which will have long term benefit both with respect to standing and further income. The FhG initiative being explored is significant. There are opportunities to improve international connections (e.g. in Denmark and Germany) to other centres of excellence in those fields.

A number of mechanisms have been established for strategic collaborations outside academia in particular with industry: there are regular workshops and steering meetings with the industrial partners within the consortium, specific interactions have been established via European proposals and projects as well as specific demonstrator activities are in place. The impression given by the documentation is that XPRES has a number of good and strategic industrial and other user collaborations that are being used pragmatically to both drive the work and get utility from the work (however recall that the data does not yet show the outcomes of this). No specific public affairs or public engagement activities have been reported – this is a gap from the international perspective.

The case study collaboration reported is with a good group of partners and addresses a real industry driven problem/opportunity for industry building on previous track record. It also shows strong evidence of additional funding via the FFI Programme. More effort could have been made on the presentation of the case study to be clearer about the sustainable manufacturing achievements.

Integration with education

The overall grading of integration with education for ProdKTH in an international perspective *is under satisfactory development.*

There is good evidence that XPRES is working hard and successfully at the education interface. XPRES projects influence the set-up of new undergraduate/masters level class/course content. Course improvements have made in the areas of sustainability in manufacturing and in 3D digital modeling. At the postgraduate level there is the significant 27MSEK Innofacture industrial PhD program and instances of PhD student development by a Doctoral Seminar course. An XPRES junior academy has been established and there is an interface to the EU Learning Factory. There are however gaps, No specific elements have been introduced yet with relation to blended learning, e-learning and/or international project learning (for example like the program 'Global

Production Engineering' steered from Germany). Adjustments to the PHD program have been reviewed with the Royal Swedish Academy of Engineering Science in order to address shortcomings in the number of PhD students and actions put in place defined to deal with them.

Management

The overall grading of management for ProdKTH in an international *is on target and developing with high standard.*

An appropriate governance structure has been established and is running. This encompasses the executive committee (responsible for strategic development), the management board (responsible for the 1 – 3 years plans and delivery), the international scientific reference group (to establish and grow international connections and to guide XPRES) and the industrial reference group. The detail of reporting and comments help give confidence that the SRA is being actively managed and thinking hard about its direction and utility demonstrating this by some of the changes it has made since starting. There seems to have also been some careful review and thinking in 2013. Corrective actions at all levels are active and seem to be working. In addition an operational PULSE meeting has been established on a weekly basis. It is not however clear how industry has a role in project choice. XPRES is workmanlike and professional with both a clear industry focus and the courage to move into new areas. XPRES is clearly becoming of international standing – it should perhaps reflect on those areas in which it might seek international leadership to Swedish benefit. Hiring seems to have had its ups and downs but national and international recruiting is effectively executed and the SRA seems focused on addressing issues. No examples, however, are given of how the search for candidates is carried out or what advertisements look like. There are a number of female faculty involved (~20%) and a number of female PhD's graduated, particularly in 2013, but gender mix must remain a focus of attention.

With respect to the management of the environment and its match to societal needs, there are well established connections to industrial companies and to academics nationally. The SRA is focused primarily on industry and is increasingly focusing on other societally important areas including healthcare delivery and alcohol related issues. It remains unclear, however, if and to what extent efforts have been made in public affairs/public engagement and in particular the stimulation of young learners. This is increasingly important internationally.

Evaluation Report for TransKth, KTH (TRENoP, Transport Research Environment with Novel Perspectives)

Research output

The overall grading of research output in an international perspective for TransKth is *reaching international standards.*

The bibliographic analysis of TRENoP points towards a substantial number of publications that are also well cited and hence, well received in the international research environment.

Utilization and benefits

The overall grading of utilization and benefits for TransKth in an international perspective has *developed satisfactorily.*

Stakeholder engagement in problem formulation and implementation, and the impact on society or business of the research have developed with great satisfaction, the capacity to transfer research results for utilization, and the environment's capacity to provide qualified personnel or research-based knowledge less so.

The research seems to be utilised extensively by policy-makers and has in fact influenced important decisions – from setting the prices for congestion charges to applying the research to the design of the Stockholm metro etc. There are clear societal benefits of the research and its application.

The outreach to business is less clear. There are some initiatives in this regard, e.g. a link to Scania, or the Volvo Foundation) but there is no listing of any entrepreneurial activities, patents, spin-offs, or resultant product/service developments. A substantial number of industry experts have been employed by TRENoP in the earlier years of the project, though not later. Overall, there is no clear definition and overall target by which means TRENoP wants to measure its impact.

There is little insight in the self-evaluation as for how exactly stakeholder engagement has been organised. The case indicates a good level of involvement of TRENoP researchers in policy-making and TRENoP researchers are members in a vast number of national and international research fori, centres, and platforms, yet there is no systematic approach to stakeholders with respect to cluster management. Listings of media coverage, conference organisation or even seminars are not provided.

At the same time, TRENoP has attracted substantial funding for the SRA also beyond the project, which is a good indicator for the success of the project. In this light it is worrying that employment levels as well as outputs in terms of PhDs dropped significantly towards the end of the project.

Collaboration

The overall grading of collaboration for TransKth in an international perspective is *effective in several dimensions.*

With respect to the further advancement of the environment's international standing, the collaboration between co-applicant universities, other SRAs and international collaboration are effective in several dimensions. The use of strategic collaborations outside academia, and the strategic collaborations described in the case study are effective in several if not all dimensions.

The collaboration with the co-applicant focuses on the area of city logistics, smart cities, and smart transportation. It would have been good to see a list of joint publications to support this argument. Joint employments and degree programmes could have further supported the integration of these research environments.

Collaboration with other research units, nationally, with other SRAs, and internationally, is better developed. There are some links to the Chalmers SRA and hints about links to energy and ICT SRAs, though specifics are not provided.

TRENoP researchers have succeeded to establish a wider EU network, which they also capitalised on in joint EU applications. TRENoP is also represented at the European Road Transport Research Advisory Council. Mechanisms of collaboration are established based on journal papers, lab visits and lab work as well as on international standards and projects. It remains unclear where TRENoP claims a leadership in. Many activities were successful in establishing exchange of researchers on the international level.

The case of the Stockholm metro is of role model character for the foresight, the extent of influence, and the ongoing support of TRENoP. The case describes the collaboration network and processes in designing the expansion of the Stockholm metro. The SRA has been very successful in getting involved in these processes and has been able to use the process in education as well as research-related activities.

Integration with education

The overall grading of integration with education for TransKth in an international perspective is *under satisfactorily development.*

The partners associated with TRENoP in general do play a major role in education which results in many master theses, for example. In addition, specific new elements such as like iTRUE or C-campus have been introduced with the help of TRENoP. Interesting elements are also LiU's co-ordinating role in the Postgraduate School in Intelligent Transport Systems and the interdisciplinary master's programmes in Russia and Ukraine.

The reported TRENoP numbers of doctoral and licentiate degrees, however, are rather low, and it is worrying that they are decreasing towards the end of the project.

Management

The overall grading of management for TransKth is *on target and developing with high standard.*

A management system has been established based on the Principal Coordinator (PC) who is responsible to ensure the implementation of the research program and structure and a ten member Management Group which is responsible to steer the operation. There exist also linkages and interactions to other university leadership teams. Other management boards or architecture forums do not exist. There exists a mechanism to dynamically modify the management board membership. The focus in terms of management is on developing the leadership skills of academics (at KTH), and on supporting women's careers (at LiU).

Recruitment mechanisms had to be specially devised for TRENoP to meet the high demand of researchers. This was obviously successful in the beginning of the project when it comes to faculty positions. On the other hand, graduation statistics point towards a shortage of PhD students.

The major core elements of TRENoP's strategy to ensure the environment's capacity to meet societal needs are multimodality and multiscale. TRENoP leans on the core partnership of KTH with SCANIA in terms of road mapping. The new ownership of SCANIA as part of the Volkswagen Group and a higher degree of diversity should motivate TRENoP to expand their core partnerships towards international partnerships. TRENoP has a good outreach to other communities, research centres, boards of companies, and policy-makers, altogether contributing to its potential to meet societal needs.

Evaluation Report for EvetKth, KTH (Swedish e-Science Research Centre, SeRC)

Research output

The overall grading of research output for EvetKth in an international perspective is between *reaching international standards* and *on the frontline* with a tendency closer to *on the front line*.

SeRC provides capabilities for a wide collection of strong scientist across many disciplines. The publication activity is at a high and rising level. There are several high-impact publications, and in general the work appears in leading journals and attracts a good number of citations. However, it should be checked, how researchers can publish such a high number of journal papers: 142 involved research staff – the no. of part time researchers are unclear – deliver 282 journal papers in the first year (!) which usually take 12 – 18 months from final paper acceptance until official publishing.

Major contributions have been realized in the fields of bioinformatics, fluid dynamic and climate control as well as in brain computing. The impact is generally very high when judged by scientific-domain-specific criteria. From the viewpoint of providing capabilities and methodologies for computational approaches to various scientific problems, the impact could be further enhanced by closer collaboration with eSSENCE, the other SRA in the area of e-science.

The research project SeRC fully meets the high expectations in transforming the new e-science methodologies into tangible solutions within the application field of natural science, life science, climate control and engineering business in industry.

Utilization and benefits

The overall grading of utilization and benefits for EvetKth in an international perspective *has developed satisfactorily*.

SeRC provides excellent capabilities and resources for computational scientists, who in turn are able to do transfer research results for wide utilization in the society, industries, and in other scientific domains. However, the existing influence of SeRC (compare the high no. of activities (media, conferences etc.) should be used more industry application oriented and targeted. There exist an intense cooperation and publication mechanisms between SeRC researchers and industrial companies. Nevertheless, it remains unclear how much of the researched topics and solutions have already now potential for industrial and societal implementations (a more thorough review might be desired).

Also the existing networks of the SeRC partners have been actively used for prioritization and for driving specific solution developments. Also the annual SeRC meetings did incorporate strong industry input.

It is clear that SeRC has very positively contributed to the training of computationally literate personnel to Sweden, and that it has had an important role in strengthening the knowledge base required for building the digital society.

The SeRC project has demonstrated that e-science methods do have an impact on exploring and developing new and better solutions for society and industry. SeRC has potential, however, to further intensify the contact with non-digital expert groups of the Swedish society.

Collaboration

The overall grading of collaboration for EvetKth in an international perspective is between *effective in several dimensions* and *effective in all dimensions* with a tendency closer to 'effective in several dimensions'.

The four participating universities have smooth and forward-looking collaboration. Collaboration with the other academic partners could be well established, however, the highest number exist on open activities without project character. There exists room for improvements on that side.

Many of the scientific domains have excellent international networks and collaborations. SERC researchers are involved in some of the most ambitious international collaborations, such as the EU Flagship Projects

(Graphene, Human Brain) and they actively use a wide network with collaborations throughout the world, incl. a number of top ranking universities like e.g. in the US, in Germany and in Japan. SeRC could also win a number of EU project funds and is active in conducting international conferences like the IEEE on e-science in 2011 (together with eSSENCE). However, from the e-science point of view one can perhaps see some deficiencies, for example in the relatively limited role given to data-intensive methodologies and resources (machine learning, data analytics etc.)

According to the reported answers collaboration with the other academic partners could be well established (examples are the set-up of a formal research centre with KTH as the host with an international well known expert, Prof. Morton Daelen from Oslo). A high number of collaborations exist with academia, however, the highest number exist on open activities without project character. There exists room for improvements on that side.

Further synergy benefits could be gained from tighter collaboration (merging) with eSSENCE.

Integration with education

The overall grading of integration with education for EvtKth in an international perspective is in between *under satisfactory development* and *developed with internationally high standards*.

First of all, SeRC activities and key personnel are well embedded in the host universities, with the PIs and scientists playing an active role in education at all levels. This means, that SeRC is active in undergraduate and graduate education. New courses are provided as part of the curriculum in computer intensive fields. Also, a new type of twinning projects is set-up to bring together students from core technology (computer) areas with students from e-Sciences application areas (e.g. engineering or life science). The number of 45 PHD certificates and the number of 9 licentiates is o.k. but not on the highest level compared internationally.

Management

The overall grading of management for EvetKth in an international perspective is *on target and developing with high standard.*

SeRC is well managed, with an experienced team of PIs with strong scientific track records and demonstrated management skills.

A rather lean management structure was introduced with a steering committee with one representative aspects appointed by each university. Modification was necessary along the way in order to foster the operations (community coordinators). The overall lead is with a director, serving also as principal investigator (with a linkage to the host university authorities).

Specific recruitment initiatives and mechanisms have been established both on a national and international level. With the help of those mechanisms the high number of recruitments could be achieved. Many researchers were hired from other locations and countries.

Two bodies have been implemented for the incorporation of societal needs: the advisory group (AG) with representation from the most relevant application areas (academia and industry) comes together at the annual SeRC meeting in order to make suggestions on new and long term actions. The second body, the coordinated meetings in the steering team every quarter recognizes new needs for society and industry and influences the short terms actions.

Evaluation Report for MolBioKth, KTH
(Science for Life Laboratory – a national resource centre for high-throughput molecular bioscience)

Research output

The overall grading of research output for MolBioKth in an international perspective is between has *developed satisfactorily* and *on the frontline.*

MolBioKth is a new venture and therefore the start was slow but now the publication output has picked up speed with over 260 papers in 2013, 33 articles being in high impact journals. Clearly the bibliometric analysis shows that output is above international standards. When one analyses the citation rates, the impact of MolBioKth is spreading internationally. Because MolBioKth is developing into a national centre for developing infrastructure, this impact is bound to be considerably higher in the future. Obviously, the high costs of infrastructure today demands concentration, but it is difficult to assess whether SciLife is playing such a role in the Swedish research environment. How easy and feasible is it for outsiders to make use of the SciLife facilities? It is probably too early to judge.

Utilization and benefits

The overall grading of utilization and benefits for MolBioKth in an international perspective *has developed satisfactorily.*

The main task of SciLife Stockholm has been to set up platforms in genomics, proteomics, functional genomics, bio imaging and bioinformatics. These facilities will then be used by many research groups in Sweden. MolBioKth is also involved in producing new knowledge that can be transferred to industry. The impact is still rather low because these are early days for MolBioKth. However, several highlights have been listed which attest the high quality of the research activities at SciLife Lab in Stockholm.

Because MolBioKth has national importance, the process of procuring funds involves almost the whole biotechnology scene in Sweden. The stakeholders are indeed many. How this large infrastructure investment will benefit Sweden is too early to say. One would of course hope that also new technologies would emerge from such focused funding. Sweden has great traditions in developing biological equipment and methodology, and therefore this should also be an important challenge for SciLIfe.

Since MolBioKth is mostly involved in basic research and setting up technology platforms, the impact on society and business is difficult to judge after only 4 years of operation. Most of the facilities have been established only recently. The buildup has been fast and in the next 5 years one will see what impact SciLife will have.

MolBioKth has built up several special platforms for transferring research for utilization. A major effort is the establishment of a High Throughput Centre for Drug Discovery. The Innovation Offices of KTH, KI and SU are involved in technology transfer, capitalizing and the research performed at MolBioKth. Stockholm has a lively biotech scene and Mathias Uhlen is well known for his entrepreneurial activities. So MolBioKth is well positioned in this respect.

Also the capacity to train and provide qualified personnel and research-based knowledge will take some more years to assess. MolBioKth is active in an area of research that is central to biology and medicine and it is therefore bound to be of strategic importance for Swedish biotechnology and medicine. Interesting are the projects on microbes in the Baltic Sea and on bioenergy. It would be important to mix themes and knowhow in such a way that completely unexpected breakthroughs become possible.

Collaboration

The overall grading of collaboration for MolBioKth in an international perspective is between *effective in several dimensions* and *effective in all dimensions* with a tendency closer to *effective in several dimensions*.

The coming together of KTH, KI and SU in establishing MolBioKth is an example of synergy between universities, which is exemplary. No single university can afford to establish centres like SciLife. There is no doubt that this synergy will advance the international standard of the environment.

The strongest collaboration is with Molbio UU since they belong to the same organization: SciLifeLab. But they have collaborations with several other SRAs as well. One issue that emerges is how all the bio banks and biomarker projects are coordinated. One would hope that in a country like Sweden such projects would be planned efficiently to avoid waste of resources that characterizes many efforts in this topical area of research today.

MolBioKth is taking part in an impressive number of 30 EU-projects and has several ERC grants. They also have academic collaborations with many leading research institutes around the world.

MolBioKth has developed much collaboration with national and international industries. This will be an increasing activity due to the strategic goals of MolBioKth. This is also a danger to get involved with too many partners. Focus will be necessary.

The affinity proteomics project is part of the Human Protein Atlas program. This is a huge effort and involves many partners both in and outside academia. What perhaps is missing a strategic partner in another academic institution outside Sweden? Only by getting international key opinion leaders involved in testing the antibody resource will rest of the world know what it is worth. This is so far not the case.

Integration with education

The overall grading of integration with education for MolBioKth in an international perspective *is under satisfactory development.*

The efforts in education have until now been mostly focused on giving courses in bioinformatics, statistics and sequencing analysis. A major effort will be to organize a 'master of science' program in Molecular techniques in life sciences. This program will start in 2015. One would hope that this will be followed by an international PhD program in the same general area.

Management

The overall grading of management for MolBioKth in an international perspective is between *not convincing so* and *on target and developing with high standard* with a tendency closer to *on target and developing with high standards.*

The management structure is complicated due to changing needs of the SciLife Lab project and the three host universities. Presently, each university has a committee to take decisions about its third of SRA funding. These efforts are coordinated by a steering committee that also meets with the Board of the SciLifeLab. The platform facilities are each headed by a director. There is also a scientific advisory board for SciLifeLab but it has never met. Thus, there seems to be some work to be done to come up with an efficient management structure and budget allocation.

MolBioKth has mostly recruited scientists to start its infrastructure operations. They now plan to recruit SciLifeLab Fellows who run their own groups. Six are recruited and will start operations in 2015. A second type of position will be SciLifeLab Associated Fellows who will work half-time at SciLife and the other half-time at their host university. This sounds like a good plan. Important is that the facilities are embedded in an environment of excellent PIs that are at the cutting edge of present day research. Here the EMBL model is an outstanding model. Too much focus on infrastructure is bound to become a hindrance for new discoveries.

MolBioKth will meet societal needs by producing excellent science and by providing an efficient and competent infrastructure for Swedish biology. MolBioKth is also expanding its research repertoire beyond mainstream topics such as Baltic Sea microbiome and bioenergy. The management is struggling to keep up with the high demands but have managed to build up a functioning institution.

One issue that needs attention is how the MolBioKth and the other SRAs involved in biomarker research will go more beyond the present state of the art. Unfortunately 'omics' technology has not had much impact on daily clinical routine. One problem is that clinical diagnostics demands absolute qualification. How is

MolBioKth together with the other SRAs meeting this challenge? We are wasting enormous amounts of funding today globally on large projects that are not able to deliver usable results.

Evaluation Report for KlimSu, SU
(Modelling Initiative of the Bert Bolin Centre for Cliamte Change)

Research output

The overall grading of research output for KlimSU in an international perspective is reaching *international standards*.

Since the SRA has been supported, the number of publications of the Bert Boling Centre for Climate (BBCC) has doubled from 100 publications/year to 200 publications/year. This may not only be due to the SRA, but certainly the SRA contributes strongly to this increase. Indeed, the SRA has allowed the recruitment of 7 tenured climate modelers, which, in 2013, contributed 36 peer review papers, an excellent score showing a great success of the SRA strategy. The bibliometric analysis also exhibits average scores for top 1% and top 10% just above average. Importantly, recent publications have been relatively equitably distributed among the Bolin Centre SRA tracks: circulation variability and decadal predictability (24), unresolved scales (42), paleoclimate modelling (22), and Arctic climate change (24). Several very interesting results have been obtained for each of those four tracks. They involve cross-disciplinary work between the SRA team of climate modelers and the other departments of the BBCC working on aerosol and carbon measurements, atmospheric circulation observations, process studies with clouds and aerosols, and paleoclimate estimates from proxydata. They concern climate variability and predictability, process studies involving unresolved scales such as those associated with clouds, understanding of past climates and evaluation of model capabilities for the past millennium, Arctic changes such as the polar amplification and fluxes of methane. This increase in cross-departmental studies has been emphasized by a BBCC internal review and it confirms the expected transverse role of modeling.

The Bolin Centre SRA has its vision fixed on becoming a significant global competitor in climate modeling and with interacting as peers with the world's best centres. For a variety of reasons Sweden should develop such a globally significant capability and, while perhaps not fully on the frontline yet, the Bolin Centre initiative is well on its way. The selection of the four aforementioned tracks shows strong reasoning and discipline. All are particularly appropriate for Sweden.

Utilization and benefits

The overall grading of utilization and benefits of the KlimSu in an international perspective have *developed with great satisfaction*.

The impact on society or business of the research environment is essentially through advice and guidance on mitigation options and on future climate change, through assessment reports, contacts and solicited lectures. The research environment has already allowed strong steps in enhancing the impact of their research on society, in particularly by strengthening the interactions between Stockholm University departments and the Rossby Centre at SMHI.

Indeed, SRA funding was used to considerably enhance communication about the Bolin Centre's climate modeling and about climate change more generally. A professional communicator has been retained and scientists are given training and opportunities to engage in public communication. Interestingly, and probably appropriately, the Centre has strategically targeted decision and policy makers and the future generations of adults for this communication. In the former case, engagement with the SMHI Rossby Centre in global climate modeling, and through participation in IPCC processes are the principal mechanisms. They have, for example, recorded.

70 of their papers cited in the last IPCC report, which is quite good. The scientists have also produced an impressive number of communication events (over 100 in 2013, the year of the publication of the IPCC working one 5th Assessment report). They have also given advice to the government and agencies through their partner at SMHI, the Swedish Meteorological Service. For the latter audience, educational materials and programs appropriate to schools, targeting especially schoolteachers, are very good.

Collaboration

The overall grading of collaboration of KlimSu is *effective in several dimensions.*

Collaboration is quite strong between co-applicants and emphasizes a very positive impact of the research environment. Co-applicants are located at Stockholm University, KTH and the Rossby Centre (SMHI). This collaboration appears to be effective in many directions, in particular through co-advised PhDs. On the science, KTH brings expertise to Stockholm University on paleoclimate modeling, chemical properties of aerosols, atmospheric turbulence. The Rossby Centre collaboration with SU has been very efficient on the development of the global climate model and the realization of the internationally coordinated experiments in support to the World Climate Research Program (CMIP) as described in the case study. Common publications are produced between co-applicants. Moreover, as already mentioned, the Rossby Centre brings a strong link to society and industry. One difficulty is the physical distance between Stockholm and SMHI (Norrköping) but the coordination has ensured regular communication to cope with this difficulty.

The research environment collaborates with other SRAs: at Stockholm University with BEAM on the Baltic, KlimSu (Ekoklim) on the impacts of climate change on ecosystems, at Lund University with KlimLu (MERGE) through SMHI on the modeling of ecosystems in the climate models, and on e-science with SeRC (at KTH). These collaborations are indeed important to allow the research environment to develop interdisciplinary collaborations on the impacts of climate change on one side and on the computing and e-science on the other side. As BBCC strengthens its modeling activities, these collaborations should also strengthen, especially with KlimLu (MERGE) as both SRAs address common or overlapping issues (e.g. paleoclimate reconstructions) and for the overall stature of Swedish climate modeling in general.

The research environment has many international collaboration, as emphasized by the 73% of publications done in international collaboration. These collaborations are particularly important as concern climate modeling since BBCC do not (and do not want to) develop its own model. They collaborate for this mainly with the US NCAR modeling group and more and more within the European EC-Earth Consortium, which develops the EC-Earth global climate model. The research environment has a clear strategy on climate modeling and their increasing involvement in EC-Earth is very positive, as it is consistent with the choice made by Sweden to invest on the EC-Earth consortium through the Rossby Centre and Lund University (MERGE).

The strategic collaboration with SMHI is essential to foster interactions outside academia as it provides the interface with the intergovernmental use of models for decision-making.

Connections with business per se are more scarcely developed, although they are occurring in the fields of air-quality measurements, ocean bathymetry and nuclear waste management.

Integration with education

The overall grading of integration with education is *developed with internationally high standards.*

The Bolin Centre has strengthened university education at all levels through its Climate Research School (CRS), primarily on master and PhD level (almost 100 PhD students) but also on post-doctoral positions and education for schools and teachers. SRA funded recruitments have been through international campaigns. On all the PhD and post-doctoral at the Bolin Centre and/or the CRS, above one third comes from abroad. The CRS also organizes international summer schools. The SRA plays a key role on developing courses on climate modeling with a strong contribution of the seven SRA-funded lecturers/professors. On this excellent base the Bolin Centre is well positioned to train more PhD recipients and postdoctoral fellows in climate modelling in order the reach the stature of leading modeling centres in Europe and North America.

Management

The overall grading for management of the KlimSu in an international perspective is *on target and developing with high standard.*

The management of the SRA has strongly evolved in 2013, which seems to reflect the success of the SRA in integrating climate modeling within the Bolin Centre as well as the recognition of the strong collaborations with KTH and the Rossby Centre. Indeed, all three participating research institutes (SU, KTH and SMHI) are

now represented in the new Bolin Centre Structure, both as part of the research areas and as members of the Bolin Centre Board. Climate modeling, supported by the SRA, is recognized as a crosscutting activity across the six research areas. Moreover, each of the new research areas is co-led by SRA-funded modelers and scientists working on climate observations and/or processes.

A crucial element for the success of this SRA appears to be the recruitment of seven lecturers/professors as part of the modeling initiative of the Bolin Centre. These recruitments have been done internationally and have brought new expertise and new competence in the SRA. They ensure a strong long-term impact of the SRA. The Bolin Centre approach is been truly international in its recruitment of funded positions, not only for lecturers but also for postdocs and research students. The SRA has also done an exemplary job on increasing the representation of women: 3 of 7 core theme leaders are women, as is one-half of the PhD students and postdocs.

This SRA is definitely headed in the right direction. They are addressing essential, and maybe even existential, issues for society and they realize that this science must be conducted in a public context of responsiveness and awareness. The SRA has strongly enhanced climate modeling at BBCC which now very well integrated in the overall activities.

Evaluation report for EffnatSu, SU
(A multiscale, cross disciplinary approach to the study of climate change effectgs on ecosystems and biodiversity services)

Research output

The overall grading of research output of the EffnatSu in an international perspective *is reaching international standards* and *on the frontline* for some aspects.

The research environment has obtained novel and important results, which are at the frontline of international research, in the areas of climate change impacts on transpiration and hydrology, marginal and isolated habitats, species migrations and extinctions, and the limitations of social learning. This has flowed not only from frontline publications, in high profile journal publications but also from strong communication of the research to conferences and popular media, which is strength of this team. The level of publication is very good with regards to international standards and as emphasized by a mean citation rate above average by 40%.The research environment has played a key role to increase the amount of publications. It has also played an essential role to foster interdisciplinary within the environment. The publication of a special issue in Ambio next spring is a very good idea and will strengthen the visibility of the outcomes for the SRA.

Utilization and benefits

The overall grading for utilisation and benefits for EffnatSu in an international perspective *has developed satisfactory.*

The self evaluation indicates good engagement with society and business. The benefits to Swedish society are tangible and include input and collaboration with various levels of government regarding water use, risk assessment, management to reduce biodiversity losses and adaptive governance with climate change. Research locations were strategically chosen to address important climate change pressures and issues in Sweden. Studying the Norrström basin has indeed been an opportunity to work with stakeholders and transfer knowledge. This has involved several municipalities as well as national authorities concerned with water management. Starting from a long lasting collaboration on natural sciences, it has been expanded in order to develop adaptive governance on water resources and ecosystem services and address societal needs in this largely populated area. The research environment has allowed a deeper engagement of stakeholders, not only from communities but also from the business sector. Through meetings with the Ministry of Environment and the Swedish Environment Agency, more comprehensive indicators have been developed. Moreover, a new research stakeholder consortium has been led by the environment on coastal management to deal with issues related to climate, water and land changes. Not foreseen initially,the SRA has developed stakeholder collaboration internationally on several case studies with UK, Mozambique and Sudan. They have also provided expertise on threatened plant species in the context of the EU water framework directive and worked within the UNESCO's Eco hydrology programme.

Collaboration

The overall grading of collaboration for EffantSu in an international perspective *is effective in several dimensions.*

The research environment has developed collaborations both nationally with other SRAs, internationally and outside academia. Collaborations with other SRAs mainly concern the Lund SRA on biodiversity and ecosystem services as well as the climate modelling SRA at Stockholm University. However, information remains limited on the impact of these collaborations.

There are several international collaborations with universities in the EU and with the UK, USA and Australia. These have involved research on species conservation, wetlands, water, and risk assessment. There is notable involvement in UNESCO ecohydrology assessments. The senior scientists were already well known in

the international literature prior to the environment, and this has been important in developing new collaborations. The level of participating in global committees or agreements, such as IPCC or IPBES, is however not identified. Opportunities for visiting scientists to come from other continents, or vise versa, would greatly increase the profile of the program and research collaborative opportunities. Joint graduate programs, internships and exchanges with universities elsewhere in the world could also be further fostered.

The case study provides a good illustration of collaboration outside academia. This case study, Ecosystem Services in local and regional urban planning in Stockholm County, aimed to incorporate ecosystem services concepts into planning tools in Stockholm and Nacka counties, and to use the case study for education at Stockholm University. Results have been included in a societal inquiry and will lead to science publications. It is also interesting that the case study has also triggered a stakeholder exchange within the educational programme. Some other activities have been developed outside academia. Such as a new inter-disciplinary research-stakeholder cooperation consortium-network, which provides a strategic platform for building capacity to transfer results to industry, water authorities, municipalities, and other organizations? The aim of this network is to facilitate relevant knowledge exchanges and practical use of new research and development results. The research environment should build on these experiences to further strengthen the links between researchers, practitioners and policy makers. They could benefit from an advisory committee including stakeholders.

Integration with education

The overall grading of integration with education for EffantSu in an international perspective has *developed with internationally high standards*.

Different levels of education are integrated with the research environment at the Masters, PhD and Post-doctoral levels. This is fostered through participation in three Masters programs that attract a large number of international students. The research environment has also developed two Masters courses that are broad-scale and cross-disciplinary. The research environment brings a cross-disciplinary dimension to these courses and 28 international PhD students are exposed to the new courses and concepts. Recruitment for the master programs includes about half international students, which is quite high in international standards. It is noteworthy that all participants in the research environment are engaged in teaching, including the majority of PhD students and some post-docs. In addition to advanced education, the environment also provides basic education outside of academia. For example, the development of films and children's books are valuable for integrating the research program with different levels of education outside of the university setting.

Management

The overall grading of management of the EffantSu *is on target and developing with high standard.*

The program appears well managed with a solid management framework and infrastructure for effective development, delivery and communication of the goals and products. There is a steering committee including representatives from the different partners involved and research is organized around four clusters. Most of the research environment recruitment is targeting PhD and post-docs levels, complemented by other funding. The strategy for these recruitments follows the research environment needs and international standards. The research environment has also recruited partly or fully one assistant professor and four lecturers. The research environment is also particularly concerned by the career of young researchers. Promoting researchers as head of clusters has helped promoting their career. The overall gender balance of the research environment is particularly impressive, even at the steering committee level. The opportunity for interactions nationally and internationally is high, provided by the research clusters, graduate student groups, international committee membership, and international collaborations. The program could provide more opportunity for students to do internships or exchanges, or for established scientists to have sabbaticals or exchanges with academia outside of the EU, which would further advance the environment's international standing. The research environment would also benefit from an advisory board with national, international and non- academic participation.

Evaluation Report for HavSu, SU (Ecosystem approach to the Baltic Sea, BEAM)

Research Output

The overall grading of research output in an international perspective for Ecosystem Approach to the Baltic Sea *is reaching international standards.*

This research environment has generated a considerable number of publications of which a significant proportion is in high profile journals. Many of these papers address over-arching fundamental science issues that have global relevance, but also local relevance in the Baltic Sea environment. In particular the metagenomics work on microbial populations in the Baltic was of great interest because it demonstrated how Baltic populations were different to open ocean populations, the lack of N- fixing cyanobacteria, estimates of 20–30% flux of primary production to deeper waters and impact on eutrophication, bioaccumulation of neurotoxins in both cyanobacteria and diatoms is of great interest in terms of scientific impact.

It was difficult to evaluate whether the rate of output per full time equivalent member of staff is internationally competitive because of the manner in which the bibliometric data were presented together with the profile of FTEs engaged in the project. There was some evidence that the results have been over-inflated through the integration of work undertaken previously rather than reporting only results funded under this initiative. Evidence for this is derived from the inclusion of a book in the metrics which would have taken much longer to produce than is indicated by the publication date in relation to the metrics. Ironically, by over inflating the statistics on outputs in the early years the researchers have down-weighted the upward slope of research output trajectory across the lifetime of the project.

The information provided in the self-evaluation documentation and in response to the follow up questions was extremely uninformative and made it almost impossible to evaluate the impact of the research in a meaningful manner. There is a website that elucidates more clearly the scientific impact of the research from which the information below was gleaned. That said, the inability of the institute to articulate clearly in the evaluation reports is a matter of considerable concern. Either it indicates that the research environment does not consider this exercise to be important, or this indicates that they do not really understand what they have achieved.

Nevertheless despite this short-coming, BEAM has high aspirations ‘to help society implement adaptive ecosystem-based management for the Baltic Sea, protecting our life support systems while creating a predictable, science based environmental regulation of business’. Scientists have talked to and advised environmental managers, written UNEP/WHO reports and input to the Baltic Sea Action Plan, helped form the Baltic Sea Centre at SU with its communications-action based team The Baltic Eye which aims to convert the science knowledge into useful knowledge to provide improved knowledge and decision support for policy makers. With these developments the capacity to transfer results has developed with great satisfaction. BEAM is transdisciplinary in nature and this will aid the transfer of results and understanding across disciplines e.g. it is hosting a transdisciplinary conference with Stockholm Environmental Law and Policy Centre (SELPC) with special participation by the Swedish Agency for Marine and Water Management (HaV). From the information received knowledge transfer seems to be mainly to environmental managers and policy makers.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for Ecosystem Approach to the Baltic Sea *has developed satisfactorily.*

There is ample intellectual and FTE capacity within the research environment but it was not clear in the documentation how this resource was being used effectively. The implication was that previous involvement with stakeholders meant that the PIs within this research environment were aware already of the key issues of concern to stakeholders. However without a clear mechanism to engage stakeholders it is impossible to see how transfer of research results can be effective. This process should include stakeholders from the outset and

throughout the project. The self-reflection document focused mainly on the use of workshops to generate more research questions or to facilitate research which they appear to have done successfully e.g. case study example. However this approach is very inward looking rather than being more open to stakeholder engagement and input. A key area for development might have been to invest in knowledge exchange fellowships to translate research into policy outcomes. In this respect other research environments performed much better.

There was little attempt in the evaluation documents to address the benefits of the research in a meaningful or quantitative manner. Fundamental research, that is over-arching in nature, sits in the background. However it should be possible with advanced consideration to formulate an impact plan that would enable evaluation of impact. To illustrate my point the final sentence sums up the lack of quantitative information '….and promoted the competitiveness of Swedish Industry'….this is a big claim but no evidence is presented to support it. Furthermore we could find little evidence for useful transfer to industry other than last paragraph in FRAGA 8 '… in frequent dialogue with governmental officials and with representatives from e.g. the fishing industry…' which is pretty non-specific and collaboration with Wallenius Water AB a water treatment company but there is no indication of what BEAM has supplied . In response to Fraga 9 they mention possibly impacts to business (remote sensing, shipping, water treatments, pathogens, environmental monitoring, and early warning systems. However there is no indication that these are being explored – something for the future perhaps.

There has been good use of the research environment to generate courses around the outputs and research from the project as evidenced by a three course at Masters level and the introduction of a PhD student seminar series. Considerable success was achieved in generating PhD research projects around the framework of the research programme and these individuals will provide a vital pool of suitably qualified scientists of the future. Thus there has been considerable benefit in creating additional resources from the original funds and in the provision of future highly trained scientists in the area of ecosystem science.

Collaboration

The overall grading of collaboration in an international perspective for Ecosystem Approach to the Baltic Sea is *effective in several dimensions.*

The interactions with other SRAs were limited to date but effective where they have occurred. However given the potential synergy between this and the UmU programme of research it is surprising that the links were not stronger throughout the programme, indeed there would be a strong case to be made for cross-disciplinary PhDs. The lack of other collaborations is disappointing and underlines that BEAMs aim was to develop and strengthen the RA within SU, pulling the expertise that they have into a collaborating programme, rather than collaborate externally.

Projects within BEAM have international collaboration, together reaching around 60 as is evidenced by the international collaborations in publications (66% have international collaboration). International collaboration includes academic institutes/universities from Baltic Sea states (as evidenced by the Case Study) as well as from further afield, including USA, Canada and UK. On the website there is a useful film on the development of the Baltic Sea Health Index – an international collaboration with the US.

The researchers engaged in this environment already had strong international collaborations hence it is difficult to evaluate the extent to which this environment has furthered that reputation and standing. Certainly the investment in personnel will have strengthened and consolidated the existing reputation of Stockholm University and will continue to make this an attractive place to work.

There appears to have been strong connections with relevant stakeholders some of which are industrial organisations (although it is unclear that they were fully integrated into the programme of work – see above). Policy connections seem to be under-represented and a programme of placement for students or researchers within Government or EU policy organisations would have been extremely beneficial and was approach used in other research environments.

Integration with education

The overall grading of integration of education in an international perspective for Ecosystem Approach to the Baltic Sea *is developed with internationally high standards.*

There was clear evidence of the integration of BEAM research into the education curriculum but this developed to a limited level depending on the student level of entry. This integration was best developed at the MSc and PhD level with rather ad hoc involvement at undergraduate level.

BEAM has had student gatherings, PhD students have given lectures, films of key issues and lectures have been made available so that information reaches students beyond SU. The integration of the RE into different education levels is a great achievement and looks like it gives a really great integrating experience to the students. Note we had to access the BEAM website to be able to fully assess this aspect.

Management

The overall grading of management in an international perspective for Ecosystem Approach to the Baltic Sea is *on target and developing with high standard.*

The management structure was simple but has missed the opportunity to integrate stakeholders in this stage of the process as they would usefully input in guiding and steering the direction of the programme, including in relation to the process of recruiting new and strategically important researchers. Such an approach is important to gain stakeholder buy-in.

Given the outputs from the project to date, the management is partly effective in this respect, but has not realized the full potential of the funding opportunity and has not developed more fully a strategy for knowledge exchange and evaluation of impact. This latter point should have been considered at the outset and in future it may be helpful if the funding bodies stipulate that this needs to be addressed and assessed in a funding application.

The project appears to have recruited good quality staff that are productive and that come from a wide range of backgrounds. Apparently these appointments have made considerable contributions to the research environment although this was poorly evidenced in the documentation provided.

The research was highly focused on the societal needs of the Baltic environment and the wider international community. However, this would be served better with a stronger science translation strategy which is a common weakness throughout this environment. There is no purpose in performing excellent research if it is not utilized by the intended audience.

Evaluation Report for HållSlu, SLU (Forests and other plants)

Research output

The overall grading of the research output for HållSlu in an international perspective is *on the frontline.*

The number (269 in 3 yrs) and quality of publications is excellent, with 96% coverage by WoS, and 20.8% in the top 10% (i.e., double the average). The number of books (2) and book chapters (3) in the first year two years is a rapid start and undoubtedly results from earlier work that was the foundation of this research environment. Publications of journal articles was slower to start but is dramatically increasing, reflecting timely completion of research projects. Nine publications in leading journals like *Science* and *Nature* show the excellence achieved in this environment. In addition, a large proportion in journals with impact factors 5-20 show the major impact internationally. The strong publication in applied journals with impact factors less than 5 is very important because the applications of this technology in the real forest and climate is a crucial step that remains to be adequately addressed world-wide. Bibliometric analysis shows that the citation rate for publications is 1.99, i.e. twice the average. Major accomplishments include publishing the genome of Norway spruce and unravelling complex C and N dynamics governed by above and belowground organisms. The potential for this research to affect the structure, function and productivity of Sweden's forests is profound, with potentially good and negative consequences, with impacts on society that will not be known immediately or completely. However, the team is making excellent efforts to address some key parts of these issues. The scientific impact could be greatly increased in the future with a holistic examination of these technologies on ecology and society.

Utilization and benefits

The overall grading of utilization and benefits for HållSlu in an international perspective has *developed with great satisfaction.*

The excellent partnership with stakeholders in governments, business and institutes, especially Skogforsk, was strategic for creating capacity to transfer of results for utilization in the business sector. These strong networks and lines of communication have been used from the outset of the environment for formulation of the problem statements, and implementation of the research. Additional close connections with SweTree for turning biotech research into innovations are also a successful collaboration, with at least one graduate employed by this biotech company. The strong and multiple connections and collaborations with many forest companies and industrial crop companies also shows very high capacity to transfer the research results.

Notably, some patents have already been bought by companies and transformed into commercial innovations. The employment of graduates from this environment by these organizations has strengthened the capacity to transfer results. The development of several graduate courses and recently a Master's program, where the environment researcher create and teach in the courses, also builds capacity to transfer research results to future scientists. The transfer of results could benefit a wider audience concerned with the ecological and sociological implications of the technology. The environment recognizes the potential importance and opportunities for innovations in tree genetics and propagation of genetically modified trees to affect biodiversity, ecology. Research on the ecological and social impacts of this research, although acknowledged, need better development in future programs. There also could be better engagement with the non-forest public about the implications of this work for society. There are many ways to do this, including collaborating with social and communications scientists and the Stockholm Resilience Centre. The impacts on the business sector are forthcoming.

The research is having some influence on silviculture practices, but progress is yet to be made on how to integrate the new genotypes into the natural forests and measure and manage the inevitable ripple effects through ecosystems. There has been development of GM plant products ready for market. Understanding the legal and social impacts of the products is not known, but should be examined. The program has recruited a

large number of PhD students, with 7 graduated, and PDFs over the four year period. These include similar proportions of international and Swedish students, and male and female, all which important both for training local HQP but also for bringing expertise into the country. The attractiveness of the program to high quality students has been increased with the development and teaching of the joint courses by the scientists, creation of a new school focused at the PhD level, and the inclusion of new research in these courses. The students in the programs also greatly benefit from research that is integrated with stakeholders, providing them with professional contacts and skills that other graduate programs would not get.

Collaboration

The overall grading for collaboration of HållSlu in an international perspective is *effective in several dimensions*.

Collaboration and engagement between SLU, Umeå University and Skogforsk is excellent. The strategic collaborations are extensive with many meetings and strong feedbacks between stakeholders, advisors and the scientists. Collaborations with industry and small businesses are also fostered through cooperation in formulating key strategic questions and implementing the results. The distance and difference in financial management of the two universities was challenging at the beginning but resolved. There was apparently more trouble dealing with GMO legislation in the EU. These challenges suggest a two-way communication between the environment and public be established so that the implications of the research for the eco-sociological environment are better researched and understood. This sensitivity and investigation into the social and ecological issues would advance further the environment's international standing. There has been extensive collaboration with SciLifeLab SRA in sequencing the Norway Spruce Genome, good collaboration with the Bio4Energy SRA in long-term silviculture experiments testing fast-growing broadleaves, and some collaboration with the Standup4Energy SRA with bio-economics in Uganda. Developing collaboration with the MERGE SRA based at Lund University in incorporation of terrestrial ecosystem dynamics in climate modeling would seem to be mutually beneficial. The environment's international standing is excellent in biotechnology and high production silviculture. The international collaboration has been excellent, especially within the EU and Canada. The international collaboration is also fostered through the training of international graduate students. Joint graduate programs, internships and exchanges with universities internationally could further utilized to advance the collaboration and international standing.

The case study, Somatic Embryogenesis, has strong extensive collaborations nationally and internationally, and between academic and several non-academic organizations. It involves development of SE techniques, protocols, automatization, and evaluation of growth performance of the SE seedlings. These advances are already translated into technology and business (e.g., SweTree). There is still a gap in studying and understanding the effects of SE on the environment (in this report called C effects, or common environmental effects). The importance of this issue is highlighted by this statement: 'Productivity increases of more than 30% could be achieved if plantings were limited to a few elite clones'. This has the potential to be risky to ecosystems.

Hence, there is a need to study the implications for the ecological and social environment.

Integration with education

The overall grading of integration with education for HållSlu in an international perspective is *developed with internationally high standards.*

Different levels of basic and advanced education are integrated with the research environment at the Masters, PhD and Post-doctoral levels at three campuses (Alnarp, Umea and Uppsala). This is fostered through development of the research school, development and teaching of courses by the environment's scientists, integration with existing courses, training programs and other SRAs, and integration of student research with stakeholder groups. It is important that the research environment fosters broad education in areas that will be impacted by this science for its graduate students. Some graduate students and PDFs have already found positions in Sweden, or are collaborating with international scientists, or are advancing their studies. There is a

very high employment rate of graduates nationally and internationally historically. Students are starting to publish their work in high impact journals, and some have graduated.

Management

The overall grading of management for HållSlu in an international perspective *is on target and developing with high standard.*

The program is well managed with a solid framework and infrastructure for effective development, delivery and communication of the goals and products. This is evident in metrics like publication record and number of students trained. The success of the program reflects excellent collaborations among the co-applicants, the institutes and businesses, networks, the scientists, the graduate students and post-docs, and the steering committees. The opportunity for interactions nationally and internationally is very high within the disciplines and potentially across disciplines. The host applicant and co-applicant have highly effective recruitment strategies for recruiting international and national students, for a diverse student body. The recruitment of 27 PhDs and 22 lower degree students is outstanding. The opportunity for exchanges and international degrees appears excellent, which is another good recruitment tool. Almost half are female students, which is very good given the traditional nature of forestry and horticulture. This program aims to meet societal needs through development of biotechnology. The program is very well managed and is achieving this goal with excellent science, excellent training, strong networks and excellent collaborations. The program is clearly delivering its objectives with high quality publications, technologies, and training of HQP. The impacts of this research on societal needs will be great, both positively and potentially with unforeseen negative consequences. Managing the environment to address all dimensions of the research to society will be more difficult than the actual management of the program. This has already been hinted at in the self-evaluation with respect to GMO legislation. Some areas for potential improvement are in innovative engagement between the environment, social and ecological scientists, and the public through novel communication vehicles and integration of the research and HQP at many levels.

Evaluation Report for HavUmU, UmU (Ecosystem Dynamics in the Baltic Sea, ECOCHANGE)

Research output

The overall grading of research output for HavUmU in an international perspective *is reaching international standards.*

The first three years of ECOCHANGE involved an intensive focus on marine data collection and analysis across the different Baltic Sea basins. In the last two years this substantial effort resulted in a very satisfactory growth in publications, including some in international peer reviewed journals. Although not in the Nature Science league, the outputs are in good highly competitive journals that are likely to report high quality and useful science. Publication rate of c. 2 per year per FTE is close to the border of internationally competitive although there may be evidence in the publication profile of a slight inflation (e.g. pulse at beginning of programme and early production of book may be the product of research prior to the start of the project). Whilst this is difficult to judge it is also likely that there will many publications after this assessment due to the intensive data collection aspect of this programme.

The research team for ECOCHANGE was very aware at the very start of the programme for the need to engage stakeholders throughout the process. The formation of a stakeholder panel to oversee and guide the research programme was highly significant and provided a strong model for research impact. It is not surprising therefore that the results are highly focused on policy needs. The scientific impact of ECOCHANGE is clearly important to marine managers for all nations bordering the Baltic Sea and therefore provides good value for money for Swedish taxpayers. The understanding that increased rainfall, combined with temperature rise in the future is likely to increase the supply of ADOC to the Baltic (from land runoff) which will stimulated bacterial production (at the expense of phytoplankton growth) and lower oxygen concentration due to its consumption warns of the potential spread of hypoxia with negative impacts on food web dynamics and fish production is novel and of international standards and interest. Also the work highlighting the connectivity between offshore, coastal and freshwater fish life cycles, behaviour and dynamics may offer useful management solutions, for example for pike management. These are examples of results that have emerged that are highly novel and of direct benefit to managers in the Baltic context.

Utilization and benefits

The overall grading of utilization and benefits for HavUmU in an international perspective *has developed with great satisfaction.*

The capacity to transfer research results for utilization both to industry and policy stakeholders as well as to benefit the next generation of scientists was paramount in the minds of the proposers at the outset of the proposal. The ECOCHANGE results, approach and strategy of integrating researchers in a policy environment and stakeholder has been integrated within teaching. The content of courses has been changed to increase awareness in students at the undergraduate level. The stakeholder group has been key in identifying important and practical societal issues and implementation possible solutions through applying research as well as directing training needs for future generations. These stakeholders have also given lectures on the courses in the University thereby engaging the student community in current needs and research requirements. Of particular note is the integration of researchers into policy and management frameworks to ensure that research outputs are disseminated and that policy needs are understood. This does seem to be a genuine two way process that advantages and enriches both researchers and stakeholders through a deeper understanding of each other's needs and priorities.

ECOCHANGE scientists have transferred their understanding and knowledge of Baltic Sea ecosystems for practical and commercial benefit, especially in relationship to industry e.g. their work on stickleback-fish food collaboration with fisheries and aquaculture to use stickleback as food for aquaculture fish is a very useful application of the understanding of the behaviour and dynamics of this voracious predator. Another good

example of application of their understanding of the carbon cycle is their work with Blue Growth (a collaboration with CEMENTA) to use algae to take up CO_2).

ECOCHANGE has also developed impressive knowledge exchange and collaboration with key governance agencies (e.g. HELCOM, EU Water Framework Directive, Environment and Education Ministries), land-based industry (energy, cement, paper), marine industry (biotechnology, fisheries, sports fisheries, aquaculture), NGO (BSAG) and directly to the public (via social media).

ECOCHANGE participants clearly understand that the health of the Baltic Sea and how this may alter in a changing climate is of great societal importance, especially to those counties bordering it and the many industries depending on its ecosystem services and have gone to great effort communicating this widely to industry, policy makers and the general public. The use of social media is good and the recipients of the research are named and listed.

There is therefore clear evidence that ECOCHANGE has had direct impact on society or business and that its relationship with stakeholders is very well developed and will continue to provide a platform for future meaningful collaborations.

Collaboration

The overall grading of collaboration for HavUmU in an international perspective is *effective in all dimensions.*

The collaboration between ECOCHANGE and co-applicant universities has been very effective despite the challenge due to the geographic distance between the participating organization as well as the multidisciplinary nature of the RE. This seems to be due to the effectiveness of the organizational structure of ECOCHANGE and detailed planning of responsibilities, resources and activities and good communications within the project. They had joint meetings, workshops and PhD students to facilitate collaboration between co-applicants. Collaboration within ECOCHANGE promoted this interdisciplinary research, especially amongst Baltic countries.

There is also clear evidence of collaboration with the other SRA BEAM (Stockholm Uni, SU) with clear product delivery. However given the potential synergy between this and the SU programme of research it is surprising that the links have not been stronger throughout the programme, indeed there would be a strong case to be made for cross-disciplinary PhDs. Reading both self-assessments it appears that UmU appear to have valued this interaction more than SU.

There is evidence of strong and effective international academic collaboration (e.g. international authorship of papers is 47%) including real academic investment in international fellows, a guest Professor, visit of young researcher to USA as well as collaborations with international organizations (eg. HELCOM), the Finnish environment authority and research institutes in other Baltic countries. Working across national boundaries in these ways is likely to bring rewards and different perspectives and future alliances and is to be commended.

There is also much evidence of effective and practical strategic collaborations outside academia. The strategic collaboration with BIORAS on ecosystem modelling has proven to be essential for the programme to address critical gaps and mutually beneficial. Others collaborations with energy, cement, fisheries, and paper, aquaculture and biotech industries are highly commended increasing the value of the investment and are discussed above.

Integration with education

The overall grading of integration with education for HavUmU in an international perspective is *developed with internationally high standards.*

Knowledge gained from ECOCHANGE has been incorporated into the universities' undergraduate, MSc and PhD courses through a wide variety of cross disciplinary courses and specialist courses in e.g. genomics and R statistical analysis. The RE has also supported postdocs and international fellows and visitors and PI's contributed to training across the partnership members. The ECOCHANGE RE has stimulated development of collaborative courses with shared teaching between collaborating universities and BIORAS with more planned

for the future. Evidence for this is that overall there was 26 PhD students (10 from outside Sweden). The RE invested directly funding 7 PhD students and had 15 PDRA and 8 international fellows involved in its research.

Additionally the findings from ECOCHANGE have been incorporated into undergraduate and postgraduate courses at the universities. ECOCHANGE has a 'young scientists group' to encourage the production of bottom-up ideas and joint projects. It is also very encouraging to see that science communication is included in the portfolio of teaching and experience offered at both undergraduate and postgraduate level and that junior staff have been encouraged to gain early career supervisory experience. The multidisciplinarity and relevant training on offer will generate highly skilled graduates necessary to meet future challenges. These activities ensure capacity building of qualified personnel in Baltic Sea multidisciplinary research and bode well for the future research based in this RE in Swedish research.

Many of the young researchers have already been successful employed in the RE. Additionally, the senior researchers are applying for further funding and the collaborating universities are investing in the RE. This RE is also likely to be a growth area for job provision for the newly qualified scientists from ECOCHANGE.

This must be a very stimulating environment for a young researcher to be part of: international, multi-university and multidisciplinary research that has a real connection to the end-user with direct experience of how practical use of academic research can help address current and future issues of societal relevance. Indeed, recruitment of the students that emerge from post-doctoral training has developed with great satisfaction and can be tracked into directly relevant sectors – evidence that ECOCHANGE is already providing qualified personnel for several sectors.

Management

The overall grading of management for HavUmU in an international perspective has *developed with high standard.*

ECOCHANGE has an impressively forward thinking management team. From the start ECOCHANGE management established the mechanisms necessary to identify and fill the gaps in the programme (and did this honestly and openly to the benefit of the programme), formed a stakeholder group to identify and address the real future needs of society and industry through a vigorous programme of engagement with societal and industry related working groups, developed an exciting and stimulating environment for researchers and students within the participating universities and industries.

The management structure has accommodated changes in personnel and reorganization of some of the work programmes. This is clearly outlined and appears to have been undertaken effectively without detriment to the programme attaining its targets.

The management has ensured international collaboration from the start, both regionally with Baltic countries but also internationally through collaboration, conference attendance (in Norway, UK and Italy), and visiting fellowships. There is a clear recognition of the need to develop and nurture early career scientists with a main focus on recruiting young scientists by ECOCHANGE management.

Gender equality is addressed and the postdoctoral barrier to females acknowledged but more importantly address how they will tackle this shortfall. Recruitment of international students, postdocs and fellows has been an effective means of ensuring success in promoting the REs international standing. It would be useful to present the results beyond Europe in order to bring the knowledge gained from this RE to other regions around the world also suffering from similar environmental pressures and change.

Members of the ECOCHANGE and the affiliated universities are continuing to invest in the area as well as applying for further research funding in the RE. This has been a very effective investment for Sweden with gains on numerous fronts in this societally important research area.

Evaluation Report for EnergiUmu, UmU (Bio4Energy)

Research output

The overall grading of research output for EnergiUmU in an international perspective is *on the frontline.*

The bibliometric indices are impressive with a mean citation index 50% above World average, 15% of papers in the top 10% and a few (e.g. about 3) in the top 1%. There has been a marked increase in all types of outputs (except books) during the period of the grant. Given the size of the research group described in the application, a journal publication output of 4 papers in the first year seems abnormally low but nevertheless the output of 140 journal papers in 2014 looks good. Sixty five per cent of publications are based on international collaboration, which is a good indication that a wide range of researchers are involved in the work and aware of the results.

A variety of five key results are listed and these relate to the targets in the original proposal. The research on the spruce genome is described as world-leading and was published in Nature. Other outputs have were achieved in collaboration with industry partners and/or are being up scaled ready for industry use, so there is a good mix of research types. Advances are made in wood polymer biosynthesis and its regulation, new bio-based composite materials, methods for green chemicals at industrial scale, fundamental insight into thermal conversion, and development of catalysis and separation technologies among other things.

The environment has further consolidated its Swedish networks in the bio energy sector, most importantly the Processum Biorefinery Initiative and Solander Science Park, but has also engaged in the launch of the Swedish Gasification Centre (SFC). The environment has increased its involvement in industry clusters. Increasing number of outgoing and incoming research visitors. Further, the environment participates in IEA Implementing Agreement tasks and has ongoing collaboration and student exchange with a number of Nordic universities, European universities and universities in South Africa and Australia. It is very positive that outreach has been made to DOE and its many research laboratories. Such outreach has also facilitated the possibility to perform experiments at the Canadian Light Source laboratories.

Other external funding has increased considerably in the period, from 1.6MSEK in 2010 to 67.2 MSEK in 2013, which demonstrates capability of the environment to boost its activities. Some of these resources come from international funding, including 7 EU projects, some Nordic projects and a Swedish-Australian platform.

Utilization and benefits

The overall grading of utilization and benefits for EnergiUmU in an international perspective has *developed with great satisfaction.*

The environment has further strengthened its industrial networks and collaborations, not least with SP Processum and Solander Cleantech. Together with industry, the environment has bridged the knowledge value chain from basic research to a comprehensive set of pilots and demonstration and test facilities for new biorefinery technologies. Also the environment actively utilizes regional innovation centres, matchmaking meeting sand arenas to disseminate results and engage with industry.

The environment demonstrates sound outreach activities toward national and international industry and stakeholders. Participation assures that technology strategies are aligned with industry needs and that implementation of technology research and development is a common task.

The environment is most notably one of the founders of the BioInnovation Initiative in which the Swedish bio based sector comes together to agree on visions and strategies for a resource-efficient bio economy. Founded in 2014, it is too early to judge the sustainability of the initiative.

Also at European level, the environment participates in the Bio-based Industries Joint Undertaking and the European Forest Technology Platform.

The environment clearly considers itself as the provider of the necessary knowledge and technology to fulfil the political target of reducing GHG emissions and highlights the many initiatives in which it participates, ranging from broader initiatives such as the as BioInnovation Initiative to specific (star) research projects.

The upscaling of the technology has been a priority. By means of the network of pilot and demonstration units this has been steadily implemented, e.g. the industrial scale production of pellets, new or improved methods for production of bioalcohols and bioacids developed, up scaled production of single cell protein, trials for synthesizing ethyl chloride and experiments for separating CO_2 from synthesis gas. 30 applications have been filed for IPR. Not surprisingly, industry especially has used the methods developed. It is somehow surprising that no new companies have been established but this might be related to the close cooperation with existing firms. It will be interesting to see whether the efforts to promote the use of the network of pilot and demonstration units will be used by other national and international researchers.

It appears that few qualified personnel have gone into industry yet. This is partly because some of the programs, such as the Graduate program and new undergraduate Bio-resource degree are new and have not yet produced graduates/trained researchers. It is stated that 50 per cent of Bio4Energy-type graduates go on to work in industry although it is not clear what sort of graduates these are.

Collaboration

The overall grading of collaboration for EnergiUmU in an international perspective is *effective in several dimension.*

The organizational set-up of the Bio4energy environment seems to closely follow the one described in the application with programme directors, executive board, seven platform leaders and steering committee and with representatives from all three universities. It is a signal of commitment that top university leaders are represented in the board who decide on strategy and finances, at least to some extent. As the strategic funding is allocated a priori to each of the partners, it is positive that 10% of the grant has been decided to be used to strategic development of the environment. Appropriate measures are taken to manage the coordination and communication among the parties across institutional and physical distances. However, there are few references to explain which partners carried out the key research.

The three energy environments collaborate with each another, including some information materials. More important is research collaboration in f3 (The Swedish Knowledge Centre for Renewable Transportation Fuel) and SFC (Swedish Gasification Centre).

The bibliometric analysis states that 65% of publications are with international collaborators which are a good figure. The team has been successful on several EU funded international collaborative projects and has made links with researchers in Australia, Canada and South Africa as well as in Europe. This also includes access to international laboratories as well as the offering of pilots and demos for international researchers.

Two industrial development clusters, Örnsköldsvik and Solander Science Park in Piteå were listed in the application as strategic partners in the SRA. Both have been involved. For example, the work at the Biorefinery Demo Plant at Örnsköldsvik has resulted in six patents transferred to industry. The collaboration tables in the follow up assessment show that the number of collaborations outside academia have increased by a multiple of four (22 to 91) from 2011 to 2013 and that the collaborations outside academia, which include industry, research institutes and public agencies, now account for 60% of the total 148 collaborations. Sixty percent of the non-academia collaborations are listed in the category of being in the core of the environment and contributing with long-lasting resources. Some of these results may have been facilitated by the research foundation ETC acting as a service provider to the industry and also the research institute Innventia working to produce and refine research results together with industry.

The case on the Bio4Gasifications demonstrates an effective project organization with regular and different types of meetings for all involved, good division of work, with industry partners being involved in every aspect of the work, 9 PhD students involved in the project and opportunity for under graduate students to visit industrial sites and pilot scale facilities. It is unclear whether they have also had access to laboratories to do work. All in all, a partnership with the strategic industry partners is clear focus and represented with high level

university managers, as well as professional facilitators. It makes a group that appears to be having significant impact.

Integration with education

The overall grading of integration with education for EnergiUmU in an international perspective is *under satisfactory development.*

The most important integration with educations takes place in the Bio4energy graduate school developed for PhD students and started in 2013. It has had 30 PhD/post-doctoral researchers participate from the Bio4Energy programme and also now some external participants.

Each of the three universities naturally takes advantage of the environment in their relevant existing or new master programmes, with or without industrial partners. Likewise, other measures such as STINT are used to facilitate student mobility, something which also benefits B4E students and researchers. There are relevant MSc courses at LTU and UPSC, and a partially related course at UmU. There is a new Bio-resource undergraduate degree at UmU that programme researchers have helped develop.

B4E collaborates with the Forest Products' Industry Research College (FPRIC) founded in 1996. The college is made up of Chalmers, KTH, Umeå University, Karlstad University and Mitt University and the intension is to list some of the PhD courses as an FPRIC course.

Management

The overall grading of management for EnergiUmU in an international perspective is *on target and developing with high standards.*

The management seems to be functioning well, effective in adjusting the major challenges and changes since 2009. It shows good foresight that the decision making groups are in the process of creating an operational strategy for B4E for 2015–20. It is understandable that the realization of such a strategy is partly based on some sort of continuation of the strategic funding, but the environment at the same time has to demonstrate a robust funding strategy relying on a variety of resources, including other external funding. Representation from the partners on the management boards is good but they are all male dominated. The one panel designated to have a high proportion of female participants (scientific advisory board) does not seem to have met?

The recruitment procedures for PhD students and post docs seem like the normal ones used by academic organisations. It is stated that the majority of Bio4Energy's PhD students and postdocs are from outside Sweden giving a good international profile and future potential for wide ranging research and industrial links. Opening up more Graduate School courses for external students will contribute to position the environment in the international research community.

The original intention to pursue a generation shift seems to have been realized as the environment has recruited a number of senior juniors who deliver excellent work. All three universities have gender and equal treatment policies in place.

Evaluation Report for SäkUu, UU (Natural-Disaster Science, CNDS)

Research output

The overall grading of research output for SäkUu in an international perspective is *on the frontline.*

The CNDS is a new research centre with its focus being very important area for society. This is a research community being built up and with new PhDs and post.doc and also more senior academic personnel involved, the number of publications is steadily increasing, not least journal articles. To address the research needs, the cross disciplinary centre has to overcome the traditional disciplinary structures. The annual Forum on Natural Disasters will likely lead to much greater scientific impact as it broadens its exposure and connectivity – which already seem to be excellent. They have received prizes and awards for graduate student and young research (e.g., Best Paper Award at ExtremeCom 2013 and EWSN 2014 on outdoor wireless sensor networks. Young Researcher Award at the 5th International Biennial on Negotiations, VMSG poster on the analysis of eruption products, Haldane Prize for the best article published in Public Administration 2013 (Case study)). Being a relatively new strategic, multidisciplinary and cross sectorial research area, with definitions vague and journals with little legacy, the traditional citation and high impact journal factor is difficult to use. The bibliometric study does show above average mean citation rate (1.38) and above the 10% proportion. The number of journal articles per person is 0.65, although still in disciplinary journals. The proportion of publications based on international collaboration is 78%, which is relatively high. The article on integrating climate change adaptation, disaster risk reduction and urban planning is the second-most downloaded file from IJDRR (May 2014). The CNDS has systematically mapped the international scientific community working in this area and invited the best to be member of the International Advisory Group in 2012/13. Also, discussions of PhD collaboration and exchanges are discussed with top DRR centres. The conference presentations and other publications in 2012 were high and hopefully these will convert into journal publications. It is encouraging that the journal articles in 2013 are much higher than the sum of the first 3 years. The Centre is attracting scientists from components so increasing the research outputs.

Utilization and Benefits

The overall grading of utilization and benefit for Säk Uu in an international perspective is *developed with great satisfaction.*

The CNDS was designed very well to work in close collaboration with societal stakeholders for a smooth transfer of knowledge to the benefit of the society, including the Forum for Natural Disaster co arranged with key stakeholders, the discussions with the National Advisory Group of high level authorities, the Academy meetings with stakeholders, and an informative and updated web-site. They have also encouraged PhDs to work with stakeholders and offer courses on dialogue with stakeholders.

The environment represents an exemplary case of how key societal stake-holders are actively involved in research and education, in jointly formulating research objectives, continuously discussing problems and results during the research process, and when diffusing results. The PhD projects are chosen with the involvement of authorities and inputs from different levels of society. The emphasis on dialogue is quite impressive and the range of organizations is excellent as is the contribution to the post 2015 HFA (The Hyogo Framework for Action 2005–2015 (HFA) – Building the Resilience of Nations and Communities to Disasters).

The impact is well illustrated at various levels and with different measures. The problem driven and user/stakeholder driven research produces an immediate impact on society, being authorities (Swedish Water and Wastewater Association, county administration, MSB and even Japanese authorities) or companies (e.g. energy, insurance, security and IT companies in Sweden) and recently also international insurance companies and hereby actively supports the efforts to integrate business in the natural disaster management. Further, the researchers engage in the development of strategic research programs, support relevant platforms and provide advice to national bodies, most notably the Government's Crisis Management Coordination Secretariat. And

researchers also participate in public communication channels. The focus also on public-private partnerships is important and not often done in research networks. This can more effectively lead to the integration of the business sector in natural disaster management.

This is a new program, with few graduates yet, but the centre has built its programs, advisory groups and methods of interactions to targets the requirements in public and private organizations, both when formulating policy-relevant research problems and disseminating research-based knowledge. The environment provides highly qualified personnel to government offices, national authorities, military and security entities, regional and local crisis management units and international bodies such as EU and UN. The further provision of qualified personnel is closely related to the contribution of the environment to the higher educational programs.

Collaboration

The overall grading of collaboration for SäkUu in an international perspective is *effective in in all dimensions.*

The collaboration between the host university (Uppsala University) and the co-applicants (Karlstad University and the Swedish National Defence College) has been updated and is set on being further improved. The development of the environment rests on a strong dedicated cross disciplinary approach anchored in primarily the research school and the stepwise built up of common mechanisms such as the (NAG) in 2011 and the International Advisory Group in 2012/13. Very dedicated people have taken the lead – together and within each of the 10 research units – and without the adequate management tools managed to take the necessary actions to drive forward this research area.

It is evident that the further development of the collaboration/environment will built on the experiences gained so far with a more well defined and visible structure capable of handling further projects and activities. Important is the fact that the institutions behind the environment recognize the achievements gained so far and the fact that these are developed in a strong problem driven and interdisciplinary setting. It is also promising that a new organizational structure is foreseen, hopefully giving the environment (CNDS) the necessary institutional mandates to independently act towards its constituencies, being funding agencies, universities, industry, etc.

The CNDS is one of two 'Security and Emergency Management' SRA environments and it interacts regularly with the other Security Link (technology-disaster focus) with the offering of courses and links through committees. There is also a connection with the StandUp energy-research environment in terms of issues such as tsunamis.

The environment has systematically mapped the international scientific community working in this area, has a role in HFA2 and invited the best to be members of the International Advisory Group in 2012/13. Also, discussions of PhD collaboration and exchanges are discussed with top DRR centres.

The environment has deliberately built strategic partnerships with authorities, most notably with MSB participating in the Programme Council, funding research, and cohosting the Forum. The environment deliberately uses the National Advisory Group and its high level members in public and private institutions, including insurance, to further advance the knowledge creation and dissemination. Interesting is the intention to build targeted partnerships where tools and models can be open to a wider range of stakeholders.

The ash cloud study is an excellent example of very good strategic collaborations which illustrates this dynamic, highly ambitious and high impact environment, where the overall research of risk reduction and ash cloud contingencies consists of a combination of individual research projects with overlapping areas of empirical focus and outputs.

Integration with education

The overall grading of integration with education for SäkUu in an international perspective is *under satisfactory development.*

They are integrating research with education in graduate, undergraduate, and practitioner training programs which are well connected to the research program with the educational programs. They are also working beyond the CNDS through programs in other departments and at other universities, which are cross-

disciplinary. Interactions with society are also involved through workshops, conferences and meetings as well as specially designed education and training programs.

More indirectly, the research knowledge is integrated in the courses and supervision tasks being performed by the involved researchers in their respective institutions. Just highlighting the various courses at the different universities gives an exemplary overview of the overall teaching environment.

Management

The overall grading of management for SäkUu in an international perspective is *on target and developing with high standards.*

The development of the CNDS and the merging with CANDIM and the connections nationally and internationally, as discussed before, all demonstrate the management ability to make things happen and move ahead in this important field of research with great societal value. The management has proven successful in developing the research school as the core activity integrating and combining the multiple disciplines, methods and tools towards developing understanding and solutions to the problems identified. This has been done with emphasis on constantly involving societal stakeholders while at the same time searching collaboration with the top international scientific centres and researchers. This can only be done with equally high scientific ambitions and achievements, as described above. ´´Deliberate recruitment efforts aim at balancing disciplines and gender, especially when hiring the future generation researchers. With the massive intake of PhDs in 2011, it is natural that the environment plans to strengthen the career development of younger researchers. Nonetheless, it would be good if the environment assures a stable inflow of PhD candidates both for providing qualified personnel to the society at large and also to recruit be most talented to the research environment.

They have effectively built international student recruitment and well-linked this with the International Science Program's research school which also connected well with IRDR/UCL (UK) and RMIT Disaster Research Network. The importance and attractiveness of this research area is indicated by the call in 2011 which brought more than 700 applicants from which 22 PhDs and post-docs were recruited. The field of DRR and interdisciplinary work are and will continue to be attractive for emerging researchers. The connections with the insurance sectors are also important in this regard. They are putting in place a new organization to have an increased fraction of post-doc and research positions in order to provide graduated PhDs a career within CNDS with a continuing support of interdisciplinary work. The process above ended with 17 PhD students, 3 postdocs, and 3 young researchers (with PhD dissertations older than 3 years) all of whom were top rated. Most of the new CNDS collaborators started their employment on 1 September 2011 and will defend their theses in the academic year of 2015/16 – thus the outputs for the near future are guaranteed and so the importance of continued support.

Evaluation Report for PolregUu, UU (Uppsala Russian Research centre, URRC)

Research output

The overall grading of research output for PolregUu in an international perspective is *reaching international standards.*

This is a highly productive research environment based on the information available for 2010 through 2013. There are an impressive number of publications across types, especially journal articles, which are the most difficult to publish in given the standards of double-blind peer review. For the purpose of wide readership, researchers have published a number of works in relevant indigenous languages, which is extremely important for supporting scholars in the regions studied by UCRS and for maintaining a productive intellectual space in the 'area' that the UCRS researchers can benefit from over time. There is a good mix of senior and junior scholars in the Centre. However, some intellectual assumptions appear to be somewhat out of date, and the list of themes misses some key issues (Place in the World/ Foreign Policy/ Political Economy), which would also be important in any inter-disciplinary approach.

A highlight of this centre's work is the intellectual collaborations it has developed in the regions studied and with other scholarly environments. The researchers note a number of books that have had wide intellectual/political impact on understanding modern Russia, as well as two intensive manuscript workshops that pushed the field forward analytically and produced new transnational intellectual relationships. Such projects facilitate the publication of high quality scholarship focused on Russia and post-Soviet regions by experts in the Uppsala Russian Research Centre and elsewhere.

In general this application is certainly interesting in its mix of scholars and areas and topical. It fits in nicely with existing University institutions and expertise, including library resources. It has some deficiencies, however. It lacks a focus on Russia and the World, and Russia's contributions to debates and institution-building within the so-called BRICS group. It also occasionally seems to be a little incoherent in representing an uneasy mix of existing expertise and interests. Rather than promising theoretical or empirical insights, the project instead offers a more straight forward contemporary analysis of dynamics. It scores modestly on the former count (theoretical and empirical), whereas it scores well on networks, events, activities, and more pragmatically oriented publications. The lack of an innovative theoretical and methodological component means that the Centre's approaches to these activities will be underpinned by a rather old-fashioned problem-solving perspective, which may not offer anything new to the area of study.

Utilization and benefits

The overall grading of utilization and benefits for PolregUu in an international perspective *has developed satisfactorily*.

This is primarily a research centre whose members are active on a number of fronts that demonstrate commitment to make practically available their knowledge/expertise (e.g. on Russian energy policy, nationalism in Ukraine, and managing conflict related to ethnic differences to media) to broad public audiences and entrepreneurs, for example by reviewing transnational business-related contracts. The centre has also become a practical intermediary between researchers and students, on one side, and governments and companies in Russia and post-Soviet environments on the other. They have also worked closely with teachers and training programs in Russia and Ukraine with great success. They are particularly committed to outreach programming, attending such programming sponsored by non-academic formations such as NGOs, businesses, and government agencies for the purpose of gaining and sharing information and connections. They choose to focus on problems that connect theory and practice and have set up an interactive model between academic and non-academic individuals and formations to facilitate a seamless process of 'transfer.' At the same time, there is a strong element of weaving a narrative for centre funding around an existing body of activity and expertise, gaps are present, some contributors are more active than others, and the justification is a little behind the curve.

Expect a more rounded approach in which existing scholarship was complemented with some more creative/ speculative approaches.

Collaboration

The overall grading of collaboration for PolregUu in an international perspective is *not effective so far.*

Some stakeholders are named, and the potential benefits have been considered. However, as there are gaps in the research agenda, some of which are vital (e.g. politics, political economy, foreign policy, Russia's place in the world), this aspect is quite patchy. The intellectual contribution should be primary for research centres and funders and stakeholder engagement emerges in the longer term.

Collaboration with society and business: this has been engaged with but it's not considered the primary purpose of research. This centre understands that Islam, political upheaval, and government collapse are areas of overlapping interest between it and the Centre for Middle Eastern Studies at Lund University. Collaboration seems to be more aspirational than existing, but this may not be considered a problem by the SRC. Both centres have much to address. Moreover, there are enough differences to make it difficult to constitute (for example) joint workshops or research projects, although the circulations and politics of petro-based rentier economies may be an interesting overlap, as are the dynamics of militarism. The gaps identified (and there may be others) are important. There should be a concerted programme of international engagement and thematic development. The impression from the proposal is not this; it seems to be more weaved around continuing what is already being done.

This Centre has collaborated with other research centres focused on similar projects, including in Sweden and Finland. However, one could expect more concrete plans for the development of research links, activities, and networks with other leading and similar centres. International collaborations eastward are a strong area for the Centre, with collaborations in Russia (especially the Russian Academic of Sciences and the Higher School of Economics) and former Soviet Republics. In addition, there are collaborations with the U.S., England, Scotland, Germany, and Canada. URRC also coordinated an EU Framework 7 proposal on security and democracy in the Caucasus with 18 partners, although they came in third in the competition. The centre has also coordinated with NGOs and political opposition groups in Azerbaijan and Belarus.

The URRC highlights their 'Corruption and How to Fight it in Kyrgyzstan' Project in 2012 and 2013 to discuss effective strategic collaborations with non-academic organizations for policy purposes. In this case, one researcher in the group has become so well-known on this area that he advises the Kyrgyz government and president and has become a prominent analyst on this topic in media and public venues. One result has been a 2013 anti-corruption strategy informed by his research.

Integration with education

The overall grading of integration with education for PolregUu in an international perspective is *developed with internationally high standards.*

The centre has developed a dynamic and active interdisciplinary research environment that has attracted many scholars and professionals and helped to produce and train new ones. Part of its success is likely related to its openness to projects that emerge from the interests and expertise of collaborators or interested collaborators. Proposals are then rigorously discussed through a democratic process guided by the mission and principles of the centre. The centre has established strong relations with academic programs at Uppsala, including the M.A. in Human Rights, as well as other M.A. programs, offering advanced coursework and mentoring for graduate students. Since 2011, they have established programs to train and support two to three younger researchers per year from Russia and the former Soviet republics on social science research methods. They have mentored them as well to publish in international venues related to political science, law, peace and conflict, and law and plan to co-author an edited volume. They have also actively encouraged collaborations and residencies for Ph.D. students and postdocs from the region to work at the Centre with Swedish Institute funding. We would also expect strong links to be built with other such centres working in Europe, the UK, and the US, in order to network, increased research-based knowledge, and share expertise.

While the URRC does not have its own independent teaching program within the university, its faculty actively participate in teaching assignments in the faculties of Social Sciences, Theology, Law, Arts, and Languages, ranging from lectures to full courses. Researchers also supervise M.A. students, chair student seminars, and jointly supervise Ph.D. students, who are allowed to be in residency at the centre. They in addition provide competitive residency opportunities for non-Uppsala graduate students, for example from Sweden, Finland, UK, Belarus, and Ukraine.

Management

The overall grading of management for PolregUu in an international perspective is *on target and developing with high standard.*

The URRC offers a potentially a dynamic environment with highly engaged participants and supporters. Part of this seems to be related to a 'flat' organization with three research directors responsible for separate thematic areas, allowing convergences and new possibilities within the same environment, as well as flexibility in the capacities available to address 'emerging challenges' or new problems. In addition, since its original application, the centre has begun to collaborate with the Cultural Anthropology and Ethnology Department on 'circumpolar studies' in Artic Russia, focused on social and cultural resilience and adaptation as well as international law and resource management, in collaboration with Russian scholars. It is important that the environment work to further advancement of the environment's international standing.

A very strong aspect of the centre is its continual infusion of fresh intellectual energy through short term and long term residencies by competitively recruited graduate students from Sweden, Europe, Russia and post-Soviet areas, as well as visiting postdocs and established scholars. The centre is highly attentive to age and gender balance in their recruitment efforts, although they write that the rules of the Swedish labor market in this respect act 'as a severe constraint' on their freedom to constitute the most fruitful research environment.

The URRC is very oriented toward outreach, increasing awareness, making their research accessible across a wide range of academic and non-academic audiences, and disseminating research through all channels available to them, including public debate, websites and electronically, and seminars and workshops. The organizational structure allows them to easily address emerging societal and non-academic needs.

Evaluation Report for MolbioUu, UU (Centre for genomic and proteomic medicine)

Research output

The overall grading of research output for MolbioUu in an international perspective is *on the frontline.*

During the period 2010–2013, scientists from MolbioUu have published 611 papers, with an estimated coverage in the World of Science of 96%. The output has increased from 8 papers in 2010 to 329 papers in 2013.The proportion of these being of national and international collaboration is 54% and 60%, respectively. The proportion of publications in the top 10% and top 1% is 15.1 and 1.9%, respectively. Since each exceeds the 10% or 1% value, this indicates that a greater than expected number of the unit's publications are amongst the best in the world for this field. 15 articles were published in Nature, Science, Nature Genetics and Nature Methods in 2013.

The bibliometric analysis shows a mean citation rate of 1.62, indicating that the unit's publications are cited above the world average by 62%. The percentage of publications with an impact factor of 6 or greater was ~30%. The government has developed a national centre for molecular biosciences based upon the success of SciLifeLab. MolbioUU has completed 2814 research projects where their facilities were used, demonstrating that their infrastructure is used by the community. Another measure of the impact of the environment is the impressive number of ERC Investigator and Wallenberg Fellow and scholar grants awarded to researchers in MolbioUU. Of the 89 EU grants submitted, 32 were funded, constituting a success rate of >30%. This amounted to 38 million Euro to researchers at Uppsala. Several of the papers published by scientists in the project have provided important advances in areas such as the impact of life style factors on metabolism (via epigenetic changes), fat turnover in humans, novel in vivo approaches to visualize function and viability of human pancreatic islets, novel functional data on type 2 associated genes etc.

Utilization and benefits

The overall grading of utilization and benefits for MolbioUu in an international perspective is *developed satisfactorily.*

Regarding the capacity to transfer research results for utilization, a total of 16 patents have been filed and 5 companies founded. Three projects with AstraZeneca have received 5 year funding awards. The unit cites the advent of AIMdays™, a unique meeting concept where companies and the unit converse and discuss collaborative/common interests. Similarly, the VINNOVA-funded project 'SciLife Innovation' serves as a partnership model for bringing SciLifeLab researchers and industry together for collaborations. A total of 3 MSEK has been awarded from VINNOVA and the Uppsala node of SciLifeLab to support collaborative projects within SciLife Innovation. Two projects (Mercodia and Candix) are ongoing.

The funding was largely used to establish technical facilities with instrumentation and personnel, although a major outcome was in establishing new collaborations. The VINNOVA and AIMdays™ meetings have resulted in development of the Drug Discovery & Development (DDD) Platform and the Clinical Diagnostics Platform, which have been established to accelerate progress to translation. Altogether 379 scientists and 70 companies (including Roche AB, GE Health Care, Mercodia AB, Novartis and SKG) have participated in in the six AIMdays™. Other meetings, such as the antibiotic resistance meeting, were also sprung from the AIMdays concept. The DDD platform consists of 28 industry scientists and 10 academic scientists.

The unit has participated in over 600 activities (news articles, radio, TV) by the SciLifeLab researchers with the public in 2013, up from 30 in 2010 at the start of the SRA program. The Array facility of SciLifeLab has developed a genetic diagnosis test for mental retardation, offered now as a prenatal screen. Additional panels for tumors and inherited diseases are in development and pilot tested. Similarly clinical biomarker platforms for CVD and cancer are in clinical trials. Between years 2010–2013, 161 PhD degrees were awarded in SciLifeLab. New courses were developed to provide training in advanced techniques and methods for data analysis, given the focus of SciLifeLab in the areas of bioinformatics. So far 5 new companies have resulted.

While MolbioUU has been good at establishing and intensifying contacts and collaborations with its stakeholders, the question arises as to whether academia really has the ability to do a better job to develop drugs than industry has. All over the globe this is now an expanding academic enterprise, but so far few real breakthroughs have been achieved. The main impact of MolbioUU is through its research excellence. We have to be reminded that basic research has applications in today's society and the efforts to move funding to more applied projects are bound to fail. Basic research and business thrive in different culture. The important issue is whether those ideas emerging from the research bench with commercial potential can be identified and then moved in incubators to proof of concept, and from there into companies. Whether Uppsala has the right structures in place is difficult to judge from the material given, but one sign of success is that 5 new companies have been founded.

Collaboration

The overall grading of collaboration for MolbioUu in an international perspective is *effective in several/all dimensions.*

Although not originally having a co-applicant university at the time of application, since it's initiation in 2010, SciLifeLab in Uppsala coordinated efforts with SciLifeLab in Stockholm. This has facilitated the sharing of information and samples to enhance the overall goals of establishing biobanks, bioinformatics, and training environment. Next the plan is to extend this to encompass collaborations/satellites at other Swedish universities. The organization of the AIMdays™ and now the spin-off meetings from this are projected to facilitate further collaborations. So far several SRAs have collaborated with SciLifeLabUa, including U-CAN, EXODIAB and U-CARE, and apparently a cooperative of sorts with U-Can and epiHealth for biobanks. One wonders however how the collaboration on developing biomarkers and clinical diagnostics is being pursued within the context of the entire SRA system.

There are 222 reportedly unique collaborations at 155 organizations as a result of the inception of SciLifeLab, with 44 being national and 59 being international. The largest portion of these is in academia. Working collaboratively outside academia, SciLifeLab is working with ELIXIR, a European bioinformatics infrastructure, to collectively archive, integrate analyze and exploit the large and heterogeneous data sets. An application for a Swedish node of the translational infrastructure EATRIS has been submitted. Funding has not yet been noted as attained.

In the case study, four universities are collaborating. AstraZeneca and SciLifeLab have a 4 year grant (2014–2018) for new treatments against cancer stem cells using SciLifeLab platforms. This collaboration is noted as having greater potential to lead to clinical development since it is with industry. However, one misses any results so far (perhaps too early to discern) to show that this has had a meaningful or substantial impact.

Integration with education

The overall grading of integration with education for MolbioUu in an international perspective is *developed with internationally high standards.*

The researchers at MolbioUU are participating at all levels of education in Uppsala, starting from undergraduate all the way to PhD training. Especially in bioinformatics they are a crucial element in the teaching activities in Uppsala. Because MolbioUU has developed such an outstanding repertoire of technology platforms, they provide essential training grounds for the biomedical community in Uppsala. In 2013, 43 new courses were developed to be topical to the focus of SciLifeLab. Courses were also taught at other major Swedish universities. The point to this was to provide Bioinformatics teaching to fill strategic niche since industry has been cutting back in the discovery phase of science. Also courses in genome sequencing, population genetics and proteomics have been organized. Their PhD training program is also delivering highly trained graduates for the Swedish community: 161 PhDs since 2010. An additional program that has been initiated is the SciLife Fellow project, predicted to be a major asset to the education and training mission.

Management

The overall grading of management for MolbioUu in an international perspective is *on target and developing with high standards.*

SciLifeLab carefully and strategically selected young promising scholars as group leaders. MolbioUU now has 175 group leaders. Most of them were already in Uppsala but they recruited six young group leaders who have been successful. Obviously new blood is life elixir of every research environment, thus one hopes that MolbioUU build in a turnover element into its structure so that exchange is guaranteed. Nearly all of the new recruited group leaders published in the topmost journals in the last 2 years. This strategy was seen as so successful that it has been adopted as the strategy for the new national board of SciLifeLab.

With the formation of the DDD in combination with the targeted AIMdays™ conferences, the direction of the management seems appropriate. As of 2013, the management team is 21 people, ~50% fewer women than men, although an equal number of men and women PhD's are produced with the program.

The organization encompasses a steering committee, a management team, and a committee to manage the technology platforms. The overall leadership is in the hands of a director and two vice directors. In 2013 a national SciLife board was established. While this national program is exciting, showing the success of the SciLifeLab SRA (in that that it is to be emulated in a nationwide program), the management of the research environment is now complicated due to the wider-spread reach of SciLife nationally. How this will be managed effectively is uncertain at this time.

In the self-assessment, MolbioUU stresses the establishment of the platforms in clinical diagnostics and drug discovery as their contribution to meet societal needs. One hopes that they are right in this assertion, as it might be argued that academia cannot do a much better job than the Swedish pharmaceutical companies have done. As such it is recommended that an evaluation of these efforts be conducted so that corrections can be made as needed. The great value of MolbioUU is their world class research and their superior infrastructure.

Evaluation Report for EvetUu, UU (eSSENCE – An eScience collaboration)

Research output

The overall grading of research output for eSSENCE in an international perspective is between *on the frontline* and *reaching international standards* with a tendency closer to *on the front line.*

The report outlines impressive numbers for eSSENCE, especially for journal publications. Questions need to be asked, however, how researchers can publish such a high number of journal papers: 110 involved research staff – the # of part time researchers are unclear – deliver 81 journal papers which usually take 12 – 18 months from final paper acceptance until official publishing. For a proper scientific community discussion there should be a balance between journal papers and conference papers with a majority on journal papers in this field of science but with a significant portion of conference papers in order to build up a good network.

eSSENCE covers a wide spectrum of application areas, which is quite expected as computational approaches nowadays penetrate nearly all areas of scientific enterprise. eSSENCE provides resources to computational scientists in terms of hardware, software and application support. In judging the research output, one has to bear in mind that computational methods are enablers and that the scientific value is judged by the standards of the scientific domain. eSSENCE provides support and capabilities. The domain areas are generally strong, well established and internationally visible. The work is in general of international standards and in some cases front-line and path-breaking. What are less obvious are advances and breakthroughs in computational methods and capabilities (e.g. novel algorithms, parallel-computing tools, databases, machine-learning and big-data analytics etc.).

Major contributions have been realized in the fields of dynamic simulations of material magnetics computational biochemistry, dynamic eye movement tracking and large scale eigenvalue problems.

Utilization and benefits

The overall grading of utilization and benefits for eSSENCE in an international perspective *has developed satisfactorily.*

The transfer of eSSENCE research results happens (i) from e-science capability providers to domain areas and (ii) from science domains to industry and society at large. eSSENCE provides crucial support to some areas (e.g. computational chemistry, molecular dynamics, materials simulation etc.), which in turn have demonstrated successful knowledge-transfer activities. The existing influence of eSSENCE (compare the high # of activities (media, conferences etc.) should be used more industry application oriented and targeted. There exist, however, a number of cases where the eSSENCE solution approaches have already been transferred (e.g. integrative data analysis or numerical methods for heart surgeon). eSSENCE has concentrated its effort towards industry mainly in the fields of material science (research on metal oxides), pharmaceutical industry and multi-physics simulations for computer gaming and 3D CAD / PLM industry.

The impact with respect to utilization of eSSENCE methods is on a modest level only but significantly increasing, usage of good services and process is low. The industry collaboration level is rather low and on a declining path.

Collaboration

The overall grading of collaboration for eSSENCE in an international perspective is *right in between effective in several dimensions* and *effective in all dimensions.*

eSSENCE collaboration with the other academic partners could be well established (examples are the set-up a research community which identifies new areas of application and participates in international networks). Also novel collaborative research formats and projects have been introduced (e.g. a 2-years post-doc program). A high number of collaborations exist with academia, the highest number exist even on activities with project and resource contribution character.

The collaboration appears smooth and forward-looking. eSSENCE has a wide network with collaborations throughout the world, incl. a number of partner universities in the Netherlands, in Germany and in Great Britain. eSSENCE could already win 25 of EU FP7 project funds and is active in conducting international conferences like the IEEE on e-science in 2011 (together with SeRC).

However, from the e-science point of view one can perhaps see some deficiencies, for example in the relatively limited role given to data-intensive methodologies and resources (machine learning, data analytics etc.). The division of e-science activities into two SRAs (eSSENCE, SERC) appears not to be the optimal solution for Sweden.

Integration with education

The overall grading of integration with education for eSSENCE in an international perspective is *in between under satisfactory development* and *developed with internationally high standards.*

First of all, eSSENCE activities and key personnel are well embedded in the host universities, with the PIs and scientists playing an active role in education at all levels. The eSSENCE partners have created a national graduate school for e-Science technology (SeSE: Swedish e-Science Education). In addition, eSSENCE is also active in undergraduate course offering. The number of 37 PHD certificates and the number of 23 licentiates is o.k. but not on the highest level compared internationally.

Management

The overall grading of management for eSSENCE in an international perspective is *on target and developing with high standard*.

eSSENCE is well managed, with an experienced team of PIs with strong scientific track records and demonstrated management skills. There is some concern of renewal aspects and the relatively small engagement of junior faculty to managing and developing eSSENCE.

eSSENCE has established a management system by setting-up of a *Programme Council* (developing the program as a whole), a *Management Group* (developing the program towards the eSSENCE goals, implementing collaborations, coordinating the activities and preparing reports and controlling the budget) and *Reference Groups* (including PIs). Alternations in membership happened, but on a moderate level only. Specific recruitment initiatives and mechanisms have been established both on a national and international level. With the help of those mechanisms the high number of recruitments could be achieved.

eSSENCE is primarily working through a network approach to identify new ideas, needs and project modifications. Special workshops are set-up to discuss and align those new topics. It remains, however, unclear to which extent those workshop results are treated as serious input to the project management decisions in terms of realizing them as part of project adjustments or new editions.

Evaluation Report for CancerUu, UU (the U-Can Comprehensive Cancer Consortium)

Research output

The overall grading of research output in an international perspective for CancerUu is *on the frontline.*

The publication output has been high taking into account that this consortium is smaller than many others: number of the publications in the bibliometric study is 626 and many of them have involved either national or international collaborations. The publications include papers in top journals and based on quality measurements and citations the numbers are clearly higher than the international average. The primary goal of U-CAN is to establish bio-banking for longitudinal sampling of tumor and blood samples before, during and after therapy and to create a new platform where clinical expertise and longitudinally collected biomaterials are closely integrated with preclinical expertise. Collecting and follow-up processes take a long time and therefore, the full impact will come only later. However, this type of activity is of primary importance in cancer field. U-CAN has already made and published technical improvements of bio-banking procedures.

Utilization and benefits

The overall grading of utilization and benefits in an international perspective for CancerUU *has developed satisfactorily.*

Currently the process has reached the stage, where the U-CAN infrastructure and collections are now readily available to researchers in order to improve diagnosis and treatment. Technology developed for U-CAN bio-banks has resulted in a new company, ExScale Biospecimen Solutions AB, with launch of a commercial product in late 2014. Also the Regional Cancer Centres (RCC) with direct impact on the cancer care in Sweden collaborates closely with U-CAN. Thus, U-CAN has demonstrated its capacity to transfer its achievements to academic, health care and business world. It is expected that when the collections with long-term follow up are ready the end users will be many.

U-CAN has arranged meetings with presentations of the progress and aims of U-CAN for several representatives of Uppsala-based companies. Moreover, U-CAN has together with UU innovation arranged an additional meeting day with local businesses to engage stakeholders in problem formulation and implementation. For example, the research-based pharmaceutical industry organization in Sweden has continuously been involved in the data specification phase for real-time clinical databases for the different diagnoses to ensure that industry needs are met. Several pharmaceutical companies support the inclusion of additional cancer types by grants to U-CAN demonstrating the attractiveness of the mission of U-CAN.

Due to the long-term nature of U-CAN project, its full impact remains to be seen. However, current development with a wide variety of collaborators (as stated above) is promising and satisfactory.

The number of doctor degrees has been rather good. However, based on the numbers given the personnel exchange between academia and industry has been practically non-existing and could be significantly higher. Instead, in providing the knowledge related to bio-banking such as sample collections, sample information, data management etc. U-CAN researchers have been essential.

Collaboration

The overall grading of collaboration in an international perspective for CancerUU is *effective in several dimensions.*

The U-CAN partners have the following portions in the consortium: University of Uppsala (50%), University of Umeå (40%), University of Stockholm (5%) and KTH (5%). It looks that Universities of Uppsala and Umeå and their affiliated hospitals have significant collaborative efforts to reach the goals of U-CAN and thus increase its international standing, but University of Stockholm and KTH do not have that much of input in these collaborative efforts at the moment. Their platforms may be needed more in the future?

U-CAN has collaborated with StratCan and BioCare on cancer related aspects. Close interactions have also been taken place with the strategic project U-CARE. U-CAN has close collaboration with the strategic initiative Science for Life Laboratory to sequence cancer genomes. These collaborations are without any doubt helping to increase the international visibility of cancer research in Sweden.

U-CAN researchers have fruitful collaborations with many different foreign universities that are leading in their field of research. Fruitful collaborations can be verified from the significant number of joint publications together with international groups. This is also an area, which most likely will increase in near future due to the unique cohorts of U-CAN. These cohorts will inevitably make U-CAN an attractive partner for many studies.

As stated earlier U-CAN has close contacts and collaborations with several industrial partners. This is also an area that is likely to increase in future.

The case study (COMDIA) is a mission of several partners to bring new molecular methods developed by academic partners and commercialized by SMEs to improve clinical diagnostics. The role of U-CANs has been to collect the human tissue and plasma samples to test new/improved methods to detect mutations, which have impact on clinical management. One key component in U-CAN and in the COMDIA project has been to develop a workflow for efficient extraction of biomolecules from tissue samples. This work has resulted in a new method to extract DNA and RNA from tissues. It was patented and formed the basis for the start-up of ExScale Biospecimen Solutions AB in 2012. The project has run 2010–2014 and involved several partners. It looks actively proceeding.

Integration with education

The overall grading of integration with education in an international perspective for CancerUU *is under satisfactory development.*

From the description regarding education one is left with impression that integration with different levels of education is somewhat limited as it mainly seems to cover training of young scientists. U-CAN has initiated a research school 'Individualised Cancer Therapy' which is based on a one-week intensive course, attendance at a seminar series and practical exercises, demonstrations and site visits. The course is given annually both in Uppsala and Umeå. In addition, there are several specific courses and seminars offered by U-CAN.

Management

The overall grading of management in an international perspective for CancerUU is *developing with high standard.*

The management structure of the U-CAN is rather complex consists of several committees/working groups: Programme Council, Management Group, Project Coordinator/Administrative Director, Executive committees, Research Boards, Prioritization group, Diagnosis and Working groups. The outcome of U-CAN so far indicates that the management has succeeded well.

The use of recruitment is not described very clearly and therefore hard to assess. For the goals of U-CAN the recruitment of clinicians and researchers from other hospitals is important, because it will significantly increase the number of patients and samples in the bio-bank. Moreover, active recruitment of promising scientists is in focus to foster a new generation of excellent scientists and the future of U-CAN.

The management has been able to lead the consortium well that can be seen especially from the successful alliances with health-care and pharmaceutical industry. These alliances are fundamental to meet the societal needs caused by cancer.

Evaluation Report for VardUu, UU
(U-CARE Better Psychosocial Care at a lower cost?)

Research output

The overall grading of research output for VardUu in an international perspective is *reaching international standards*.

The number of outputs has grown considerably over time and the nature of the research (i.e. RCTs; need to develop software) implies a lag to publication. There is not as much international collaboration on outputs as might be expected.

Scientific impact is felt to be borderline for reaching international standards: they state interest by 9 research groups in using their U-CARE portal but it is less clear what that means from an academic perspective, e.g. they have a very small number of visiting researchers and, as noted above, only about a quarter of outputs have international collaborators. Additionally, the novelty/distinction of their approach to care is perhaps not as strong as they state (although undertaking the RCTS is clearly novel) and in the meantime there could be more scope to orientate themselves to the international community in respect of broader issues such as use of the internet to deliver (non-psychosocial) care.

Overall, there is recognition that the nature of the RCTs means there is a lag to impact and outputs and that this may well develop further in future, but in the meantime there perhaps could be more international focus and orientation.

Utilization and benefits

The overall grading of utilization and benefits for VardUu in an international perspective is has *not developed satisfactorily*.

Whilst there is agreement that stakeholder involvement in problem formation and implementation has developed satisfactorily, in the other 3 dimensions, there is less satisfaction. There are relatively few collaborations allowing for translation to practice and none with public agencies; the intentions are stated but evidence is not apparent. Several potential impacts on society are listed (eg, better and more equal access to services, more cost-effective provision; more participation in own care), all of which are very admirable, but these do not appear to be borne out in practice, with only one instance of research impacting on a public agency reported in each of the 3 years. The impact on business again seems restricted to potential, rather than actual impacts, and collaboration with businesses is not as extensive as predicted in the application and the centre seems to be a bit narrow in their thinking about who may have an interest (e.g. beyond app designers and computing industry). There is what sounds like a very good collaboration with Uppsala University Innovation Unit which might help transfer results to practice, but the survey suggests relatively few collaborations of type 2 or 3 which indicates perhaps limited interest in/scope for translation; and zero collaborative partners in public agencies (the latter is recognised by the group as an area for improvement).

In terms of the provision of qualified personnel or research based knowledge, there is again a hypothetical response rather than evidence – with the exception of the mobility programme with the University hospital – and the focus of the response to the survey question seems to be on the research topic rather than on the organisation and what it can achieve.

Overall, whilst there appears to be a great deal of potential for impact and benefits, the evidence that it is happening is rather sparse. An important caveat to this evaluation is that the nature of the research has meant a lag whilst the software has been developed and also a lag whilst trials are undertaken. So the lack of immediate impact is to some degree understandable, but nevertheless some more progress might have been expected even at this stage.

Collaboration

The overall grading of collaboration for VardUu in an international perspective is *effective in several dimensions*.

The main strengths appear to be in relation to strategic collaborations described in the case study and also in terms of some non-academic collaboration. Thus the links with patient groups appear strong and collaborations have been made with registries to facilitate data collection and many clinical specialties. It is less clear what links have been made with public and government agencies. With regard to international collaborations, there are several links with research groups in the UK, Belgium, Italy, Denmark, Holland and USA: joint papers, joint bids, appointments and exchange visits are mentioned. But these do not seem to be reflected in some of the data provided, e.g. apparently low collaborative outputs and low numbers of visiting researchers. A local grant has been obtained to plan a future EU application so this is promising for the future.

Collaboration with other SRAs is marginal although there are some links with Information Systems as an academic discipline within their own University. The collaboration with Lund University for health economics described in the application did not proceed because a link was made with their own health economics group instead.

Integration with education

The overall grading of integration with education for VardUu in an international perspective is *under satisfactory development*.

UCARE has developed new courses in their field of psychosocial care and collaboration with a Dutch group has established graduate education in Complex Interventions. Many researchers have teaching responsibilities in Uppsala University and contribute in programmes in health, informatics and social sciences. There are some interesting developments planned around ICT teaching for the future.

Management

The overall grading of management for VardUu in an international perspective is *on target and developing with high standard*.

UCARE is to be applauded for setting up a new organisation and a new research field which is an ambitious task and will take time to achieve. However, within this overall grade there are some weaknesses identified. In particular, there is a lack of detail with regard to the research environment's capacity to meet societal needs. There is general discussion about the relevance of the research topics to the future of the healthcare system (which is accurate of course), but a lack of information about how the group will ensure they will achieve these things. General discussion about involving end users in research and strengthening links with business are not very convincing without the added detail about precisely what will be done. The specific planned actions of organising post-doc positions co-funded by industry and academia and enhancing management by involvement of expertise in entrepreneurship are sound ideas but why they are only just at the planning stage now, rather than having been progressed at least partially already, is not clear.

The international standing of the group is hampered slightly by the need for Swedish speakers in relation to delivering the intervention and there are attempts to overcome this, but closer international links with top researchers may have been expected by now – the links with other countries should be monitored to ensure they are translated into concrete actions, such as joint grant applications and papers.

The opportunities given to younger and early career researchers are very good and these should pay off in terms of producing high quality capacity in the future.

Evaluation Report for EnergiUu, UU (Stand Up)

Research output

The overall grading of research output for EnergiUu in an international perspective is *on the frontline.*

The increase in number of researchers involved in the environment is also reflected in the increasing number of publications, with journal papers and conference proceedings being the dominant channel; several publications were in the top journals. Some basic research results are published in high impact journals whereas more applied research results are published as conference proceedings. It is claimed, but clearly documented that co-publications among environment partners increase due to the research collaboration. Some reflection on co-publications with industry would be useful.

According to the bibliometric study, publications are well covered by WoS and proportion of publications based on national and international collaboration is relatively low (20% and 38%). The impact of the publications are high, with 1.65 mean citation rate and in the absolute top of the proportion of top 10% and top 1%. The publication rate has increased by more than 3 (3.3 for journal articles; 4.2 for conference publications) while the number of personnel has gone up by about 2.2 times. The number of journal articles per person is 0.83. Since the funding in the last year was 5M euros, the journal articles per M euros of funding was 73.

The report states 'Standup's academic impact is reflected in: a) publications in high-impact journals b) invited speakers at international meetings, c) opening of new research fields, d) participation in national and international networks, and e) external grants. Ocean electricity production, power converters, and solar cell research are of highest international standards as measured in internationally peer reviewed internal university evaluations.' This and other material provided indicates a high-level of scientific impact.

Utilization and Benefits

The overall grading of utilization and benefit for EnergiUu in an international perspective *has developed satisfactorily.*

StandUp has research in marine and solar energy, batteries and power electronics, all with applications in industry. The environment has reported annually on an increasing number of applications for IPR, research agreement with industry and mobility between academia and industry. KIC InnoEnergy (hereafter KIC) is mentioned as an example of a strong long-term collaboration with innovation as the key target. It is unclear whether the KIC is included or complements the strategic research environment. The bi-annual StandUp Academy meetings are mentioned as important fora for transfer of knowledge but this is not, by itself, a sufficient mechanism for transfer for the utilization in society or business sector. Spin outs are mentioned as an indicator of transfer of results and several spin out companies are mentioned but not supported by the statistics provided. Another indicator is the impressive number of applications for immaterial property rights being filed.

The strategic research environment has produced results that have an impact on the industry. A proxy for measuring impact is the number of spin outs and collaboration with industry, where some examples are mentioned (though no statistics). Pilot demonstrators are mentioned, but without further information. An interesting example of impacts is in the area of legislation where they are making the links between ecology and energy production; they are developing an all-embracing systematic legal approach which could have positive broad implications. The StandUp community is also active in public conferences and fairs, media, policy networks and schools, and other outreach activities. In schools, they are working to educate future generations. Their website, supported by a communications officer (www.standupforenergy.se) is part of actions to ensure impact and visibility in society and, probably through that to business.

The research education in form of PhDs and postdocs are mentioned as perhaps the largest impact of the environment to the society and an average 25–30 PhDs, with the number of females about doubling and males about tripling, and licentiates have been obtained in the period. It is very positive that industry to a large extent participates in steering groups for the different PhD projects, supports industrial PhDs and even co-supervises

PhD. KIC is mentioned as an example where two of the four universities develop their educational triangle between academia, industry and innovation.

Collaboration

The overall grading of collaboration for EnergiUu in an international perspective is *effective in several dimensions.*

They have decided to use recruitment of younger co-workers (researchers?) to build new cross-cutting research fields. An agreement is being formulated by the four Vice Chancellors to have a long-term vision of StandUp as a major international research and innovation collaboration platform. They have agreed that UU will focus on renewable electricity production in collaboration with LTU, KTH on renewable electricity production and propulsion of electric vehicles and SLU on energy and climate assessment. It is unclear how the different universities make sure that the strategic resources support Stand-Up's intentions and strategies or how the management structure supports and monitors the development of the program in a proactive way. It is not the four partners in StandUp that have engaged in KIC but the two dominant StandUp universities. It is therefore unclear how the linkage between the Stand-Up next generation and the KIC is foreseen in the strategy under development.

There is interesting collaboration with the e-science program ESSENCE (UU) and SERC (KTH) on models for energy relevant materials and modelling for wind flows with CNDS. KIC is mentioned as an institution that has stimulated increased interaction with academic institutions and European companies. This has not been documented by StandUp.

The environment reports to have major strategic collaboration with industry, 46% of 261 collaborations in 2013 and a similar % in 2012. Half of these collaborations (54%) are characterized as either a collaboration which supports and participates in sub projects with resources to the environment or even strategic collaborations contributing with long-lasting resources. Examples are highlighted, including major competency centres where problems are addressed together with industry such as bilateral collaborations with ABB and utilities and the automotive industry. Interesting is to notice that a sort of work of division is foreseen between research institutes such as SICS, Swera and Skogforsk to address the more applied research and the universities to address the more fundamental research. Whether this has been deliberately been the strategy and action throughout StandUp is difficult to judge. Again KIC is mentioned at the facilitator of new meeting places for European companies.

It is interesting that the environment has chosen the case of Swedish Hybrid Vehicle Centre which is hosted by Chalmers; StandUp is not the lead but KTH and UU researchers are deeply involved in all three research themes and taking the lead in one of them. The Centre of excellence is a convincing example of a strategic collaboration between the involved universities and the industry. It is however unclear which role StandUp as an environment has in the Centre of Excellence. Industry partners in SHC give lectures at the bachelor and master courses, and SHC inspires the other StandUp partner SLU to embark on LCA of non-road machinery.

Integration with education

The overall grading of integration with education for EnergiUu in an international perspective is *under satisfactory development.*

The environment notes that with KTH and UU being partners in KIC, KIC is thereby also a partner in StandUp and hence contributes to the overall educational programmes at KTH and UU, in particular incorporating innovation and entrepreneurship. It is not clear with respect to this claim and clarification is needed about what is the StandUp environment core/contributing activities vis-à-vis other collaborations, such as for example KIC.

However, there is no doubt that the strategic funding with its emphasis on researcher education contributes to PhD and post doc activities as an integrated part of the environment, and for the two smaller university partners of StandUp. No example is mentioned where all four partners are involved in research education together nor in master program.

Recruitment of faculty with an international background has led to a revitalization of energy related courses and most scientists in StandUp are involved with teaching at all levels. There has been a joint master of engineering program strengthened and new courses offered in other masters programs. They have also new on-line courses for distance education in wind power at Campus Gotland.

Management

The overall grading of management for EnergiUu in an international perspective is between *not convincing so far* and *on target with high standard.*

The question is whether SRA is regarded seed money to the Swedish branch of KIC and other strategic initiatives or whether StandUp is a strategic environment in its own right around which other initiatives are evolving, nurtured and developed. The KTH and UU involvement in KIC has developed gradually over the years with demonstrated results in terms of new educational initiatives, networks, etc. But this can only be regarded a fragment of the environment, with only two (though dominating) of the four partners participating. The managerial linkages between the environment and the various other strategic initiatives are unclear. The same goes for other strategic centres.

Major changes in the environment have taken place since the inception, which demonstrates dynamic, vibrant academic communities (though with or without the visible hand of the Stand-Up management): new research direction on natural resources and climate impact; inclusion of the energy systems group and linkages with other disciplines; new pilot plants; and establishment of KTH transport laboratory in 2013. The environment has deliberately worked to strengthen the university faculties with talented assistant and associated professors within emerging areas. With these new, young and often international faculty members, energy related courses have revitalized, new courses have been established and e-courses developed. The environment has actively made internal recruitment efforts towards its student communities in combination with international advertisement of all PhD and post doc positions to attract the best possible candidates, encouraging younger faculty. The mobility pattern between industry and academia goes each ways.

Without doubt the individual partners of StandUp manage and conduct their activities with respect to meet the societal needs, but the sum of the individuals does not substitute for a managed StandUp community. On the web, the StandUp for Energy only states individual researchers responsible for the various research areas without mentioning the program coordinator, whereas the newly established StandUp for Wind program highlights the management structure, including director, chairman of the board, responsible researchers and members of the board.

It is difficult to judge whether this actions above are due to a deliberate, aligned and coordinated effort by the environment or something which each institution would have pursued anyway. A strategic environment with this level of funding and with the ambition to effectively and efficiently to manage the environment's capacity to meet societal needs a much stronger management set-up, not least a daily management preparing decision support to the strategic bodies and implementing the various activities across academic and institutional boundaries.

APPENDIX 5: SRA ENVIRONMENT SELF-EVALUATION

In 2009 the Swedish Research Council, Formas (Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning), VINNOVA (Swedish Governmental Agency for Innovation Systems), and the Swedish Energy Agency submitted recommendations on financing 43 grant applications for the 20 strategic research areas that the Swedish Government designated in the Government Research Bill A Boost to Research and Innovation (2008/09:50). The overall policy of the Swedish Government is to strengthen Sweden's position as a research nation and thereby increase its scientific competitiveness in a globalised world.

The 43 research environments are financed from 2010 through 2014. This funding is for a 5-year period and reached 1.35 billion Swedish kronor (SEK) in 2012. The funds are allocated directly to the higher education institutes (HEI).

The evaluation

The Swedish Research Council, Formas, VINNOVA and the Swedish Energy Agency have been commissioned by the government to conduct an evaluation of the strategic research areas. The evaluation will be reported to the government on May 1st 2015. A working group consisting of representatives from the Swedish Research Council, Formas, VINNOVA and the Swedish Energy Agency, and Forte as a consultation partner, was formed in 2013 to plan and implement the evaluation.

The evaluation will be conducted by an expert panel with experience and expertise within these five dimensions, and having an academic profile that matches the broader themes of the strategic research areas. The panel will utilize the applications from the research environments, the follow-up studies from the strategic research areas (2010–2013), self-evaluations, bibliometric data and conduct hearings with university pro-chancellors and representatives of the research environments.

The evaluation focuses on five dimensions:

1) Management and planning of the research

2) Output and quality of the research
   Striving for scientific excellence was the fundamental criterion for the review of all submitted applications for strategic research areas.
   The assessment of research output in the evaluation will include the potential for development of the scientific environment, the prioritisation made among activities to generate conditions for research excellence, and strategies to increase international scientific competiveness in the research area.

3) Utilization and benefit of the research for society and industry
   The research is expected to be of strategic importance for society and the business sector. The assessment includes the research environment’s capacity to generate benefits from research findings.

4) Collaborations
   The research is expected to be of strategic importance for society and the business sector. This includes strategies for the engagement and participation of the business sector, industrial research institutes and other community organisations in problem formulation and implementation. The assessment in the evaluation includes strategic collaborations that aim to strengthen the research, its importance for society and the business sector and to further advance the research environment’s international standing.

5) The link between research and education
   There should be a link between the strategic research and advanced education and research training. The

assessment in the evaluation includes the research environment's capability to provide the industry and society with qualified personnel and research based knowledge.

Aim and expected outcome

The overall aim is to evaluate the development of the quality of the research made at the HEIs and in the designated research areas and environments in relation to their own unique starting point and pre-requisites. The financed research is expected to not only represent research of the highest quality but to be part of the international scientific frontline. The object of the evaluation is to illuminate and clarify whether this is the case and the possible added value of the 2008 government initiative.

The self-evaluation

The self-evaluation is part of the background information for the evaluators in their assessment of the increased support to strategic research areas and the included research environments. The self-evaluation is distributed to each one of the 43 research environments included in the government's investment in strategic research areas.

The focus of this self-evaluation is

1) Research Output
2) Strategic value for society and the business sector
3) Collaborations
4) Research and Education Integration

The following should be considered when you are carrying out the questionnaire:

- The self-evaluation should be answered in consultation with co-applicant(s).
- When answering the questions, the original grant application and the previously reported information provided in the annual follow-up studies should be considered.
- There is limited space for your answers, use it to give as detailed and to-the-point information as possible.

OUT: Research Output

OUT 1a) Publication profile (includes questions 1a-b).

Please fill out the proportions of different kinds of publications from the strategic research environment (numbers should correspond to the number of publications reported in the 2010–2013 follow-up studies)

Output type	**Number of outputs 2010**	**Number of outputs 2011**	**Number of outputs 2012**	**Number of outputs 2013**	**Total outputs**	**% of total outputs**
Books						
Book Chapters						
Journal Articles						
Conference Publications						
Other						
Total						

OUT 1b) Please comment on the publication profile and its development over time (Out 1a) (1600 characters)

OUT 2) What research results from the strategic research environment have had the most significant academic impact? Describe briefly the development and standing of the research compared to the research performed internationally. (1600 characters)

STR: Strategic value for society and the business sector

(Compare to question B6 in the follow-up focusing on the industrial and/or societal problems and needs that have been addressed in the research.)

STR 3) Elaborate on your strategic research environment's capacity and capability to transfer research results for utilisation in society or the business sector. (1600)

STR 4) Elaborate on the impact of your research to society. (1600)

STR 5) Elaborate on the impact of your research to the business sector? (1600)

STR 6) Exemplify how industrial and societal needs have been identified and how it has influenced the choice of research problems addressed. (1600)

COL: Collaborations

Collaboration with co-applicant(s) universities/research institutes

COL 7) What is the long term plan for the collaboration between host-university and co-applicant(s) regarding the strategic research environment? (1600 characters)

COL 8) What has been the major challenges in the collaboration between host-university and co-applicant(s) regarding the strategic research environment? (1600 characters)

Collaboration with other strategic research environments

COL 9) To what extent have you collaborated with other research environments included in the strategic research areas? (500 characters)

Strategies and support regarding collaborations

COL 10) Describe the purpose of different kinds of collaborations to reach the intentions of your strategic research? (Please make use of Table B3 in the annual follow-up studies) (1600 characters)

COL 11) Describe the development, since the start of the funding, of your international collaborations with partners in and outside academia (including the EU Framework programme). (1600 characters)

Collaboration Case Study

We have chosen a case study format. This to create the possibility for you to focus on one successful ('best practice') project that includes collaboration as an example of when it has served the purpose of conducting research of high international quality with relevance for society or the business sector.

COL 12) Choose one of your research projects that include collaboration with one or several non-academic organizations or companies to illustrate how collaboration a) has improved the research quality and b) has improved the prerequisites for society and the business sector to utilise the research.

When describing your case we would like you to consider the following aspects:

- A description of how the collaboration has been organised (*contracts; division of labour;*
- *meetings; financial or in-kind contributions etc.).*
- If and in what way the research collaboration has led to advances or alterations in higher education programs associated with the strategic research at the university
- If and in what way the research collaboration has led to an improved international status of the strategic research environment.
- The major challenges in this research project with regard to its collaborative aspects.

Name of Project: (100 characters)

Short description of the project: (500 characters) Project Period:

Collaboration partners (maximum 2). Please enter confirmed contact information.

1. Organisation:	2. Organisation:
Contact person:	Contact person:
E-mail:	E-mail:

In total you have 6000 characters at disposal for your case study (including the space given for the name of the project and its short description above).

INT: Research and Education integration

INT 13) Exemplify how research within the strategic research environment is integrated with different levels of education (1600 characters).

INT 14) Explore to what extent the educational programs associated with the strategic research environment provide the industry and society with qualified personnel and research based knowledge. (1600 characters).

INT 15) Explain to what extent you use international recruitment of students (including research training of PhD students and post-docs) to achieve the goals for the strategic research environment? (1600 characters).

OTHER:

OHT 16) What are the major changes made in the research program since 2009? Please describe and motivate (1600 characters).

OTH 17) Describe your long-term strategy for the supply of competence to the research environment, both in terms of research capacity and leadership. How are succession, equality and diversity dimensions incorporated in this? (3200 characters).

OTH 18) Have you applied for, and/or received EU-funding within the scope of the research environment? Please list the number of applications and received grants respectively. (500 characters).

OTH 19) Elaborate on how your research environment ensures that also future industrial and societal needs are identified and incorporated in the research (1600 characters).

OTH 20) What has the specific funding from the strategic research grant meant to your research environment? (1000 characters).

APPENDIX 6: HEI MANAGEMENT SELF-EVALUATION

Introduction

In 2009 the Swedish Research Council, Formas (Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning), VINNOVA (Swedish Governmental Agency for Innovation Systems), and the Swedish Energy Agency submitted recommendations on financing 43 grant applications for the 20 strategic research areas that the Swedish Government designated in the Government Research Bill A Boost to Research and Innovation (2008/09:50). The overall policy of the Swedish Government is to strengthen Sweden's position as a research nation and thereby increase its scientific competitiveness in a globalised world.

The 43 research environments are financed from 2010 and reached 1.35 billion Swedish kronor (SEK) in 2012. The funds are allocated directly to the higher education institutes (HEI).

The evaluation

The Swedish Research Council, Formas, VINNOVA and the Swedish Energy Agency have been commissioned by the government to conduct an evaluation of the strategic research areas. The evaluation will be reported to the government on May 1st 2015. A working group consisting of representatives from the Swedish Research Council, Formas, VINNOVA and the Swedish Energy Agency, and Forte as a consultation partner, was formed in 2013 to plan and implement the evaluation.

The evaluation will be conducted by experts with broad experience and expertise in management and planning of research, and with academic profiles that matches the broader themes of the strategic research areas. The panel will utilize the applications from the research environments, the follow-up studies from the strategic research areas (2010–2013), self-evaluations, bibliometric data and conduct hearings with university pro-chancellors and representatives of the research environments.

This part of the evaluation focuses on the management and planning of research when it comes to

1) Output and quality of the research

Striving for scientific excellence was the fundamental criterion for the review of all submitted applications for strategic research areas.

The assessment of research output in the evaluation will include the potential for development of the scientific environment, the prioritisation made among activities to generate conditions for research excellence, and strategies to increase international scientific competiveness in the research area.

2) Utilization and benefit of the research for society and industry

The research is expected to be of strategic importance for society and the business sector. The assessment includes the research environment’s capacity to generate benefits from research findings.

3) Collaborations

The research is expected to be of strategic importance for society and the business sector. This includes strategies for the engagement and participation of the business sector, industrial research institutes and other community organisations in problem formulation and implementation. The assessment in the evaluation includes strategic collaborations that aim to strengthen the research, its importance for society and the business sector and to further advance the research environment’s international standing.

4) The link between research and education

There should be a link between the strategic research, advanced education and research training. The assessment in the evaluation includes the research environment’s capability to provide the industry and society with qualified personnel and research based knowledge.

Instructions for the University Management self-evaluation:

- One self-evaluation per strategic research environment should be submitted
- Questions UM1 and UM2 are not research environment specific; the answer should be the same in all submitted self-evaluations regardless of which strategic research environment the self-evaluation represents. UM 3–5 are specific to the strategic research environment at hand.
- The self-evaluation should be answered by the pro-chancellor of the host HEI in consultation with co-applicant(s)
- The name of the question (i.e. UM1 for example) and the question itself should be included in the submitted document with answers. **The total length of the document should not exceed 14 pages including the questions**.
- The self-evaluation(s) should be **submitted as PDF-files saved using the acronym** used in the follow-up studies (See Appendix 1) and submitted to eva.mineur@vr.se with a copy to anders.sundin@vr.se

Last response date is June 30, 2014.

Self-Evaluation Questions:

Name of strategic research environment: Acronym (See Appendix 1):
Host University:

Rapporteur (Name and title): Co-applicant(s):
UM 1) Are there differences in how the University supports the SFO-environments compared to other priority research areas of the University that have not received external strategic funding? If there are differences, can you give examples?

Maximum 1 page for UM1

UM 2) What is the inspiration and the benchmark for the university's Higher Education and Research Management, and why, in regard of

a) Maintaining or reaching research quality of the highest international standard and to reach an international leading position within their field of research.
b) Linking the strategic research areas with the needs of societal organisation and the business sector?
c) Cultivating collaborations with other universities and non-academic organisations?
d) Strengthening the link between the research and education? Maximum 2 pages for UM2

UM 3) What is the nature of support (for example recruitment strategies, management training, collaborations, infrastructures) from the host-university when it comes to the development and management of the strategic research environment in regard of

a) Maintaining or reaching research quality of the highest international standard and to reach an international leading position within their field of research.
b) Linking the strategic research areas with the needs of societal organisation and the business sector?
c) Cultivating collaborations with other universities and non-academic organisations?
d) Strengthening the link between the research and education? Maximum 2 pages for UM3a-d

UM 4) SWOT analysis.

Please explore the Strenghts, Weaknesses, Opportunities and Threats to the Strategic Research Area hosted by your university, in regards of

a) Maintaining or reaching research quality of the highest international standard and to reach an international leading position within their field of research.
b) Linking the strategic research areas with the needs of societal organisation and the business sector?
c) Cultivating collaborations with other universities and non-academic organisations?
d) Strengthening the link between the research and education?

Perform the SWOT-analysis with the insight of different stakeholders (Such as research managers, or co-applicant university representatives).

Maximum 4 pages for SWOT analysis (UM4)

UM 5) What is your plan for the long-term partnership and collaboration with the co-applicant organisation(s) for the strategic research area? Please include considerations regarding the distribution of funding between the universities.

Total maximum of 2 pages for UM5

APPENDIX 7: EXTERNAL REVIEWER ASSESSMENT PROTOCOL

Research environment:	**Host university:**
Acronym:	**Expert:**
1. Research output	
Each criterion below requires a grading*. Use one of these grades: *not convincing so far / reaching international standards / on the frontline*	
1.1 The publication profile is* Discussion:	
1.2 The scientific impact of the research environment is* Discussion:	
2. UTILIZATION AND BENEFITS	
Each criterion below requires a grading*. Use one of these grades: *not developed satisfactorily / developed satisfactorily / developed with great satisfaction*	
2.1 The capacity to transfer research results for utilization has * Discussion:	
2.2 Stakeholder engagement in problem formulation and implementation has* Discussion:	
2.3 The impact on society or business of the research has * Discussion:	
2.4 The environments capacity to provide qualified personnel or research based knowledge has * Discussion:	

Research environment:	**Host university:**
Acronym:	**Expert:**

3. collaboration

Each criterion below requires a grading*.
Use one of these grades: *not effective so far / effective in several dimensions / effective in all dimensions*

3.1 The collaboration between co-applicant universities is * with respect to the further advancement of the environment's international standing
Discussion:

3.2 The collaboration with other SRA's is * with respect to the further advancement of the environment's international standing
Discussion:

3.3 The international collaboration is * with respect to the further advancement of the environment's international standing
Discussion:

3.4 The use of strategic collaborations outside academia is*
Discussion:

3.5The strategic collaborations described in the case study demonstrates to be *
Discussion:

4. INTEGRATION WITH EDUCATION

Each criterion below requires a grading*.
Use one of these grades: *not demonstrated so far / under satisfactory development / developed with internationally high standards*

4.1 The integration of the research environment with different levels of education is*
Discussion:

Research environment:	**Host university:**
Acronym:	**Expert:**
5. Management	
Each criterion below requires a grading*. Use one of these grades: *not convincing so far / on target and developing with high standard / moving beyond set goals*	
5.1 The management of the research environment is * with respect to the further advancement of the environment's international standing Discussion:	
5.2 The use of recruitment relative to the goals/ intentions of the environment is * Discussion:	
5.3 The management of the research environment is * with respect to the environment's capacity to meet societal needs Discussion:	
6. questions with reference to the criteria that you want to put forward to the expert panel	
7. Other comments	

APPENDIX 8: EXPERT PANEL PROTOCOL

Host university: GENERIC TEMPLATE
Expert: PANEL
Use one of these grades*: *inadequate/good/excellent

1. STRATEGIC MANAGEMENT AND USE OF THE SRA FUNDING

1.1. Overall, the management by the University for reaching the government goals is *

Q: When will you reach/do you have the potential to reach the **highest international** quality and if/when you're there, how will you maintain that level?

Q: How do you define **innovation** and what is the role of universities in it? How do you balance between opportunity-generating blue skies research and need-based, challenge driven research? How do you define need?

Q: Which SRA would you lift as the **best practice** for reaching the government goals and why?

- Careers for young scientists? Sustainability of the SRAs?
- Sustainable funding for infrastructure?
- Integration of education? Engaging students? Engaging all professors and some stakeholders in teaching?
- Stakeholder engagement and societal/industrial impact of research and education? Life-long learning to upgrade expertise of societal, industrial experts?
- How was the money used strategically?

Q: For the others that did not do as well, what went wrong, what did you learn? Are you considering giving up some of the SRAs for the benefit of others making a world class impact?

1.2 The support of the SRA environments by HEI management is*with regard to the goals of the government effort.

Q: How will you continue to support the development the SRA? (How) will you prioritize the funding between these SRAs in the future based on their progress and future potential?

2. ADDED VALUE

Q: What is the overall added value* of the SRA instrument at this HEI?

- What would the SRAs look like today if the current strategic funding was not available?
- Please give examples from SRA environments.

Q: Is this a good instrument for improving both quality and impact?

Q: How does this funding instrument complement the other on-going strategic or other funding instruments in Sweden, Linneaus initiative; the Swedish Research Council research infrastructures, various CoE programs e.g. by VINNOVA, SSF, etc.?

3. SUMMARIES OF EACH OF THE SRA's

Q: What is the clearly visible impact in 5 years of your SRA according to the government criteria for funding:

1. Highest scientific quality in an international comparison and
2. Strategic importance for society and the business sector?

APPENDIX 9: EXPERT PANEL SHORT CV:S

Tuula Teeri
Current position and employer: President, Aalto University, Finland
Research interests and Management Experience: Plant fibre degradation, biosynthesis and engineering. Management Experience in Finland, Sweden, Switzerland, Germany and Singapore: Director of research centres of excellence, Vice Dean and Vice President (KTH Royal Institute of technology), Board memberships in research foundations, councils, national research evaluations and government advisory boards.
Web page: www.aalto.fi/en/about/organization/president/

Erik Arnold
Current position and employer: Chairman, Technopolis Group; Adjunct Professor in International Innovation, University of Twente.
Research interest and Management Experience: I have been studying the design, implementation and evaluation of research and innovation policies since the early 1980s. This includes a large number of programme evaluations as well as evaluations of research councils and innovation agencies and innovation system reviews across more than 30 countries.
Web page: www.technopolis-group.com

Neil Geddes
Current position and employer: Director Technology, Science and Technology Facilities Council (STFC)
Research interest and management experience: fundamental physics: Quantum chromodynamics, matter-antimatter asymmetries, evolution of the early universe. Also the application/exploitation of computing technologies in scientific research (e-science): data acquisition and trigger systems, distributed computing, data management and processing.
Director of e–Science, Particle Physics and Astronomy Research Council (PPARC) 2001–2004, Director of e–Science, STFC 2004–2012. Chairman of LHC Computing Grid project, 2006–2008

Mary O'Kane
Current position and employer: Executive Chairman, O'Kane Associates; & NSW Chief Scientist & Engineer.
Research interest and Management Experience: Automatic speech recognition. Evaluator of government programs and research entities in Australia and other countries (2001–15); President, University of Adelaide (1996–2001). Member of most major Australian Government research boards & director of several private sector listed companies (1990–2015).
Web page: www.okaneassociates.com.au/ www.chiefscientist.nsw.gov.au/

Katherine Richardson
Current position and employer: Professor, Leader, University of Copenhagen
Research interest and Management Experience: Professor in biological oceanography and leader of the Sustainability Science Centre, University of Copenhagen. KR is active both as a member in and/or chairperson for a number of national and international research committee/advisory boards. She has published over 100 scientific papers and book chapters.
Web page: www.ku.dk/english www.sustainability.ku.dk

Kalervo Väänänen
Current position and employer: Rector, University of Turku, Finland
Research interest and Management Experience: Bone cell biology and bone diseases. Rector, University of Turku, Finland. Academic Rector, University of Eastern Finland. Chair of Health Research Council, Academy of Finland. Board Member, Academy of Finland.
Web page: http://www.utu.fi/en/university/organisation-and-management/rector/Pages/home.aspx

APPENDIX 10: LIST OF EXTERNAL REVIEWERS

Name/Title	Organisation	Main area of research
Albert Benveniste, Directeur de Recherche	INRIA	Technology
Alicia El Haj, Professor and Institute Director	Keele University	Medicine
Birte Holst Jorgensen, Vicedirektör	Danmarks Tekniske Universitet	Climate
Carol Turley, Dr. and Senior Scientist	Plymouth Marine Laboratory	Climate
David Williams, Professor	Longborough University	Technology
Debbie Thurmond, Professor and Associate Director	Indiana University	Medicine
Decio Eizirik, Professor	Université Libre De Bruxelles	Medicine
Don Boesch, Professor and President	University of Maryland	Climate
Eduard Gröller, Associate Professor	Technische Universität Wien	Technology
Frances Hasso, Associate Professor	Duke University Durham	Social Science
Frances Wall, Professor	University of Exeter	Climate
Gabriella Tranell, Associate Professor	Norges Tekniske-Naturvetenskaplige Universitet	Climate
Gordon McBean, Professor	Western University Canada	Security
Grete Botten, Professor	University of Oslo	Care Science
Gyöngyi Kovács, Professor	Hanken University Helsinki	Technology
Irfan Siddiqi, Associate Professor	University of California Berkeley	Technology
Kai Simons, Director	Max Plank Institute	Medicine
Leif Andersson, Professor	University of Helsinki	Medicine
M. Maral Mouradian, Professor	Rutgers University	Medicine
Mahendra Mallick, Principal research scientist	Georgia Tech Research Institute	Technology
Maria Goddard, Professor and Director	University of York	Care Science
Michel Kaiser, Professor	Bangor University	Climate
Oliver Richmond, Professor	University of Manchester	Social Science
Rainer Stark, Professor and Head of division	Fraunhofer IPK	Technology
Risto Nieminen, Professor and Dean of school of science	Aalto University	Technology
Sirpa Jalkanen, Professor	Nat. Institute of Health and Welfare	Medicine
Suzanne Simard, Professor	University of British Columbia	Climate
Sylvie Joussaume, Director	CNRS	Climate

The Swedish Research Council, Formas, VINNOVA and the Swedish Energy Agency have evaluated the Strategic Research Area Initiative launched by the Swedish Government Bill on Research Policy in 2008. The Swedish Research Council for Health, Working Life and Welfare (Forte) actively participated in this evaluation as a collaboration partner. The initiative includes 43 research environments in 20 specified strategic research areas.

The evaluation was carried out on by an expert panel of six professors with vast experience of university and research management, as well as research policy formation and evaluation. The expert panel has been chaired by Tuula Teeri, President of Aalto University, Finland. 28 external reviewers have supported the panel with an initial assessment of the performances of each individual strategic research environment.

The evaluation report consists of the expert panel's assessments and conclusions.

Vetenskapsrådet

Energimyndigheten

formas
Forskningsrådet Formas

FORTE
Forskningsrådet för hälsa, arbetsliv och välfärd

VINNOVA

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