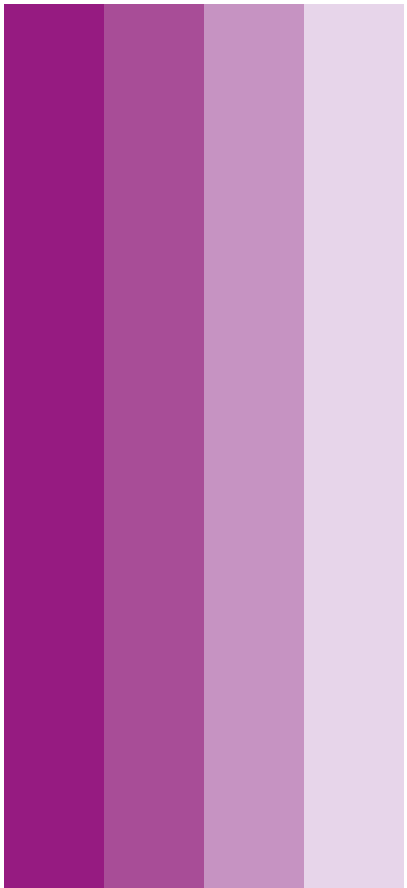
JÖNKÖPING UNIVERSITY

ARC 18

ASSESSMENT OF RESEARCH AND COPRODUCTION



Preface

In 2018, Jönköping University (JU) decided to initiate an external assessment of research and co-production (Assessment of Research and Coproduction 2018 – ARC18). Co-production is in this context defined as production of research together with stakeholders; a process that generates high quality knowledge, pursues the research frontier and results in innovative and useful activities in, and for, industry and the public sector. For JU, it is the first time an assessment of research and co-production has taken place; the overall aim of ARC18 being to further strengthen Jönköping University's insights on how to continue to support the positive development of the university. More specifically, ARC18 evaluates the criterion for quality research within JU, and provides a means to strengthen its structure for our scientific activities in offering reliable background material for strategic decisions.

To ensure different perspectives, disciplines and cross-boundary learning, four research environments at JU were selected: *Lifelong Learning, SPARK*, *IMPROVE* and the *Centre for Family Enterprise and Ownership* (CeFEO). Each research environment worked diligently to scrutinize and address all the questions and areas of evaluation, and the external experts did extensive work in analyzing, interviewing and synthesizing results. The outcomes have been significantly helpful for JU's continuing work in developing and profiling research at JU. Besides giving examples of strength and high-quality international research, the assessment identified areas with varying potential; highlighting internal functions that could provide additional support and delineating favourable examples of linking research and innovation.

For me, it is clear that besides ARC18 providing profitable experiences, insight and knowledge, it is an imperative constituent in developing JU's capability to meet the challenges of today, tomorrow. Challenges that require knowledge, and ultimately cooperation. I am most grateful for the dedication and operose work undertaken by panel members, researchers, project leaders and staff; this has been a joint effort that will act as a beacon for future directions.

Agneta Marell
President
Jönköping University

Acknowledgements

The ARC18 would not have been possible to perform without the great work and effort of the researchers involved in CeFEO, IMPROVE, Lifelong Learning and SPARK. The project group, consisting of Marie Ernsth Bravell (project leader), Mats Jackson, Ylva Lindberg, Mattias Lorentzi, Niklas Sjöstrand, and Peter Swalander, must be recognized for their incredible input in the discussions, reasoning and writing, to push the process forward. Stefan Carlstein made great contributions regarding bibliometrics. We are also grateful for the financial support given by the Knowledge Foundation. Last, but certainly not least, we recognize the work of the external experts: Roland Bal, Satya Brink, Clay Dibrell, Torbjørn Digernes, Carole Howorth, Erik Höglund, Gunilla Jönson, Magnus Klofsten, Matti Koiranen, Christian von Plessen, Julie Reed, Airi Rovio-Johansson, Kjell Rubenson, Yukiko Sawano, Bernhard Schmidt Hertha, Helle Wijk and Håkan Wiklund.

THANK YOU ALL!

Contents

Jönköping University

Jönköping University is a young professional-oriented university characterised by a high degree of internationalization, an entrepreneurial spirit and extensive collaboration with surrounding society. It is one of three Swedish private, non-profit institutions of higher education with the right to award doctorates. JU has around 11,000 students, of which 2,000 are international students. The university is one of the top universities in international student exchange and among the best in Sweden in terms of attracting international students. Campus has a truly international and academic environment with students and staff from all parts of the world. Both within education and research, JU has a close cooperation with business and society. JU operates on the basis of an agreement with the Swedish Government and conforms to national degree regulations and quality requirements. The university is organised as a non-profit corporate group with Jönköping University Foundation as the parent organisation and six wholly owned subsidiaries: The School of Health and Welfare, the School of Education and Communication, Jönköping International Business School, the School of Engineering, University Services and Jönköping University Enterprise (pathway studies).

Research at Jönköping University

The research at JU is performed on the four schools: The School of Health and Welfare, the School of Education and Communication, Jönköping International Business School, the School of Engineering Each of the four schools has its own designated focus areas and research activities. In some of the fields, research is conducted in collaboration between two or more of the schools. Much of the research at JU is inter- and multidisciplinary and is also performed in collaboration with regional, national and international partners. In the year 2018, Jönköping University decided to implement an external assessment of research and coproduction (Assessment of Research and Coproduction 2018 – ARC18). The goal was to the get an overall picture of the research conducted at Jönköping University. Therefore, one research environment at each school were selected. It should be noted though that two of the selected units/environments, are more JU-overarching (SPARK and

IMPROVE), whereas two of the units/environments, Lifelong Learning and CeFEO, are more specifically related to their schools. The research environments are also very different in their way of organizing, publishing, and presenting their results.

Research at Jönköping International Business School

JIBS research focus on the areas Entrepreneurship, Ownership and Renewal. Most of our research has a strong international connection, and we collaborate with partners all over the world. The research environments encourage working over disciplinary boundaries. This makes the research more relevant and strengthens our footing in the business world. Researchers at JIBS are also active partners in several international networks, which means that we participate in and initiate international research projects. Located in one of Sweden's most dynamic enterprise regions, JIBS is ideally placed for world-class research in a wide range of areas and for close cooperation with business and society.

JIBS conduct research in four different disciplines: Business Administration, Economics, Informatics, and Statistics. Areas include entrepreneurship and family business, international trade, regional economics, economic geography, financial economics, logistics, statistics, business development, innovation, management and media management. JIBS also have a number of research centres that are internationally renowned and are able to attract well-known experts in their fields. The research centres Centre for Family Enterprise and Ownership ((CeFEO) included in the ARC18 at JU) and MMTC have institutionalized visiting professorship programmes.

JIBS see **entrepreneurship** as a research field, a practice and an attitude and the research in entrepreneurship aims to assist in solving the challenges that entrepreneurs, businesses, organizations and society as a whole face today and in the future to create innovation and sustainable business development. The research in entrepreneurship is interdisciplinary, integrating perspectives from business administration, economics, and informatics, as well as combining quantitative with qualitative methods.

JIBS research in the field of **ownership** focuses on the structures, characteristics and strategies related to various types of ownership in

organisations. Much of this research is inter-disciplinary to explore fields and concepts such as family business, corporate governance, succession, ownership transition, emotional and psychological ownership, financing, laws and regulations, agency, accounting and reporting, networks and alliances, power and responsibilities. One of the largest focus areas in ownership is family business and CeFEO that participates in many diverse activities, both nationally and internationally, to support a greater understanding of the structures and strategies of successful family businesses. Another unique focus of ownership research at JIBS is examining a variety of perspectives on legal governance issues related to ownership from the fields of microeconomics, macroeconomics, econometrics, finance, law, accounting and management.

JIBS research on **renewal** encompasses a wide range of perspectives and approaches. It comprises concepts such as economic renewal, regional renewal, business transformation, ownership transition, reshaping of industries, failure, change management, globalization, the urbanization process, and more. The researchers recognize how successful innovations often change the relative positions of firms competing in an industry and addresses ways for enterprises, and industries, to capitalize and build upon change and progress rather than succumb to them. JIBS renewal research also reflects how trade and geographic conditions enable industries and regions to rejuvenate but also why they fail. Our scholars' expertise in spatial economics asks and seeks to answer the questions as to how cities, counties, regions and nations can encourage economic development and growth. Thus, the research also includes analysis and understanding of the causes of renewal transformation in the wider social, cultural and structural contexts where firms operate.

Research at School of education and communication

School of education and communication (SEC) research focus on education and communication. The research milieus in these fields are multi-disciplinary and anchored in social sciences and the humanities. The research milieus have widespread international collaborations and networks, while being closely linked to professional practices nationally and regionally in sectors pertaining to education, organizations, and media and communication. The SEC research milieus comprise of the disciplines: pedagogy, didactics, media an

communication studies, sustainability research, psychology, management, sociology, history, geography, religion, languages, literature, and mathematics, contributing to focused thematic and cross-disciplinary research, as well as to provide the school's educational programmes with high quality research foundations.

SEC sees **learning** and **communication** as research fields, practices, and attitudes for researchers. The aim of SEC research is to assist in solving challenges that educators, school leaders, organizations, as well as specific social and professional groups face in the 21st century's digitalized and media dense society, in the creation of inclusive and sustainable, social and communicative, practices for learning.
SEC research is organized in five milieus:

- Lifelong learning (LL)
- Media and Communication Studies (MCS@JU)
- Learning Practices inside and outside School (LPS), including the research groups: CCD@JU (Communication, Culture, and Diversity), PIL@JU (Place, Identity, and Learning), SER@JU (Sustainability Education and Research).
- Practice-based educational research (Praktiknära utbildningsforskning, PUF), including the research groups: MER@JU (Mathematics Education and Research), PER@JU (Preschool Education and Research), and KKUP (Kunskapskulturer och undervisningspraktiker. Knowledge cultures and teaching practices).
- CHILD (Children, Health, Intervention, Learning and Development) which is an interdisciplinary group between the School of Health and Welfare and SEC.

A national centre for life-long learning – ENCELL, resides at SEC, and is linked to research endeavors in the research milieu Lifelong Learning. The recently launched Institute for super intendents also resides within the realms of Lifelong Learning.

Research at School of Engineering

At the School of Engineering, research is conducted in the area of industrial product realization, in which the school has established degree-awarding powers since 2010. The School of Engineering is very involved in the development of SPARK which is Jönköping University's research and education environment with a focus on developing the area *knowledge intensive product realization.*

The research within the School of Engineering is interdisciplinary with the overall aim of providing contributions to theory formation and improved methods within industrial product realization. Industrial product realization can be defined as the process by which a new product idea is conceived, investigated, taken through the design process, manufactured, marketed and supported. The focus of the research is especially appropriate for the county of Jönköping, since this region has the largest number of employees in small and medium-sized manufacturing companies in the country.

Research has an important contribution in being instrumental in an industrial context. Apart from fundamental demands for originality and solidity in research we attach importance to business relevance and applicability. The School of Engineering has thus an extensive collaboration with hundreds of partner companies in different branches.

Research is conducted within research groups/departments at the School of Engineering, as well as in co-operation with JU's other schools, other Swedish universities/colleges, and international research partners. The research is organized in six research groups/departments:

- Department of Computer Science and Informatics
- Department of Construction Engineering and Lighting Science
- Department of Industrial Product Development, Production and Design
- Department of Materials and Manufacturing
- Department of Mathematics, Physics and Chemical Engineering
- Department of Supply Chain and Operations Management

Research at School of Health and Welfare

At the School of Health and Welfare, research is conducted in the areas of health, care and social welfare, which stand out well nationally and internationally. Cooperation is conducted within research groups/center-formations at the School of Health and Welfare, as well as with JU's other academic colleges, other Swedish universities/colleges and international research partners. In addition, collaboration often takes place with public and for-profit actors within health, care and welfare. The quality and development of the research is subject to discussion and analysis through regular seminars at the Research Council. The management of the School of Health and Welfare contributes to the possible removal of economic and organizational barriers to the development of research and we strive to become a leader in Sweden and internationally prominent, specifically with regard to interdisciplinary research in the field of health and welfare. The research is interdisciplinary with the overall aim of providing contributions to theory formation and improving methods for the promotion, preservation and re-creation of individuals' health, well-being and welfare. The research is focused on five research groups:

- ADULT (Alienation, Disability, Unify, Life style and Treatment)
- ARN-J (Aging Research Network - Jönköping)
- CHILD (Children, Health, Intervention, Learning and Development) which is a collaboration with School of Education and Communication.
- IMPROVE (Improvement, innovation, and leadership in health and welfare), which is the research environment from School of Health and Welfare that is included in the ARC18 at JU).
- SALVE (Social challenges, Actors, Living conditions and Research Venue)

The School of Health and Welfare also conducts research within three centers. They are focused in a specific research or development area that aims to create a dynamic platform for collaboration across departmental and organizational boundaries in Sweden and abroad:

- Biomedical Platform
- Centre for Oral Health
- Jönköping Academy for Improvement of Health and Welfare

ARC18

Process description

In the spring of 2018 the president at JU decided that JU should perform an external assessment of research and co-production, (ARC18). ARC18 is an assessment of the quality of research and co-production within four research environments at JU - SPARK, IMPROVE, Lifelong Learning and CeFEO (Center for Family Enterprise and Ownership). The ARC18 at JU aimed at getting an overall picture and identifying strengths and limitations in the broader spectrum of research at JU. As such it will provide means to strengthen the quality of the scientific activities at the university by offering reliable background material for future strategic decisions. The purpose was therefore also to receive proposals and decision support for the continued development and profiling of JU.

The president's decision stated that the assessment of research and co-production should be evaluated on the basis of a model consisting of a) *a self-evaluation* (including strategic information, quantitative data such as bibliometric analysis and funding, and impact case descriptions), and b) *an external assessment of experts* within respectively field. The model follows previous evaluations carried out at other universities in Sweden.

Project group

Vice president for research was decided by the president to be project leader, and also to form the project group of ARC18. It was decided that following persons at JU should be included in the project group: Emelie Hassel, HR-specialist (quit her job in September 2018 and was only part of the project group in the beginning), Mats Jackson, professor and dean of research at School of Engineering, Ylva Lindberg, associate professor and dean of research at School of Education and Communication, Mattias Lorentzi, MSc and library director of Jönköping University Library, Niklas Sjöstrand, administrator, presidents office, and Peter Swalander, head of the project office. The project group have met regularly to plan, read, and revise the ARC18 and its report.

The self-evaluations

Each research environment executed a self-evaluation based on a template (Appendix 1). The template included indicators on research activities, research initiatives and collaboration in research in relation to academic, business, or public partners and a qualitative self-assessment of the strengths, weaknesses, opportunities and challenges. The indicators aim to describe research activities in specific areas as well as in multi-disciplinary fields and include elements such as a description of contributions to the research field, research environment and infrastructure, research output, impact, engagement and co-operation with society (organizations within business and public sector, non-governmental organizations and the public) and opportunities for renewal and actions for successful development. The ARC18 at JU generally assessed the period from January 2012 to the end of December 2017, although some of the indicators cover a shorter period of time.

The template for the self-evaluation is structured in three parts:
Part A – Strategic information about research environment (general description of the research environment and a qualitative self-assessment of the strengths, weaknesses, opportunities and challenges)
Part B – Quantitative data (general information, research output and co-operation with surrounding society)
Part C – Impact cases

Part A. Description of the research environments

Part A was completed by the leader/or appointed person of the research environment, in collaboration with researchers in the group, and based on strategic plans and other written documents. Parts of this text is presented in the chapter for each research environment.

Part B. Quantitative data

For part B, data were collected from different services and support departments at JU. The major collection came from the library and concerns the bibliometric data. Part B is presented as an appendix for each research environment.

Description of bibliometric indicators in the ARC18[1]

Collection of data

Publication records were collected on the basis of name lists provided by members of each research environment. These name lists, together with each researcher's unique user ID, and the total number of publications from the period 2012-2017 were sent to KTH Library at KTH Royal Institute of Technology, Stockholm, who performed publication statistics, citation analysis, and calculation of Norwegian scores. The databases included in the preparation of publication statistics and bibliometric indicator were DiVA, the institutional repository of Jönköping University, Clarivate's Web of Science, and The Norwegian Register for Scientific Journals, Series and Publishers ("Norwegian List). DiVA was used for general and aggregated publication counts, all publication types included. Web of Science was used for citation analysis and average field normalized data. The Norwegian List were used to generate Norwegian scores for journal articles, books, book chapters, and published conference papers.

Total number of scientific publications produced by the research environment

The number of publications in DiVA published 2012-2017 of the following document types: Article in journal, peer reviewed; Article in journal, not peer reviewed; Article in journal, review (peer reviewed); Book; Edited book; Chapter in book; Conference paper (peer reviewed); Conference paper (not peer reviewed); Thesis, doctoral; Thesis, licentiate; Report.

Aggregate publication information

Total number of publications in DiVA

[1] The following descriptions are partly based on the report: University of Skövde. (2013). *Assessment of Research and Collaboration 2013 (ARC13)*. Skövde: University of Skövde; and on descriptions by the bibliometric analyst unit at KTH Library who calculated the bibliometric values for Jönköping University.

The total number of publications in DiVA published 2012-2017 of the document types listed above.

Number of publications in Web of Science
The number of publications in Web of Science published 2012-2017 (articles, reviews, letters, proceeding papers, editorials, books, and book chapters included). The number of publications is presented as full counts.

Number of publications in Web of Science, author fractionalized
The number of publications is presented as fractionalized counts, i.e. an author's share of a publication is counted as 1/n where n denotes the number of authors.

Web of Science visibility (percent of all publications included)
The share of the total number of the research environment's publications in DiVA that is indexed in the Web of Science. Please note that many of the publication types included in the total number of all publications in DiVA are publication types that are normally not included in Web of Science.

Web of Science visibility (percent of all peer reviewed journal articles included)
The share of the total number of the research environment's all peer reviewed journal articles in DiVA that is indexed in Web of Science.

Scopus visibility (percent of all peer reviewed journal articles included)
The share of the total number of the research environment's all peer reviewed journal articles in DiVA that are indexed in Scopus.

Journals' field normalized impact
The table shows the citation impact of the journals in which the publications have been published. The journals field normalized impact gives an indication of the impact of the journals in which the unit has been publishing. For each publication the journal's average field normalized citation rate over a 3 years period is calculated. An average is then calculated for all of the journals. A value of e.g. 1.2 means that the unit has published in journals which are cited in average 20 % above the world average within the norms of the respective field. Hence, the indicator shows the average citedness of the journals of publication. Citation rates are based on Web of Science. By evaluating the

impact of the journals rather than the publications themselves, this indicator supplements the picture of the publishing profile. N.B. Caution should be exercised when interpreting values based on a low number of publications.

Norwegian score, fractionalized
The fractionalized Norwegian score is the sum of the analyzed unit's share of the Norwegian score. The Norwegian score is calculated by giving the publications a score according to publication type and level in the Norwegian list of publishers. The levels are constructed so that 20 percent of all publications in each research field belong to level 2 in the system. Conference papers will in first place be treated as articles in journals or serials if they are matched to the list of journals/serials and in second place as articles in anthologies if matched to the list of publishers.

The Norwegian Register for Scientific Journals, Series and Publishers: https://dbh.nsd.uib.no/publiseringskanaler/Forside.action?request_locale=en

Publications in level 1 journal – Norwegian list
The number of articles or review articles that has been published in journals or series classified into level 1 in the Norwegian system.

Publications in level 2 journal – Norwegian list
The number of articles or review articles that has been published in journals or series classified into level 2 in the Norwegian system.

Publications in level 1 conference – Norwegian list
The number of conference papers that either has been published in journals or series classified into level 1 in the Norwegian system or by publishers classified into level 1.

Publications in level 1 book publishers
The number of books or chapters in books that has been published by publishers classified into level 1 in the Norwegian system.

Publications in level 2 book publishers
The number of books or chapters in books that has been published by publishers classified into level 2 in the Norwegian system.

Citation indicators

Total number of citations

The total number of citations in Web of Science to publications published 2012-2017.

Number of citations, author fractionalized

The author fractionalized number of citations in Web of Science is the sum of an analyzed research environment's share of citations to publications published 2012-2017.

Citations per publication

The average number of citations per publications for publications from 2012-2017.

Share of publications not cited

The indicator expresses the share of publications with no citations at the time for the analysis.

Average field normalized citation rate

The average field normalized citation rate gives an indication of the citedness normalized to field, year of publication and publication type. A value of e.g. 1.2 means that the unit is cited in average 20 percent over the respective field norms. Year of publication was 2012-2016. Citation indicators at publication level are not calculated for publications published after 2016, since normalization of such indicators are unstable if calculated close in time. The publication types in Web of Science were *Article* and *Review*.

Share of publications among the 10 percent most cited in the field

The indicator shows the share of publications among the 10 percent most cited compared to publications within the same field, of the same document type and categorized into the same subject field. Year of publication was 2012-2016. Citation indicators at publication level are not calculated for publications published after 2016, since normalization of such indicators are unstable if calculated close in time. The publication types in Web of Science were *Article* and *Review*.

Share of publications among the 25 percent most cited in the field
The indicator shows the share of publications among the 25 percent most cited compared to publications within the same field, of the same document type and categorized into the same subject field. Year of publication was 2012-2016. Citation indicators at publication level are not calculated for publications published after 2016, since normalization of such indicators are unstable if calculated close in time. The publication types in Web of Science were *Article* and *Review*.

Authorship

Average authors per publication
The average number of authors per publication for publications indexed by Web of Science. The publication types in Web of Science were *Article, Editorial, Proceedings Paper,* and *Review*. The number in the table only shows the period average.

Average countries per publication
The average number of unique countries per publication for publications indexed by Web of Science. The publication types in Web of Science were *Article, Editorial, Proceedings Paper,* and *Review*. The number in the table only shows the period average.

Role of key scholars

Share of publications by 3 most active authors. The indicator shows the share of publications in DiVA authored or co-authored by the 3 authors with the most publications during the analyzed time period, i.e. 2012-2017. The percentages are based on all publications in DiVA. The percentages are based on full counts.

Faculty staff, funding and grants

Data on faculty staff and funding and grants were collected from human resources department, the economy department and in collaboration with research administrators at the different schools. This had to be done manually.

A template for Part B is enclosed as an appendix (1B) and description of each research environment (with adjustments since all data are not relevant for all research environments) are enclosed in appendix 3-6.

Impact Cases

Part C, the description of the impact cases was first composed by the research environments, to provide a picture of the case, research output and the impact from the view of the researchers. When the impact cases were composed, the appointed collaborators were contacted for an interview, with the purpose to provide the impact from view of the collaborators. Parts of the impact cases are presented in the chapter for each research environment.

The external assessments and grading

At the same as the research environments started to write their self-evaluations, the identification of expert panels – one for each research environments – started. It was decided that each panel should consist of 4-5 recognized experts within the field of research environment. Further, it should include at least one woman and one man, and at least one international expert and one national expert. The research environments gave suggestions on persons and the strategic committee of research discussed and decided on the invitations. Read more about the expert under the chapters of each research environment.

In September the experts received the self-evaluations from the research environments. They were asked to provide an individual assessment of the quality of research and co-production in an international perspective based on the instructions given in the *Terms of reference* (Appendix 2). They were also asked to provide questions that they wanted to raise at the site visit in December.

Site Visit

In December, all panels were at place in Jönköping for three days, to participate in workshops and seminar with respective research environment, and to write a joint grading report.

The evaluation aimed at assessing performance and prospects of the included research environments as whole, and not individual scientists. The reports and presentations from the research environments (written and oral) constituted the basic material for the joint evaluation and grading.

Joint report including grading

The expert panels were requested to assess the quality of research and co-production with external partners of the research environment in a national and international perspective. In particular, the panels should identify strong research areas and areas that have potential to grow strong. The aim was not to compare the research environments at Jönköping University with each other. Instead it aims at probing the standing of the environment in national and international perspectives, reflecting the quality and potential of each research environment. The assessment is based on the written self-evaluation and the oral presentations and workshops given to the panel at the site visit. During the site visit there was a neutral writing support available for each expert panel to ease the writing of the joint report and so that the expert could focus on the discussions.

The joint, written report and grading from each expert panel were supposed to follow the given headlines under which the panels were also requested to provide comments and recommendations on improvements. The headlines are the same as in the assessment that each expert sent individually prior to the site visit.

Aspects for grading the research

The quality of the research from a national and international perspective, with emphasis on identifying areas of strong research and successful constellations, were rated on a four-grade scale: The following guidelines are suggested for the grading:
Excellent – Internationally leading quality and visibility.
Very good – Nationally leading and internationally good and recognized.
Good – Nationally good and internationally promising.
Insufficient – The research and co-production does not meet basic scientific quality criteria at national level. Research activities should be revised.

See more detailed criteria in Appendix 2. The grading of quality of research and co-production were divided in seven dimensions listed below.

General assessment

At first the experts were requested to give a brief account of the overall impression of the research conducted in the research environment.

Quality of research

Quality of research included the international visibility and the impact to the scientific community (e.g. in terms of citations) and publications in leading journals and/or monographs. It included the reputation and position of the research environment in the international research community. The ability of the research environment to achieve and present clear scientific analyses and new results should also be considered. The assessment should reflect the position of the research environment in relation to the internationally leading research units.

Productivity

Productivity relates to the total volume of scientific publications of the research environment. The quantification of production is evaluated by means of bibliometric indicators, the number of licentiate and PhD degrees awarded, and promotions of docents and professors. Productivity and its impact should be judged in relation to the number of researchers and the time they can use for research in the research environment.

Research environment and infrastructure

Comments on the research environment, its organization, staff profile and diversity, resources and activities. Comment on the adequacy and availability of the infrastructure. Also comment on the research environment with respect to internal coherence, multi- and interdisciplinary activities, outreach activities, demographic, gender profile and leadership. The research infrastructure can be available through collaboration networks. If this is the case, please comment on this and the research environment's ability to make use of these external resources.

Networks and collaborations

Comments on the extension, quality, and intensity of collaboration that the research environment has in national and international academic networks. To what degree are the academic partners integrated with the research environment and contribute with their competence to the joint research?

Coproduction and external cooperation

Comments on the extension and quality of national and international collaborations with non-academic partners and society. To what degree are the non-academic partners integrated with the research environment and contribute with their competence to the research? Evaluate the contribution of the partners. Do the coproduction and cooperation improve the conditions for and quality of the research?

Impact

Comments on the impact of the research environment's research on society. Specifically evaluate the significance that the impact cases presented by the research environment have had for society and the non-academic partners.

Strategies and plans for development of the research environment

Assessment of the visions, goals and strategies of the research environment as well as their feasibility and prospect for success. Assessment of the activities to support the development of junior faculty members.

Experts views on potential and recommendations for development

The experts were asked to give recommendations for further improvement of any aspect of the research quality of the research environment.

Center for Family Enterprise and Ownership (CeFEO)

Description of CeFEO including impact case

Family enterprising is a long-standing phenomenon. Most of the time, families do business together in order to create prosperity for themselves and their community. For many years, however, research into family firms lagged behind, as most attention was paid to large publicly traded firms in which family ownership and management was not considered relevant or even was not supposed to exist. Over the last decades, research on family firms has grown rapidly and gained increased attention as a legitimate area of scholarly inquiry. Across the globe, research programs have been launched, family business chairs endowed, and family business centers formed.

In 1994, Jönköping International Business School (JIBS) was established with the clear vision to become a leading business school in the areas of entrepreneurship, internationalization and business renewal. Based on this overall profile of the new school, it was soon realized that a focus on family firms and ownership matters was both important and relevant. Accordingly, JIBS became a pioneer in Scandinavia with regard to establishing a group of scholars devoted to the fields of family business and ownership in terms of both research and teaching. Over the years, the continually growing research and teaching activities focusing on family business and ownership issues have become an integrated part of the internationally leading position that JIBS has achieved within the area of entrepreneurship and business renewal. JIBS is now internationally recognized as a strong research environment for family business and ownership topics, which are prioritized in JIBS's strategy for future growth.

Due to our accomplishments, the CeFEO has a wide network of universities, business schools, individual scholars and educators around the world supporting our intention to remain at the frontier of family business and ownership research and education in the future.

Vision and Mission

The CeFEO is a unit within JIBS, but it enjoys considerable independence. (teaching). The CeFEO's *vision* is to be the prime research and learning center for family enterprise and ownership. Openness, creativity and rigor characterize our search for academic excellence and practical relevance, and we collaborate with scholars, students, practitioners and policymakers. Following our vision, the leading *mission* of the CeFEO is to combine academic excellence and practical relevance. The CeFEO is an internationally oriented research and learning center with the ambition to be a natural partner for researchers and family owners/managers as well as for advisors and other actors interested in family enterprising and ownership. The mission of CeFEO can be divided into two interrelated elements:

1) To promote, conduct and share high-quality academic research on relevant family enterprise and ownership topics. Our research is interdisciplinary, highly international and characterized by openness to different approaches in terms of the research questions we ask, the theories we apply and the methodologies we use; and
2) To engage in a knowledge dialogue on family enterprise and ownership topics with stakeholders through service and outreach activities (such as seminars and education) with the purpose of increasing awareness and skills among students, owners, managers, advisors and policymakers.

Research environment and infrastructure

CeFEO promotes 1) research, 2) teaching and 3) outreach activities in topics related to family business and ownership, which are integral parts of the three focus areas of JIBS: ownership, renewal and entrepreneurship.

Research at the CeFEO is conducted through different research projects in the areas of family business and/or ownership (e.g., entrepreneurship; resource management; internationalization; product development and innovation; ownership transitions in terms of succession and exit strategies—sale, M&A, dissolution; failure and bankruptcy, CSR; and crowdfunding) and involve one or more affiliated researchers, often with other scholars from JIBS and/or from other universities and business schools. CeFEO research strives to be interdisciplinary. For instance, historically at JIBS, researchers from business administration have been encouraged to collaborate with researchers from

other disciplines (e.g., economics and commercial law) either within or across specific research projects. This approach creates unique breadth in the center's research activities.

CeFEO recently mapped all research topics/areas to illustrate how multifaceted the research carried out in is: 1. Ownership & management; 2. Entrepreneurship & firm outcomes; 3. Strategy-as-practice & process studies; 4. Ethics; 5. Accounting; 6. Others aspects related to ownership and/or family business

Ranking—CeFEO Research Worldwide

Several studies and reports have consistently identified the CeFEO as one of the leading research environments in Europe and among the top three environments globally in the area of ownership and family business studies[2]. Relatedly, a large part of the research output that has placed JIBS high in multiple rankings stems from the CeFEO. This fact is corroborated by the recent ranking of entrepreneurship research published in *Journal of Small Business Management*. In this article, the authors particularly underline JIBS's strength in family business research as a main reason for JIBS's high ranking—1st in Europe and 2nd worldwide (Xu, Chen, Fung and Chan, 2017). Recent assessments by Jönköping University library regarding the research production at JIBS also shows that many of JIBS's research publications in

[2] See for instance: **1)** Nordforsk: Comparing research at Nordic higher education institutions using bibliometric indicators: Covering the years 1999-2014, Policy Paper 4/2017; **2)** Xu, N., Chen, Y., Fung, A. and Chan, K. C. (2017), Contributing Forces in Entrepreneurship Research: A Global Citation Analysis. *Journal of Small Business Management*. doi:10.1111/jsbm.12367; **3)** Matherne III, C. E., Debicki, B. J., Kellermanns, F. W., & Chrisman, J. J. (2013). Family business research in the new millennium: an assessment of individual and institutional. *Handbook of research on family business*, Sage Publications; **4)** Debicki, B. J., Matherne III, C. F., Kellermanns, F. W., & Chrisman, J. J. (2009). Family business research in the new millennium: An overview of the who, the where, the what, and the why. *Family Business Review*, *22*(2), 151-166.

respected international outlets originate from scholars associated with the CeFEO.

Involvement in Academic Journals

As an important way of impacting the field's knowledge creation and diffusion, CeFEO members are actively involved in different academic journals (e.g., associate editor, guest editor, editorial board). Professor Mattias Nordqvist, for instance, is a founding associate editor of *Journal of Family Business Strategy*.

Creating and Organizing Workshops and Conferences

CeFEO have actively participated in multiple roles (co-organizers, discussants, chairs and so forth) in multiple research conferences such as IFERA, Babson, FERC, EURAM, AOM and SMS. Among others, we are particularly proud of the EIASM Workshop on Family Firm Management Research that was initiated by the CeFEO in 2005 and has become one of the most important venues for scholars to gather and discuss current research on family business in Europe and beyond. The Workshop is organized by our center together with the EIASM.

CeFEO Toft and Hamrin Visiting Professors

Thanks to a generous donation from the Henry and Sylvia Toft Foundation and the Hamrin Foundation, the CeFEO launched the Toft and Hamrin Visiting Professorship programs. The aim was to attract internationally leading scholars to the CeFEO and JIBS. These successful programs ran from 2009 to 2016 with many spillovers in terms of learning, education and research projects. All visiting professors contributed to educational activities in addition to research.

CeFEO Visiting PhD Students and Faculty Members

CeFEO regularly invite PhD students and faculty members to spend a visiting research period at JIBS in the rich research environment with the goal of cooperating with us and strengthening our research in the areas of family business and ownership. During the research period, the CeFEO and JIBS provide visitors with office space and access to the university and library resources and multiple research activities (e.g., seminars, workshops). The duration of these visits ranges from 2 weeks to 6 months depending on the

needs of the visitors and CeFEO availability. On average, approximately 10-15 PhD students and faculty members visit us each year. Multiple research projects, teaching activities and publications emerge from such visits and collaborations.

Impact case – Ownership Transition and Succession in Privately-Owned Companies

Description of CeFEOS:s impact

Members of CeFEO have been working on the topic of ownership transition and succession in privately owned companies, in particular in family businesses for many years. During the period 2012-2017, our work in this area serves as an illustrative impact case consisting of several activities. *The nature of impact* of this case in relation to our work can be briefly described in several areas such as research and outreach and commissioned activities.

CeFEO have been involved in multiple research activities which have entailed conceptual work and qualitative, quantitative and legal empirical research on ownership transition and succession. This research has had a notable impact through multiple publications and conference presentations in the academic arena, as well as keynote presentations. Examples include our involvement in the Global STEP Research Project, and applied research project involving both scholars and practitioners. Another branch of research on ownership transition and succession in privately owned companies builds on CeFEO's multidisciplinary nature to study legal regulation of ownership transfer. Within 2012-2017 multiple projects have been finalized and one new started on topics of ownership transfer in relation to owner's death and divorce. The impact of the research activities has been both national and international, most research has been published in international journals and presented at international conferences. However, we have also published books in Swedish. CeFEO members are also involved in multiple editorial activities as associate editors, guest-editors, and board members in the different relevant journals in the family business and ownership fields, such as: Entrepreneurship Theory and Practice; Organization Studies; Family Business Review; Entrepreneurship and Regional Development; Journal of Business Ethics; Journal of Family Business Strategy; Journal of Small Business

Management. The prime beneficiaries here have been academic researchers and educators working in the area of firm ownership transition.

CeFEO members have also been involved in several activities related to ownership transition and succession in privately owned companies with policy-makers, politicians, business owners and managers and advisors as target groups. During the period 2012-2017, for instance, CeFEO members Mattias Nordqvist and Karin Hellerstedt produced two commissioned reports for the Swedish Agency for Growth Analysis with the purpose of investigating the role, nature and impact of ownership in the Swedish population of private companies. Growth Analysis is an agency that evaluates and analyses Swedish growth policy. They provide the government and other stakeholders in the growth policy process with an advanced knowledge base and recommendations to streamline and develop the state's work to promote sustainable growth and business development. The work performed by CeFEO provided scientifically based knowledge in this work. Among other things, we produced multiple reports and events/seminars/workshops both in Sweden and abroad with participants from politics, policymaking, business owners and managers and academics among others. Moreover, CeFEO researcher Karin Hellerstedt serves on the Agency's scientific council and thus have continuous influence in their work. Dr. Hellerstedt is also former member of the Swedish Better Regulation Council. Leif Melin was also board Member of the Swedish Better Regulation Council, 2008-2015 (appointed by the Swedish Government) and board member (2013-2016) of Family Firm Institute (FFI), 2013-2016, and co-chair of the FFI Knowledge Development and Diffusion Committee.

At the time this specific impact case was initiated there was an important lack of systematic research of why and under what circumstances business owners choose to leave their business, and what happens with these businesses over the long run. Are they closed down? Are they sold or acquired/merged? Are they taken over by family members? Similarly, a persistent question was about when family owners decide to pull the plug on unprofitable firms. Is this really a financial rational decision, or do emotional motives affect family members' commitment to continue the firm "no matter what"? For instance, the wider motivations and consequences of ownership transitions and succession in family firms were unclear. The purpose of this impact case was to increase knowledge of the specific mechanisms that determines the reason behind and

outcomes of ownership transitions and succession in privately owned companies. The lack of knowledge was a problem not only from an academic perspective, but also from a practical perspective (making informed decisions among business owners and managers) as well as a policy making perspective (generating knowledge for politicians to make decisions regarding how to support business development). The activities within the impact case were initially developed by Leif Melin, Mattias Nordqvist, Karin Hellerstedt, Francesco Chirico and Lars-Göran Sund, with multiple other CeFEO members involved including Ethel Brundin and Kajsa Haag.

Plenty of efforts were made by staff at CeFEO to exploit and apply the findings related with the research on ownership transition and succession. To give an example of an ongoing activity within the impact case, the work has led to a commissioned research by Confederation of Swedish Enterprise on ownership transition to employees carried out during 2018. Former CeFEO researcher, now affiliate, Annika Hall, in her consulting career continues to make impact in society by advising family business owners and other advisers on succession and leadership transfer. Also, Lars-Göran Sund, Kajsa Haag and Hanna Almlöf has been invited to spread their research results on legal protection of ownership in several forums for business owners and business advisors. Francesco Chirico has been invited to give speeches for companies in relation to family firm ownership transfers. Another outcome of the CeFEO activities in analysing ownership and succession issues in family companies is the KK-course on "Ownership transition and Succession in Family Businesses" financed in 2017 and currently under development. The purpose of the course is to enhance participants' knowledge and understanding about how family businesses can approach succession and ownership transitions, that is, passing on ownership and/or management to the next generation of the family or sell the business externally. The broader aim of the course is to facilitate the process of succession and ownership transition in family businesses by sharing knowledge and tools for how this can be done in effective ways. In this way, the ultimate vision of the course is to increase the number of successful succession processes in family businesses.

Collaborating Organization: Swedish Association of Pharmacies

Contact Person: Björn Falkenhall, Former Head of Department, The Swedish Agency for Growth Analysis

The impact on the specific organization

There has been lack of systematic knowledge about what characterizes firms which change ownership or exit the market. The current research has shed light on these companies compared to firms which have not undergone ownership transition. This comparison had not been done in such systematic way before. There has been a concern about what happens with the companies when many elderly business owners retire, not at least among some politicians. The main results from the study indicate that companies with fewer employed, lower turnover and lower profit exit, compared to companies that undergo ownership transition. The number of companies increase under the studied time period, which give further support for that view. A main conclusion is that exits may not constitute any bigger problem, rather it reflects natural business dynamic where smaller and weaker firms exit the market. The research has thus added knowledge about business dynamic to Growth Analysis, as well as implications for policy.

The impact was quite significant, the research contributed to increased knowledge and has spurred related work within the agency. The assignment from the Government, Ministry of enterprise, was fulfilled very well and the research was an important contribution, which also led to increased credibility.

Beneficiaries and impact of the research within or outside the organization

Increased knowledge accumulation within Growth Analysis and the Ministry of Enterprise, specifically the unit of analysis, about firm dynamics and ownership changes, and implications for policy.

The research also led to related work within Growth Analysis concerning analyzes of individuals close to retirement age and their labor market status. One insight is that elderly business owners are more frequent in industries

such as agriculture and forestry, and in regions where these industries are more common. Again, this is not a problem since property and real estate will remain. The research has thus inspired and triggered related work and thoughts. The final part of the assignment was to investigate further development of the documentation of underlying data to identify changes in ownership.

Collaborating Organization: BIM Kemi, Stenkullen,
Contact Person: Peter Wållberg, Founder and Owner of
BIM Kemi, Stenkullen, Sweden

The impact on the specific organization
I had run BIM chemistry for many years, successfully, and was about to make a change, and turnover the company to the next generation. However, there was no knowledge of this in Sweden at that time, so we had to go down to Lausanne at a conference to learn more. Then I met with CeFEO and this has been very useful for my companies, but also for many other family companies, who have benefited in several ways. I have not had any scholarship, that many other entrepreneurs seem to have. To the contrary, I think it's a great advantage to cooperate with the academy when running family businesses and not as a listed company that always has to think about the next quarterly report. We have been able to use this collaboration to educate, both ourselves and future generations in family business. We have also been able to employ CeFEO researchers over the years when we needed it and we have also been in the "step-program".

Today we have a *non-family manager* and a traditional board. There we have seen that there is no knowledge of how family companies function, and how this works along with the board and the manager. To improve this we have, for example, organized seminars within the company to talk about ownership and family businesses, like for example, strategic issues for family businesses and the process of generational shifting. We have also held lectures at JU for students in different contexts, and in turn we have had challenges that we wanted to highlight and then we have had students here that were given the task of working with these challenges, and how to solve them. This have been very helpful to us on several occasions. We could then have a second opinion of what we would like to do and felt more confident in our decision after that.

Beneficiaries and impact of the research within or outside the organization

For board members who come from the big industry, it has been helpful to learn more about family businesses but above all, our management has benefited from it. Because it's difficult to go from being an entrepreneur to hiring a new manager. We also turned into troubles at one point, when we had a new manager from outside. If this had happened today, it would have been a lot easier as we know more today. Research has been beneficial outside our organization in that way that our customers are usually large companies that are not family businesses. As we have collaborated with other family companies around Jönköping, we have been able to develop arguments and benefits for running family businesses. This may have contributed to the fact that family business as a form has become a more accepted form of driving companies. We have become more accepted because of this, and our collaboration with academia and other family companies. It is also good for the next generation to increase their knowledge based on research. It is good with networks where there is a deep theoretical knowledge.

The contribution from the research is significant, between 8 and 9 on ten-grade-scale. Definitely 9 if the research has been even more spread. We definitely intend to continue with the cooperation. For example, the *owner seminar* we arranged a year ago I want to repeat, since we now are in an active ownership. We can run this for both the management and other groups. During the evaluation of the seminar we received very good grades and we have some ideas on how to do this again in the future.

Evaluation and grading from the expert panel

The expert panel for CeFEO consisted of:

Clay Dibrell, Professor of Management, Chair of Entrepreneurial Excellence and Co-Director of the Center for Innovation and Entrepreneurship at The University of Mississippi, United States

Carole Howorth, Professor, Chair in Sustainable and Ethical Entrepreneurship, The York Management School, University of York. United Kingdom

Magnus Klofsten, Professor in Innovation & Entrepreneurship and founding director of Centre for Innovation and Entrepreneurship (CIE) at Linköping University, Sweden

Matti Koiranen, Professor Emeritus, School of Business and Economics, University of Jyvaskyla, Finland

General assessment of CeFEO

This is a very impressive centre with great outputs. We found this centre to be a leading proponent of family business research, education, and outreach. The output includes world class academic research, starting of family-owned businesses, board of director guidance, and active advising in family business succession/exits.

Strengths

Publications and international collaboration. Largest cohort of family business research in the world.
Top family business scholars in the world, as evidenced through quality and citations of publications, as well as visibility of the CeFEO scholars in regional, national, and international conferences.
JU recognises CeFEO as having the strongest international reputation within the university. Outstanding director leadership.
Positive organisational culture of support and mentoring.
Internationalisation of leadership, faculty and Ph.D. students.
Staff development is well supported.

Weaknesses

Limited national collaboration with other Swedish universities.
Limited engagement with EU programmes.
Given the capacity of family business knowledge within the CeFEO, there is limited dissemination of knowledge through university courses.

Suggestions for further development

Development of national research collaborations.
The impact can be leveraged to increase external funding.
Seek opportunities for strategic partnerships to take advantage of substantial joint research projects and funding.
Development of additional university family business courses at the undergraduate, master, and doctoral levels.

Quality of research

Quality of research includes the international visibility and the impact to the scientific community (e.g. in terms of citations) and publications in leading journals and/or monographs. The ability of CeFEO to achieve and present clear scientific analyses and new results should also be considered. The assessment should reflect the position of CeFEO in relation to the internationally leading research units.

CeFEO in relation to the internationally leading research units.

Excellent research output and in highly ranked journals, book chapters, books, and monographs. Number of citations is excellent. Very highly rated by peers (i.e. JSBM (2017). Several awards and scholarships have been awarded to CeFEO researchers in recognition of the quality of their research.

Strengths

Number of high-quality publications in highly ranked journals.
High number of citations for some individuals.
Highly active in organising conferences.
Use of mixed methods and joint publications (within the university as well as with colleagues international).
Conduct well-respected practically relevant research.
Effective teamwork.

Weaknesses

The high-quality publications are concentrated in a minority of the faculty.

Suggestions for further development

Opportunities for contribution to thought leadership outside of family business.
Take the next step in the publication level the top management journals.
Consider high level international partnerships.

Grading scale

Excellent
Motivation: Top family business scholars in the world, as evidenced through quality and citations of publications, as well as visibility of the CeFEO scholars in regional, national, and international conferences. Use of mixed methods and joint publications (within the university as well as with colleagues international). Conduct well-respected practically relevant research.

Productivity

The productivity is very good with a lot of papers in well-respected journals and where some of them are well-cited.

Strengths

Good reputation for networking improves productivity.
Volume of publications is in line with other similar institutions.

Weaknesses

Very few single authors papers that could question younger researcher's independence when applying for positions.
Despite increasing faculty, the volume of publications has remained constant from 2012 to 2017.
Despite increasing faculty, a predominant amount of publications are authored by the top three CeFEO authors.
Multiple non-peer reviewed conference papers.

Suggestions for further development

Support junior faculty to be more active in writing sole-authored papers and/or being a first author.
Encourage the mobilisation of junior faculty to utilise the advice of their third supervisor.
Additional emphasis on conversion of conference papers to journal submissions.

Remaining questions to ensure the assessment
The concept of productivity should go beyond volume of publications to incorporate other parameters (e.g., inclusion of inputs as a consideration to accompany the focus on outputs; include metrics of the third mission).

Grading scale

Very Good
CeFEO with their publications and international collaboration is the largest cohort of family business research in the world. The productivity is very good with a lot of papers in well-respected journals and their good reputation for networking improves productivity. The future effort should be in junior scholars.

Research environment and infrastructure

Brief reflection of the research environment, its organization, staff profile and diversity, resources and activities of CeFEO.

An impressive research environment with a fruitful combination of permanent staff and guest researchers. The impression is that there is a good access to research funding for a broad category of staff. Good access to all type of soft and hard recourses. Presence of a good incubator environment of new cross- and interdisciplinary research ideas. Central support structure for research is still evolving.

Strengths

Critical mass of competent staff.
Interdisciplinary and boundary spanning thinking in strategy and actions.
Strong supportive experienced leadership in place.

Hothouse research environment including seminars, feedback sessions, informal meetings and external events.
CeFEO takes ownership of their Ph.D. students (e.g., flexible Ph.D. supervision system).
Flexibility in application of resources depending on needs.
Open environment facilitates quick responses.

Weaknesses

Central support structure for research is still evolving.
Perception of an emphasis on attaining smaller, short-term external funding.

Suggestions for further development

Central support needed to apply for larger external grants, such as a Vinnväxt grant, Centre of Excellence, and Competence Centre.
Take a proactive strategy in engaging the funding institutions in CeFEO's research agenda.

Grading scale

Excellent /Very Good!
Outstanding director leadership. Positive organisational culture of support and mentoring. Internationalisation of leadership, faculty and Ph.D. students. Staff development is well supported. Open environment facilitates quick responses. However, central support structure for research is still evolving.

Networks and collaborations

Very impressive international research collaborations in academic networks, as evidenced through their visiting scholar's initiative.

Strengths

International collaborations.
Engagements with leading family business and entrepreneurship research scholars.
Founding member of the STEP initiative and EIASM Family Firm Workshops.

Weaknesses

Fewer national collaborations.
Wider networks in general management research disciplines would extend the application of ownership expertise into mainstream management publications.
Visiting outgoing and incoming scholar stays are dependent on gaining funding.

Suggestions for further development

Consolidating the impressive list of collaborations and focus on those relevant to take the next step in the development of the centre.
Be alert to research proposal calls for substantial national-policy initiatives aimed to start Centre of Excellence, Competence Centres, Vinnväxt for long-term funding.
Formalisation of visiting scholar scheme for both outgoing and incoming scholars.

Grading scale

Very Good
CeFEo has many high-quality international collaborations, and engagements with leading family business and entrepreneurship research scholars, but fewer national collaborations.

Co-production and external cooperation

Impressive co-production (JU colleagues and international researchers) as well as with external collaborations especially with regional partners and stakeholders. Good achievements in scholar/practitioner collaborations.

Strengths

Nice mix of traditional university activities (research and teaching) and third mission commitments.
Interesting synergies between all three tasks of the university.
Working with high quality partners.
Long-standing high trust relationships with their external partners.
Customisable programmes with their Swedish company partners.
Collaborations and partnerships inform their research and teaching.

Weaknesses

Management of co-production and external relationships seem to be contingent on individual CeFEO staff rather than a system-wide approach.

Suggestions for further development

Develop an appropriate infrastructure for the long-term management of co-production and external relationships.
Clearly identify the prioritisation of building external relationships relative to publishing in high quality academic journals.
To what extent does the CeFEO want to work with international family businesses?

Grading scale

Excellent
Impressive co-production (JU colleagues and international researchers) as well as with external collaborations especially with regional partners and stakeholders. Nice mix of traditional university activities (research and teaching) and third mission commitments. Good achievements in scholar/practitioner collaborations. Collaborations and partnerships inform their research and teaching.

Impact

Brief reflection of CeFEO's research on society

Nice impact cases. The non-academic partners value highly the research and the researchers. There are a tremendous number of impact activities.

Strengths

Highly relevant research and teaching for the target audience. Assisted Statistics Sweden in creating rigorous constructs to measure ownership succession and exits over time. Additional examples of impact include:

1. Firm-commissioned specific research projects.
2. Tailored programmes based on the needs of the company.
3. Ownership transition and succession at the national level among policy-makers.
4. Media promotions of CeFEO and JIBS' activities through interviews with the local, regional, and national media outlets.

5. Organising international academic (e.g., Babson, EIASM) and practitioner-oriented (e.g., Mentorship programmes for companies and students) conferences.
6. Leveraging of the CeFEO brand to start an online master's programme.
7. Based on their expertise, they assisted with regional, national, and European-level policy-making.
8. CeFEO and university blog-writing.

Weaknesses

Not clear how to effectively capture impact of research (from remaining questions: How do you evidence impact?).

Suggestions for further development

Impact is important for JU strategy and therefore policies, processes and criteria need to be further developed.
Need for better cooperation and communication between the university marketing department and the CeFEO.
As CeFEO is a leading family business centre in the world, the CeFEO leadership may wish to consider partnering with other family business associations or other university family business centres to offer executive education, including participants outside of EU.
Clearer incentives and guidelines for outreach activities. For example, the university, JIBS, and CeFEO could consider additional incentives and recognition for applied scholarship.
Consider enlarging the double doctorate programme by leveraging JIBS' AACSB accreditation by strategically partnering (e.g., non-AACSB accredited institutions).

Grading scale

Excellent/Very Good
Highly relevant research and teaching for the target audience. Assisted Statistics Sweden in creating rigorous constructs to measure ownership succession and exits over time. However, since impact is important for JU strategy and therefore policies, processes and criteria need to be further developed and there is a need for better cooperation and communication between the university marketing department and the CeFEO. Further, it is

not clear how to effectively capture impact of research, but it's not non CeFEO:s responsibility.

Strategies for development of CeFEO

Brief assessment of the visions and strategies of CeFEO.

Detailed strategy with KPIs defined. The guiding framework including Openness, Creativity and Rigour is coherent and is reflected in what the panel observed during their visit.

Strengths

Their strategy is well anchored in the leadership of JIBS.
The leadership fully supports the strategy.

Weaknesses

The level of innovativeness could be higher regarding breaking new boundaries.
The use of KPIs limits the ambition of new strategy development.

Suggestions for further development

The ambition for breaking new boundaries should be more clearly portrayed in the strategy.
Follow up on discussed interesting ideas about interdisciplinary and boundary spanning activities.
Formalisation of the programme for incoming and outgoing scholars to be welcomed in CeFEO.

Grading scale

Very Good
CeFEOs strategy is well anchored in the leadership of JIBS but the level of innovativeness could be higher regarding breaking new boundaries. The use of KPIs limits the ambition of new strategy development.

Give recommendations for further improvement of any aspect of the research quality of CeFEO.

The ambition for breaking new boundaries should be more clearly portrayed in the strategy.
Follow up on discussed interesting ideas about interdisciplinary and boundary spanning activities.
Formalisation of the programme for incoming and outgoing scholars to be welcomed in CeFEO.

Other issues

The university is not leveraging the marketing potential of CeFEO. For instance, the university may wish to highlight the ownership concept of CeFEO through their marketing materials including their website.
Clarify the distinction and organisational roles between the Centre for Entrepreneurship and Spatial Economics and CeFEO?
Create externally funded chairs of ownership & governance and not just family business to enable the CeFEO's ambition to better understand the concepts of ownership.

Reflection from CeFEO and JIBS

Areas for CeFEO and JIBS to work on to further improve the quality of research and co-production

In order to have greater impact in both research and co-production at a national level, CeFEO can develop more close collaboration with other academic institutions in Sweden. Academic institutions that are relevant for CeFEO given our focus area are for instance Stockholm School of Economics, Lund University, Halmstad University and Linnaeus University. In order to better capture relevant research questions for practice, more collaboration could be developed with business and trade associations, as well as with companies and public organizations. For these, examples of relevant organizations would be Svenskt Näringsliv (Swedish Confederation of Enterprise), Family Business Network, Coompanion and Företagarna.

CeFEO could strengthen activities focused other forms of ownership than family ownership, such as employee ownership, private equity, public ownership and hybrid forms of ownership. This can be done in collaboration with these organizations that represent such ownership and with established researchers within the field of ownership issues in other fields.

CeFEO could work more intensively with diffusing knowledge through university courses and programs at JIBS and other parts of JU. Such work has started, where we are on our way to design one new bachelor course, two new master courses and new doctoral courses. We could also engage in developing courses and or workshops for our sister schools in specific ownership topics that are relevant for respective school, and/or a general course/workshop on the characteristics of family businesses.

Tension between high-quality research and co-production

In principle there should not be any tensions. Co-production can very well lead to high quality research and high-quality research publications. However, there is in practice a possible tension due to the fact that current academic positions and incentive systems are not explicitly aligned with the importance of co-production (outreach). Such projects typically take more time, and efforts from the researcher, so even if faculty members are expected to be engaged in co-production activities, time for such activities is not allocated in the positions. Co-production activities in research and teaching could be valued more in performance assessments and promotion decisions for individual faculty members. This is ultimately an issue for JIBS Leadership team, however CeFEO is willing to be part of any discussion in order to face these challenges.

Further, if time was allocated more explicitly in the three areas of teaching, research and co-production/outreach in positions, it would be easier to stimulate and incentivize activities in all three areas. There is a need for clear incentives for applied research projects and outreach activities, e.g. organizing and participating in workshops, seminars and educational activities with external partners and organizations.

Areas for JU to work with to support high-quality research and co-production

Stronger support from JU in applying for larger national grants (Riksbanken Program applications, Vinnova etc)

Stronger support from JU in the areas of marketing and external communication with regards to activities and achievements. A designated web communicator should be prioritized. Also, outreach work with companies and other organizations should be prioritized – e.g. support to hire an executive director with main responsibility to manage corporate connections. This would help to develop a good infrastructure for long-term management of co-production, as pointed out by the export panel.

JU could provide support in following up and measure impact outside academia.

JU could find and implement a performance measurement system which is more adapted for academic work in addition to the current system based on KPIs. It is to our understanding on the agenda for relevant bodies at JU (as part of HSR4R) to work with ways to systematically evaluate research output, co-production and social impact. Even if JIBS has its own evaluation system for individual research output, this is something that will be beneficial for CeFEO.


JÖNKÖPING UNIVERSITY
School of Health and Welfare
SCHOOL OF HEALTH AND WELFARE
Hälsohögskolan

IMPROVE

Description of IMPROVE including impact cases

The research environment IMPROVE brings together research on quality improvement, leadership and innovations in health and welfare. The research can be summarized in five overlapping main areas, all with application in and with health and welfare services:

- Quality improvement to increase value, quality and safety
- Leader and leadership development
- Innovation in health and welfare
- Learning and learning organizations
- Coproduction between users, citizens, professionals, society and a broad range of stakeholders as a continuation in improvement research.

It is essential to contribute with theories and methods for increased understanding of how to create increased value, quality and safety in practice, which requires close cooperation between academy and practice. The tight collaboration between theory and practice places demands on participatory methodologies, such as different forms of interactive research. There is a clear ambition to co-create knowledge with a broad range of stakeholders. Research thus generates new knowledge, but at the same time there is a shared learning and knowledge between researchers and practitioners on both the individual and the organizational level. This provides the prerequisites for research with high relevance and possible long-term impact combined with scientific stringency, which can be put to use at a faster rate in practice.

Central to IMPROVE is the emerging field of Improvement Science, which combines social and behavioral sciences with medicine, care and technology. The field is interdisciplinary and multi-disciplinary and highly applied. It has expanded to encompass disciplines such as health and behavioral economics, sociology and anthropology, psychology, statistics, informatics, epidemiology, policy analysis, philosophy, ethics, learning, and more. Thus, research within IMPROVE has the potential to give an important contribution to this emerging field as well as to more traditional disciplines and the bridging between them. The research environment IMPROVE draws on and

contributes to Improvement Science in health and welfare. With this focus, innovative intersections between this environment and other research environments are created at the School of Health and Welfare and JU as a whole. There are several good examples of collaboration between the five research groups at the school as well as collaboration with research groups at the other three schools at JU. IMPROVE also has a broad network of collaborators nationally and internationally, in practice as well as in research. The infrastructure built to support the research and education environment - Jönköping Academy (JA) for Improvement of Health and Welfare - is owned by a partnership between Jönköping University, Region Jönköping County and the county's thirteen municipalities. This collaboration provides a deep long-term partnership and good conditions for the interaction between theory and practice and shared learning, co-creation and innovation.

Missions and goals

The mission and goals are based on and aligned with JU, School of Health and Welfare, and JA's visions and strategic priorities. For example, School of Health and Welfare's research vision includes "to stimulate and develop multidisciplinary research". Jönköping Academy has a strategic goal that research should be internationally leading in Improvement Science, be innovative, have high level of practical relevance and impact, and contribute to better health and well-being. An overall mission for IMPROVE is to contribute to knowledge about improvement, leadership and leadership development, and innovation to increase the value, quality, and safety of services in the health and welfare systems locally and globally. IMPROVE has made a deliberate choice to make use of the same effect goals that is part of JA's action plan for 2018 to 2021. Four overall effect goals have been formulated: 1. Develop and increase regional, national and international networks; 2. Increased quality and total amount of research funding applied for and awarded 2018-2021 within JA and IMPROVE; 3. Internationally recognized publications and presentations of good quality; 4. Expertise in coproduction, including new PhD students and postdocs in the field. In IMPROVE's action plan for 2018-2021, we have also added to work on a supportive and collaborative research culture which will enhance impact in the wider society.

Research environment and infrastructure

IMPROVE is one of five research areas at the School of Health and Welfare. IMPROVE is also tightly connected to the Jönköping Academy for Improvement of Health and Welfare (JA). JA is administratively placed at the School of Health and Welfare, all staff (except Paul Nystedt at Jönköping International Business School/JU, JIBS) are employed at the School of Health and Welfare. All researchers and teachers, employed or affiliated at JA, are members in IMPROVE and include persons of various professions, ages, gender and lived experiences. The diversity is part of the strategy of JA where diversity among staff is highly valued which has an Impact on IMPROVE. Professions represented are (nurses, doctors, physical therapists, sociologist, health economist, HR professionals, and pedagogues). IMPROVE has men and women represented at all research levels, including professors, senior researchers, post-doctoral researchers and PhD-students. Although, there are more women than men due to the larger number of women in the health and social care sector and in the research and teaching staff at universities in this field. The majority of members is Swedish, but also includes researchers from the UK, US, and Canada.

The department for regional development in RJL in 2016 decided to support the idea of creating a European Centre for coproduction at JA. In the end of 2017 Jönköping University made a strategic decision to support a Centre for Coproduction, through an initial grant of SEK. The Center has, beside the part time commitment from several researchers already in IMPROVE, an interim professor and a project leader and four doctoral students. To be recruited is a professor and a post doc. The Centre for coproduction is administratively located as a part of JA. Since 2016 the centre for coproduction and JA work together with the Dartmouth Institute for Health Policy & Clinical Practice, US, with a similar Centre for coproduction, to develop a new international network to explore how coproduction can improve health in a broad sense through several various activities.

The quality in IMPROVE is, among others, secured and developed by having international guest professors and rich national and international networks. Within the environment, there is a number of international collaborations which expand our networks, our shared learning and co-publishing.

Under the umbrella of IMPROVE, researchers perform research in smaller subgroups. These groups are formed by projects which have received grants in a certain area or they form interdisciplinary supervisor teams for PhD projects. There are also partnerships between researchers to perform studies and write articles together on shared interests and competences. Efforts have been made to create more formalized subgroups, for example about quality registers which was successful in forming the basis for that research grant. However, since IMPROVE still is quite small in number of researchers and many research topics need many fields of knowledge, there has often been a need and wish to merge different fields of knowledge and methods to explore complex issues rather than "locking in" expertise in smaller groups. A strength in the mixed research groups is the close partnership with practice, which enhances the chances to find interesting places for empirical research and also provides opportunities to test the relevance of research questions and contribute to shared learning. Several adjunct researchers share their work between research and practice which also stimulates new ideas and the spread, use and usability of new knowledge gained.

Research consists of both externally funded research and commissioned research. In addition, many individuals conduct research in the form of article writing, which is not funded by external funds but based on interest and personal contacts. During the time period there is a trend towards more research projects with a social orientation.

The impact of engagement and co-operation with society

Improve has an extended collaboration with society and diverse stakeholders, due to the threefold ownership of JA, described above. Researchers in IMPROVE have the intention to engage even more, strategically with 6 audiences:

• citizens as they access, use and shape services; leaders in the national and regional planning of health and social services;
•educators developing the next generation of health and social care professionals;
• professional bodies and trade unions;
• public and third-sector organizations; and
• private organizations

Over the years IMPROVE has deepened and sustained existing - and created new - relationships with each of these audiences to help inform and form our ongoing research and to provide new opportunities to jointly create positive change and increased value in health and welfare. We think that these collaboratives are of outmost importance for the qualities of research since initiating and performing research together with partners enhance the relevance and also possibilities of transition and spread of results for real impact. IMPROVES infrastructure at JA enable coproduction by design and enables collaboration with society. A deeper connection to practice is also supported by many affiliated and adjunct researchers as well as PhD students that are supported and financed by health and care organizations.

Researchers in IMPROVE are involved in several of the RJL's innovation projects. This may be about creating infrastructure for traditional innovations linked to ALMI as in the Visam project and the SIRU project (Social Innovation for Regional Development) where we create infrastructure for social innovations. Our role is to develop the university's role in doing research, education and create innovations. We are also active in developing new work models as in the project 'User-driven digital rural development for health, welfare and attractiveness'. Design thinking and design lab technics are also included in these research projects. Each master's thesis and research project contain both an improvement project led by the student and a study of it. The improvement works range from developing an app to create new processes to create value in the organizations involved. Therefore, we often use SQUIRE guidelines to be able to present both the innovation and the study into text together.

Impact cases

Description of Impact Case 1: Financial incentives and motivation

The aim of the project was to develop knowledge about the complex meeting between control system, financial incentives and professional drivers in health care. The context for the project was primary care which has undergone a healthcare reform, where financial instruments have affected the primary care centers' conditions. The impact has been in several contexts (detailed below), local practice, national practice level, policy, education and research. The beneficiaries are primarily health care professionals, leaders and policy

makers interested in primary care. Primary care belongs to one of the areas that are under heavy pressure and large need of finding new models and new. Our results evidence what people do on units that are well-function. If this knowledge as used, it has the potential to be very valuable. The results show that business managers' understanding of staff motivation and driving forces (eg helping patients, stimulating tasks, social fellowship and improvement work) are crucial for organizational conditions for managing an increasingly complex activity while integrating external driving forces and challenges with employee internal needs and wishes. A promotion factor for co-operation is to create a prestigious and non-hierarchical collaborative culture where different professions work across borders and where individual professions can take over other groups' previous duties, if appropriate. More cross-border work can help physicians relieve and better utilize professional expertise in all professional professions. The health centers showed the majority of criteria for health-promoting work environment. Despite high workload, they described great job satisfaction and shared willingness to do a good quality work. However, well-functioning workplaces also have challenges to further develop in terms of working environment. A systematic quality improvement work is appreciated by the employees and creates good conditions for learning and innovation processes. A prerequisite for innovations is that employees are given time and effort to solve problems and try new solutions. Three different types of innovations were identified in the study; new models for service, processes and organization. The study shows that the business managers need to "juggle" and handle different action options linked to the relevant institutional logic (market, management, profession, patient and employee).

Research activity and impact

The research design was a case study of six well-functioning health care centers, which contributes knowledge of how they manage the situation well and where any problems may have had less space. The case is built upon project financed by AFA Insurance and was run in 2017. The researchers included Monica Andersson Bäck (University of Gothenburg), Sofia Kjellström, Kristina Areskoug-Josefsson, Gunilla Avby and Boel Andersson Gäre (Jönköping Academy). The original design of the case study did not include any interactive elements, (the project was designed by a researcher that unfortunately died before the project started). Along the way several efforts were made to ensure that the results had an impact. Firstly, all primary

care centers were visited at the start were staff got informed about the project, and at the end offered opportunity present the results but also discuss if they agreed on out interpretations. Depending on primary care centers, some meetings were longer and more interactive while a few was shorter and more information providing in nature. At one of the centers we also had an extra meeting with the leadership team where we discussed results a bit deeper. We have also targeted activities to primary care professionals on a national level by attending the large Swedish National conference on Primary Care which takes place every second year. Since the topic of financial incentives is a hot topic in health care agenda we have also made effort to spread our results at a policy level. This resulted in us writing a debate article in DN (Sweden's largest daily newspaper). The article was signed by all researchers and one public and one private owned primary care centers, as we wanted to show that this was something that we make together, and it has a title that makes this point clear: Seven researchers and practitioners: Collaboration builds a strong primary care. We have also written a PM about our results and sent it to the Government. The research has been presented to the scientific community through seminars, conference presentations and articles in peer-reviewed journals and at several levels at Jönköping University and University of Gothenburg. Project results are used in ongoing interactive research projects. Besides from this, there has also been several scientific publications (one of the articles has won a prize at EMERALD), presentations at scientific conferences, seminars and workshops.

Voices from the stakeholder

Contact person: Anette Sparf, operations manager at one of the primary care centers
Organisation: Primary care, Region Jönköping County

Description of the impact in the organization

We have received feedback regarding our excellent functioning as a primary care center. That provides positive energy to leaders and staff as well as to continue on the integrated strategy. The results are very interesting for our unit and it would be good to use it for skills development to other managers and staff. It is nice for everyone to hear that you contribute to a good business. It also makes it easier to continue to develop the unit. We continue with the

development regarding teamwork, and maybe it will be an education primary care center and then use team-based work in the education.

Description of Impact Case 2: Bridging the Gaps 1 and 2 (BG)

Bridging the Gaps 1 and 2 (BG) were two linked large research projects financed by the Vinnvård research program 2008-2013. Vinnvård was financed by a consortium of research funders: Ministry of Health and Social Welfare; Sweden's innovation agency VINNOVA; Vårdalstiftelsen; and the Swedish Association of Local Authorities and Regions (SALAR) as a first major attempt by research funders in Sweden to address the challenges of the "quality chasm" in health and social services focusing on organizational aspects, with clear aspirations to bridge research and practice. The aims of the program, including our projects, were directed towards societal impact short- and long-term; 1) increase the use of research-based knowledge, 2) develop innovative ways of organizing work, 3) stimulate the development of institutional learning structures with a focus on how to lead, manage and develop practices in organizations, and 4) establish more research on how to lead, manage and develop practices in health and social services organizations at Swedish universities. Thus, with these broad aims the very nature of BG was designed and put to action to have impact in all these areas. An important base for BG was the opportunity to study the system-wide change and improvement strategies and activities in Region Jönköping County which attracted international collaboration and attention. A participatory research approach, multidisciplinary constellations and combinations of several perspectives were cornerstones in the design of BR. Long-term impact of research is not linear but often evolves in complex patterns over time, illustrated below by the fulfilment of goals 3 and 4 in BG. With the broad aims of BG described above the impact beneficiaries are from of all levels of the health and welfare systems and universities with different time frames: international, national regional and local organizations, clinical departments or other organizational unit, patients/clients and next of kin, leaders on many levels, students, researchers and funding bodies which will be exemplified below (Nyström, Karltun, Keller & Andersson Gäre). The Vinnvård organization itself also played an important part in communication of the results from our seminars by making films, workshops with practice on national level, arrange meetings and seminars with different stakeholders, like government representatives, National Board of Health, SALAR etc.

The benefits from BG are many, diverse and occur in different time frames in a complex pattern. Short-term (aim 1 and 2), the interactive research model applied in the subprojects, performed in many different organizational contexts, provided regular interaction between researchers, professionals and management continuously both during the project period and later in projects "born" from the initial BG. Joint learning and deeper understanding of how change and improvement of care processes and outcomes can be part of daily practice developed. Mutual understanding of how research and science informed practice can build partnerships grew. Patients and next of kin were important in coproducing and co-designing services and studies in the later parts of BG (the care of congestive heart failure and atrial fibrillation). The latter studies were a source of inspiration for the Center for Coproduction, which started to develop in IMPROVE in 2016, an example of fulfilling aim 3, i.e. a long-term benefit. This illustrates how impact long-term and sustainable benefit from research is seldom linear. BG was the first project to include all four schools at JU in collaboration with the Region Jönköping County (RJL) which led to many new generative relations. To make this network sustainable, leadership at JU, RJL and the municipalities in partnership decided to start the Jönköping Academy for improvement of health and welfare (JA) in 2009, which is the infrastructure for IMPROVE. This corresponds to the fulfillment of aim 4 in the Vinnvård/BG "establish more research on how to lead, manage and develop practices in health and social services organizations at Swedish universities". The development of JA/Improve for ten years is thus an illustration of a long-term impact of BG.
To fulfill aim 3 in BG "to stimulate the development of institutional learning structures with a focus on how to lead, manage and develop practices in organizations" a master program in "Leadership for improvement of health and welfare" was started at JA in 2009. Since it started the program attracts an increasing number of students (>200 applicants in 2018), mainly midcareer professionals and leaders in health and welfare organizations. Senior researchers and PhDs graduated in BG are teachers in the program which secures a fast sharing of research with practice. The master students today lead and study improvement projects in their own organizations – with direct impact for patients/clients and next of kin and the organizations' capacity to improve – another example of long-term, nonlinear impact of BG.

An example of international impact of BG is the extensive international networks which were made available by the collaboration with professor Paul Batalden, the Dartmouth Institute, US, who was a co-applicant in BG and later became a guest professor at JA/IMPROVE. His contact with professor Paul Bate in UK, initiated that JA was invited to the EU project QUASER (Quality and Safety in European hospitals) where Boel Andersson Gäre at JA became the Swedish leader. Professor Glenn Robert was a senior researcher in the UK group in QUASER, a research collaboration which in 2018 has led to his guest professorship at JA. The ten PhD students who became part of BG have graduated from 2011 to 2018 (one planned graduation 2019) and form an important contribution to the capacity building in Improvement Science internationally, nationally as well as in IMPROVE. With diverse professional backgrounds as nurses, physicians, social workers human resource specialist and more they integrate their knowledge and skills in the field in practice organizations, by teaching and by performing continued research. The opportunity to be part of a larger program like Vinnvård with its special aims to make short- and long-term impact in practice and academia was very important in order to succeed since much of the work was exploratory in an emerging field of research. Both PhD students and senior researchers thrived from getting permission to test new ways of co-creating relevant knowledge with practice without losing stringency in the scientific task. The Vinnvård group (consisting of 20 projects in all) became a learning community for novel approaches to knowledge creation and impact formation (Nyström, Karltun, Keller & Andersson Gäre). Several scientific publications has come from the project. Since this was a large research project over several years, it has been possible to illustrate, through a few trajectories, the nonlinear fashion in which impact evolves over time, while there is no chance to provide a comprehensive list of all included activities and publications which had a connection to this initiative in one way or the other.

Voices from the stakeholders

Contact person: Agneta Jansmyr CEO of Region Jönköping County
Organisation: Region Jönköping County

Description of the impact in the organization

For many years, we have invested in supporting employees to research. We have had several employees in Bridging the Gaps, which meant a lot for their development and development of our business in terms of innovation and systematics in business development. Throughout the program, a lot of learning took place between internships and researchers while the projects were ongoing, several PhD students in Improvement Science have challenged and have since been able to teach.

Some concrete examples of direct effects in our system is the work with inflammatory bowel disease, which is now proceeding with developing learning networks with patients. The same goes for the work of childhood diabetes.

Indirect effects are that research contributed to cooperation, which in turn led to the Jönköping Academy coming. It has meant a lot for improvement science in large parts of the country through master education and research. Development work had certainly taken place, but the systematic learning between internship and academy had not developed in this way. And now the work is continuing with the co-production center with international cooperation. Co-production is a very good example of collaboration with patients. We also work with research utilization in other areas and have more and more employees who can contribute to the work. We are proud to be the organization that has the most employees with PhD in the county. With the medical education (medical doctors) in Jönköping from 2019, the focus on research and interaction between internship and academy will be further increased and a necessity.

Evaluation and grading from the expert panel

The expert panel for IMPROVE consisted of:

Roland Bal, Professor of Healthcare governance, Erasmus University Rotterdam, the Netherlands

Christian von Plessen, MD, Associate professor, Faculty of health sciences, University of Southern Denmark

Julie Reed, Professor, Senior Research Fellow, School of Public Health, Imperial College London and Deputy Director and Academic Lead, NIHR CLAHRC Northwest London, United Kingdom

Helle Wijk, Professor, Institute of Health and Care Science, The Sahlgrenska Academy at Gothenburg University, Sahlgrenska University Hospital and Chalmers Center for Health care Architecture, Sweden

General assessment of IMPROVE

The overall mission for IMPROVE to contribute to knowledge on improvement, leadership development, and innovation in the health and welfare systems is crucial and timely. The activity and results during the actual time-frame gives the impression of a promising arena for empirical research and innovation, especially the ways in which the research centre has been positioned between academia and practice and the strong national and international networks it has built over the years. However, this strength also put at risk a bias towards practice based improvement projects rather than high impact scientific studies. This is pictured by the broad publication profile including as well of professional journals, popular writings, books for professionals as well as students and chapters together with scientific journals. The environment that the IMPROVE unit is situated in is very rich with connections to the region, council, practitioners as well as international connections. The full potential and embeddedness of this environment could be made more explicit, as this is valuable asset to the university and potential to deliver internationally leading research. We recognize that this internationally unique environment builds on over 20 years of work and organic developmental trajectory from needs in the health service, to

identifying projects to coordinating activities across the wider system and in partnership with the university. This very inclusive environment with high degree of genuine hospitality in collaboration with the Region of Jönköping has been a major benefit to foster collaboration within the region but also the interest of the international improvement research community. The way in which the research team work reflects the broader culture of the region in working entrepreneurially and building relationships with a constant focus on the region's mission for "a good life in an attractive region". and indeed, Jonkoping has a very strong reputation for quality improvement on the international stage.

We see the potential, but we also see the limitations in the organization and infrastructure which need to be addressed if this potential is to be realized. We are encouraged to see the appointment of new professorial posts, but more is needed.

There is a need for conceptual development, to move from many small projects to a higher quality cross-project research that reflects potential to learn from the work in the region and to compare and contrast with national and international research. We think this conceptualization is required at multiple levels:

1. To clarify the overriding research questions that provide a focal point for the group and to help prioritize
2. To explicitly conceptualize "how" the research works, recognizing the deep connections with real world practice and the influence this has on the nature of relationships between research and practice, the types of enquiries conducted, and the methodologies used.
3. Organize resource and alignment and investment, and develop clear processes and infrastructure to streamline and facilitate research conduct
4. To describe and communicate more clearly the achievements and impact of the group in a more compelling way.

We commend the university in its vision to invest in this space and to support reflection and research that can inform and learn from the real-world health environment. We recognize the strategic placement in national and international boards that has provided a platform for influence and impact.

Strengths

That the supportive infrastructure comprises of a partnership between Jönköping University, Region Jönköping County and the county's thirteen municipalities.
That the collaboration gives opportunities for interaction between theory and practice and shared learning, co-creation and innovation.
The link between research and the master program as well as international educational projects.
The research output is strong, especially given the relative limited number of researchers active within the centre.
Impact on practice also seems to be strong, given the examples given.
The Centre is connected to major policy-making bodies in Sweden and has strong connections with professional and patient associations.
A major strength is the international orientation of the centre, with its program of visiting professors; the fact that it has been able to attract leading researchers from the US and UK is a strong asset.

Weaknesses

The large needs to improve health and welfare can be a risk for research that usually is very time-consuming.
The link between research and education at the bachelor and advanced level – where only some of the researchers seems to be involved in education activities in quality improvement.
The limited number of staff connected to the high and wide ambitions of the centre on a number of field. Although the centre has been able to attract (inter)national funding, it's base could be strengthened further.
Challenges of IMPROVE resonate with other international programs in securing senior level capacity for supervision/grant writing given the emerging field which can hamper growth

Suggestions for further development

Clarify the research mission of IMPROVE towards stake-holders in order to marketing the research ambition in contrast to practice-based quality improvement. Aim is to have high level of practical relevance and impact – how is this to be achieved? What are the implications for working relationships with JA/JCC – and with international work? What are the unique

features of the way research is being conducted that will increase its relevance and impact?

Built upon the strategic positioning of the centre between research, policy/practice and education to establish longer-term collaborations and secure funding. Maybe also further focusing on specific fields or themes. Coproduction seems to be a good candidate for this, as well as the relation to the quality registries.

Much of the report focused on the *how,* as represented by the 4 effect goals. How people are working together, how people will be supported to improve grant income etc. It would be good to hear more about the defining features of *what* people are researching, the underpinning strategy and philosophy of this work. For example, the over-riding research questions, areas of methodological strength/focus, where the study focus is (e.g. on work that takes place within JCC/JA, Sweden, or international) who the research is being conducted for e.g. partnership with JCC/JA, or for international research audience.

Quality of research

Of the 303 articles produced during the actual time-frame of six years, 180 are published in journals, many in collaboration with international authors. IMPROVE is an internationally recognized centre with some major scholars attached to it. It contributes to developments in improvement science from an interdisciplinary perspective and is able to publish in some of the main journals.

Strengths

That some of the produced articles have high impact and quality within the actual field: 2 articles are within the top 1%, 10 with the top 10% and 17 within the top 25%. The two papers in the top 1% were direction setting (for coproduction and publication standards) indicating that IMPROVE is at the forefront of international development within the field. The papers represent a diverse range of topics and methodological approaches including quantitative and qualitative methodologies and ranging from case studies to long term cohort studies.

The establishment of the Centre for Co-production strengthen IMPROVEs position between academia and practice, which makes it able to develop practice-based evidence and develop methods for improvement research. A further major strength is its international activity in research consortia and platforms to develop Improvement science research. Research includes international (2/10), national (4/10) and regional (4/10) studies demonstrating the breadth of collaboration.

Weaknesses

The gap between the demand of competence from stakeholders and the ambition and capacity from the research platform.
Researchers perform research in smaller subgroups but at the same time there is a lack of *formalized* subgroups.

The center is relatively small in relation to some of its international competitors. Slow start considering thesis production which increases over time with an average of 2,3 thesis produced each year. Unclear what the contribution of 4,9 authors on average/article has resulted in. How has the international cooperation been conducted and what has it resulted in? Few articles related the core targets of IMPROVE. The two top 1% papers were not original research but method/conceptual papers. Whilst IMPROVE was contributor to these articles this isn't clear in the Batalden paper. In addition, neither paper cited the improvement practice from the Jonkoping region, and of the 11 publications for review only 2 specifically focus on work of Jonkoping. This isn't necessarily a weakness as depends on the priorities of the unit but Jonkoping is world renown for improvement practice and it would be good to see a research and evidence base to support this in top journals.
Some papers could be strengthened for example increasing sample size for qualitative studies (2 papers had 8 and 20 participants) and the Peterson PLOS.

Applications for external research funds is largely a task based on personal initiatives.

Suggestions for further development

Create large scale longitudinal research programs which calls for the trans-scientific research expertise and grants within IMPROVE.

Focus on specific areas/themes and build on the strong connection with policy and practice.
To ensure clear expectations of visiting professors/international collaborators to attribute JU on articles.
To further clarify the type of contributions JU aim to make in the future to the international literature – especially 1% and 10% targets.
Recommendations of an aim to have original research demonstrating improvements from Jonkoping region in top 1% and 10% journals. This would be up to the unit to decide. Clarify or make explicit the goals of the unit in terms of research outputs. For future planning of quality of research papers:
Is there a clear expectation of the nature of research that will inform future articles? How is this decided? And how does it affect engagement and management of research faculty?
Example topics that might be considered to inform such decisions include:

- Within each of the areas of focus (listed on page 6) what are the major research questions or enquiries that are guiding the work? Or priority clinical topic areas?
- Will articles be conceptual or methodological think pieces? Empirical demonstrations of improvement? Novel ways of coproducing improvement between patients, researchers and practitioners? Theoretical contributions?
- Is there a preference for the proportion of work from the Jonkoping region, from national Swedish work, international comparisons (including Sweden), or international work (not featuring Sweden)?
- How are the strength of individual publications viewed against wider programmes of work with multiple publications/impact?

How do answers to these questions affect recruitment, deployment of resources, and collaborative relationships?

Grading scale and motivation to the grade

Very Good - Good
Overall is was difficult to assess the quality of the research. We would like to know more about how the articles fit to the wider mission and research enquiries of the team -i.e. to map the 300 publications against core themes and research questions/priority areas to understand. For example in the top 11 publications two were on the same topic of Senior Alerts (one on the registry and one qualitative study) - this starts to build a picture of where there is

common resource investment, but we are curious to know what of the other 300 publications relate to tell this story; and the same for all of the areas being worked on. This applies in both specific clinical topic areas, and to the meta research questions or interests e.g. of quality improvement approach, coproduction, data evaluation.

We recognize that this challenge emerges in part from the organic and emergent way in which this real-world situated research takes place and the need to maximize opportunities and relationships which can at times be unpredictable. The research team need to consider how they both keep track of and make decisions on areas of interest and focus to maintain relationships and value to the region and at the same time maximize the quality of research outputs.

The metrics presented were not so useful for assessing the quality of research. The contribution to the grey literature is also important output from research in this field but this value of this was not discussed or made valuable in the report.

Could be greater focus on achieving high impact projects e.g. cross-project evaluation, national/international comparisons, conceptual leadership pieces for the field.

Productivity

303 articles produced during the evaluated time-frame whereof 180 published in a variety of journals. 2,3 doctoral thesis/year.
The production of publications is very high given the research staff allocated to the center. Its output in terms of PhDs could be strengthened, but as understood from the self-evaluation more PhD students are being attracted.
The unit has produced a large number of publications for its size, with a high proportion in the top 10 and growing PhD programme.

Strengths

Despite the limited number of researchers at the platform the productivity is rather impressive.
Strong publication output also in the higher echelons of journals. Also a strong record of international conference presentations and seminars

The high volume of publications also make use of national and international collaborations.
Growing PhD programme with strong connect with Masters programme.

Weaknesses

The broad publication profile.
Number of PhDs could be higher as well as the ability to supervise and support PhD given challenge to recruit in improvement science field may limit future growth

Suggestions for further development

Good idea to host the Nordic conference in 2020. Maybe the centre could also organize more tracks at international conferences to attract more visibility.
Opportunity to make more of national and international collaborations for PhD supervision

Grading scale and motivation to the grade

Good
The unit is producing 25 papers per year. We also appreciate the grey literature outputs but were not able assess the quality of these and information not presented and we did not discuss in detail. It is difficult to assess productivity as the data isn't very clear - either of the FTE which do not take into account the collaborative workforce, and completion rate of PhDs. We are concerned about the sustainability and resilience of the current model as appears to depend on low percentage contributions of a large number of staffs.

To help plan and manage resource we think it would be helpful to make the contribution of all collaborators more explicit, recognizing that this is often contributions of time of people rather than funding but it is possible to make an estimate recognizing that this in itself is a success factor of the unit in attracting such large quantities of commitment and investment from their partners. Data on this will help better manage and coordinate this diverse resource and to improve presentation of the products of these collaborations. We recommend this is completed as an important step to guide the strategy and make explicit the analysis and overview of the community.

Research environment and infrastructure

The organization is built on partnership between Jönköping University, Region Jönköping County and the county's thirteen municipalities which provides opportunities for practice establishment locally and regionally as well as close interaction between theory, practice and shared learning. The platform comprises of two professors in-house, researchers on different levels of qualification, PhD students, together with international guest professors and rich national and international networks. The researcher group is characterized of diversity with persons of various professions, ages, gender and lived experiences. The research environment is characterized by a high activity already beyond its actual start with Bridging the Gaps research program, Sweden's first master's program on quality improvement and leadership in health and welfare and lately the establishment of Centre for Coproduction. The platform takes the initiative of several transdisciplinary practice/research seminars and research retreats.

The collaborative nature of the research program and the center's position in relation to major policy actors is one of its main strengths. As I get from the self-assessment, support staff, especially in relation to research funding could be strengthened.

The IMPROVE research infrastructure appears to be made up of very strong collaborative roles meaning there are many part time contributors to the programme. Having limited number of full time staff to run the unit and support coordination of research and supervision etc is a weakness.

Strengths

The international collaboration and network development between the Centre for Coproduction and the Dartmouth Institute for Health Policy & Clinical Practice, US.
The yearly premium fund based upon a quality incentive system.
Administrative support.
Career ladder for becoming a PhD supervisor.
The center has a strong position in relation to both the Jönköping health and social care system as well as Swedish policy and practice actors (i.e. professional and patient organizations).
Its interdisciplinary orientation is strong.

Evidence of substantial new grant income and new appointments
Strong relationships and continued funding from partner organizations
Solid plans for providing practical support and peer review to grant writers

Weaknesses

It is a small platform comprising of an average of 15 people.
During the actual time-frame the platform has recruited 7 persons in total.
Unclear what the age range within the research group looks like, but it is indicated that there is a large amount of junior researcher.
Unclear what it means that there is a need to be a passionate researcher.
The administrative support comprises of one employment.
There is a shortage of researcher with competence in improvement science which implies a weak possibility of employing PhD students after dissertation.
The most skilled researchers at the platform are seniors and need to be superseded on a relatively short time-frame.
The funding within the actual time-frame is limited.
The center's support staff, especially concerning research funding, could be strengthened.
Ability to support grant income and supervision across all areas of interest given limited senior and full time staff
Ability to attract additional high level competence due to global scarcity – reliance on building internally?

Suggestions for further development

Maybe there are ways to link up to the support staff of the university to strengthen support for say EU projects?
It would be helpful to have a long term development plan and anticipation of how quickly you can realistically grow - e.g. out of the PhDs you train each year how many anticipate staying on as post-docs or longer term – how much growth do you anticipate you can secure individually, versus drawing in national or international expertise – and whether on a short term or fixed term/part time etc.
Consider models for international exchanges as in my experience most PhDs feel they want to move on to another group to widen experience – perhaps consider how work with national and international collaborators can support secondments/opportunity awareness to grow international community/resource rather than just focusing on JU?

Grading scale and motivation to the grade

Good

The diversity of the team in terms of gender and professional and disciplinary background was very good. The senior leadership of this group has been very strong and new professorial positions are being created. However, we are concerned that with the senior leaders stepping back there are not so many middle-career researchers ready to step up in to these positions, and this could be an area of vulnerability to maintain the productivity, strategic and political connections (especially with JCC and JA), and focus, quality and integrity of the work. In particular we see success in this field is dependent on the relationships between the many different and diverse stakeholders. Historically this has been achieved by leaders with hybrid roles and connections to different communities. Consideration needs to given to what strategies are being used to maintain and further develop relationships given these changing roles.

Good to see new funding has been secured from FORTE and to see the productive working relationships with the guest professor. It was hard to assess overall as not all funding obtained by IMPROVE included in self-evaluation especially given the large amount of funding in kind from peoples posts within the system. As stated in previous section it is important to make more explicit these valuable contributions as a key success factor even if the finances do not go through the university system.

We appreciate and acknowledge the challenge of leading such a complex environment with many strong players and with a limited resource/few full time dedicated staff. With the previous leadership stepping back it is important to recognise how the new professor leaderships are best position to take on this leadership role, recognising that they will have their own leadership style and assets that will not exactly fit their predecessors' shoes. Support should be provided by the university to foster the leadership development of the unit professors to develop their identity, skills and confidence to lead a team in this complex space.

There is a strategic opportunity and investment in the new professorship coming in to have an understanding of the context, a commitment to continuing and building the relationships with the Jönköping region,

understanding of the health and social context, and expertise in quality improvement research, and ability to build on the international relationships of the unit.

Develop and make visible the roles of members in the core team to coordinate, support and direct the various projects taking place in the unit being clear on who is involved, their relationships, and how to interact with them to build a common culture, vision and processes. The leaders have an important role of coordinating and promoting the work of the unit, but to realise this there needs to be sufficient time and supportive infrastructure including financial and human resource support.

The processes and habits for engaging and working with different stakeholders needs to be clearer (e.g. annual meetings, newsletters, core team meetings, writing workshops). We note that at present the physical space is important, given the lack of clear office space that supports interaction and collaboration between research staff. This is especially important given the transient and part time nature of many of the staff members which presents additional challenges. There is a need to develop infrastructure and processes for time within, and between, projects to realise full potential and achieve higher impact papers for example through flexibility allocated manpower to projects when needed.

The infrastructure needs to make explicit the relationships with JA, Qulturum and Futurum as this is a major asset of the research environment and needs to be build on strategically and pragmatically.

Networks and collaborations

Cooperation with several research groups nationally, networks, together with society and diverse stakeholders. The Centre for Coproduction has recently started a dialogue about cooperation with trade units and patient representatives. Contacts have been taken with several patient organizations, public and third sector organizations and private companies.
Collaboration is one of the main assets of IMPROVE, both in relation to its connections to policy and practice as its links to the international research community. JU as a whole has very impressive regional, national and international connections

Strengths

Collaboratives initiate research together with partners which enhance the relevance and also possibilities of transition and spreading of results.
Collaboration between Swedish and British fellows within the frame-work of Vinnvård foundation.
The program of visiting professors is a major strength as it gives access to international networks and leads to highly cited publications.
Strong international, regional and national networks with leading improvement science centers and with variety of practitioners and policy makers.

Weaknesses

Unclear what all contacts with trade units, patient representatives and organizations as well as with public and private organizations has resulted in.
Ensuring get credit for contribution to international work/thinking
Harnessing networks to maximize research impact in line with JU strategy and growth of IS field.

Suggestions for further development

It seems as that the strong networks with major health and social care players in Sweden could be used to strengthen long-term funding for the centre.
Links to earlier questions on priorities for research agenda – how can JU use connections to maximize quality and impact of research enquiries

Grading scale and motivation to the grade

Very Good
We appreciate the strong international collaborations with respected researchers and to attract leading guest professors. Appear to be very strategic and fruitful collaborations.
Importance of maintaining and nurturing the existing collaborations and networks and the opportunity to extend with new appointment with new collaborations and networks.
Be more explicit of relationship, the benefits to IMPROVE and JA, how contribute to research programme (rational in how make a contribution to the overall research questions and agenda), and ensuring that JU/JA is getting appropriate credit for the work done

Co-production and external cooperation

Cooperation with several research groups internationally, networks, and international guest professors.
Excellent demonstration of commitment and integrated throughout research strategy.

Strengths

Collaboration has resulted in participation in a large EU research project on quality and safety in European hospitals (the QUASER project), a major 3-year EU FP7 qualitative research study. Two internationally world leading researchers are connected to the platform, Robert as interim Chair in Coproduction at Jönköping Academy and Hollnagel as visiting professor.
Breadth, depth and history of relationships and experience in coproduction.

Weaknesses

Unclear if it is IMPROVE that was involved originally in the EU research project.
Unclear if patient-participation contribute to the co-productive research.
Lack of clarity on how these relationships fit with research and improvement agenda.

Grading scale and motivation to the grade

Very Good
Excellent with region and policy makers, exemplified by the strong relationship and letter of support from the CEO of the region.
Could do better on co-production with patient and citizens (recognised by research leaders as an area for growth).
As noted earlier the relationships with JA, Qulturum and Futurm can be more explicit. And details of collaborative projects e.g. data registries, should be more central to the description of the research purpose and aspirations.
Given the complexities of these relationships the linear research model presented in the self-evaluation appears overly simplistic and could be problematic to the design, coordination and communication of the research strategy. This should be reconsidered and the explicit articulation of the process of how practitioners and researchers work together is an important

output to stabilize and sustain the unique working patterns of the unit, and to share this learning with other research units would be an important contribution to the literature.
Could be more explicit on what is being co-produced within the research strategy e.g. service improvement, individual patient care, research (on what)

Impact

Members of the research team have impact on research development by being involved in several national and international research committees, boards, assessment and review groups.
Through its collaborative positioning, the center is able to have a strong impact on practice. Mainly, its drive to do practice-based research, engaging with practitioners and policymakers contributes to this. The impact cases illustrate this.
Impact appears as a central driver for the work of IMPROVE.

Strengths

The in house and guest senior researchers of the platform have a great impact on the research of the field nationally and internationally.
The researchers are very active in presenting and spreading results.
The first impact case study demonstrates an impressive level of interest and awareness of this research including uptake in national media and at policy levels.
The second impact case study is an excellent example of research with primary purpose of having an impact on practice from the outset with strong coproduction and understanding complex long term impact.

Weaknesses

The report gives the impression that the impact of the platform depends on a few very qualified members of the group.
The impact of establishment of the Centre for Co-production is difficult to evaluate since it is in a start-up phase.
A majority of the abstracts and conference presentations are not scientific.

Suggestions for further development

Rethinking the rather linear conceptualization of the research process in terms of coproduction could maybe help to even further strengthen impact.

Grading scale and motivation to the grade

Very Good
The unit has a clear ambition to make a difference for users of the service, and this creates a responsibility to assess the impact that is being had. It would be helpful to have a more systematic approach that reflects the unique aspirations of the research environment, to assessing impact from individual projects and collectively to create a richer picture of the value the unit has to the region, and impact on national and international work.

The Bridging the Gap example was strong and demonstrated how the IMPROVE centre has grown from collaborative work with the region. The example from primary care was interesting demonstration of achieving strong attention in the media and with policy makers, but it wasn't clear how this was informing the next steps to build on the learning from the research to achieve improvements in care. We heard in discussions this has led to ongoing project funding - it would be helpful for this to be clear in the presentation of impact and fit with the wider research strategy.

We see this ability - to close the learning cycle and ensure that research findings help inform and solve problems, taking shared responsibility for the achievement of improvements in care - is a unique and defining feature of the IMPROVE center and the improvement research field, and should be central to all research strategy.

Impact from publications - a small number of papers were highly cited, but many were not. See comments on quality of research.

Impact on teaching - From the feedback from the research unit there are strong connections and continual coproduction and revision of content. It would be helpful for this relationship to be more specific. The courses run attract leaders from across the country so this value should be more explicit.

Strategies for development of IMPROVE

There are two tracks of visions and activities presented in the report, an increase of the quality and total sum of grants and the number of published articles as well as developing further networks and impact strategies on practice. It could be strengthened (a) by a clearer vision about the ways ahead for improvement science, (b) a further rethinking of the research process, and (c) securing more long-term research funding from policy partners. The strategy clearly outlines current processes and *how* they will be strengthened to support the research pipeline with detailed and well thought through strategies. It would be helpful if this strategy could be supported with the addition of *what* research is to be conducted with topic specific goals (see earlier comments on section 1 and 2 research quality).

Strengths

Research that promote health and welfare.
There is a strong focus on processes for increasing quality and completion of research

Weaknesses

A lack of full-time researchers and a forth-coming alternations of generations among the most qualified researchers of the team.

Suggestions for further development

Of the two tracks of visions and activities presented in the report, the main focus should be on increasing the quality and total sum of grants as well as the number of published articles in peer-reviewed high impact scientific journals, and less efforts on developing further networks and impact strategies on practice.

A clearer vision of the relationship of IMPROVE and its regional, national and international partners would help understand the space that IMPROVE is attempting to carve out. What is the unique contribution that IMPROVE makes? And what does it require from its partners?
This could be supported by a clear strategy as to what areas of expertise and enquiry are considered priorities, how they will support achieving the vision,

and how this supports strategic decision making of what topics to focus on internally and which to build external collaborations to support.

Grading scale and motivation to the grade

Good
The thinking represents a diversity of interest and expertise, but further work is needed to clarify the vision and strategy that pulls the different streams together and makes the whole greater than the sum of its parts.

Consideration needs to be given to the design strategies that enable effective working, for example the principle of having 3 supervisors for each PhD student is a good start, and more of these principles and habits would be helpful to strengthen the programme.

The grant income presents a significant opportunity, but also a responsibility, to use this funding to strengthen the research vision, strategy and infrastructure to maximize research quality and impact on users.

The 4 overarching effect goals mentioned in the action plan reflect the academic aspirations of the unit but does not consider the impact of this work and connection to the health and social care system. There is a risk that this reflects the “ivory tower” of academia rather than the real world value of the co-produced improvement research for which region is famous. The effect goals should consider the wider ecosystem of the research environment (e.g. the region, JA, Qulturum etc) and not just the research process. The grant generation/paper writing is a very important sub-process to help grow the unit, but is only a small process of the wider aspirations to achieve improvements in care in the local region. This also links to the clarity of how value and impact is measured, which we encourage further reflection on and addition to the action plan.

The action plan touches on many of the points we mentioned, but appears to be rather conservative and does not reflect the originality and uniqueness of the IMPROVE environment, and doesn't mention the challenges of the research environment of going from a series of projects to a programme against research questions and more longitudinal research, and with regards to creating a more efficient research team with differentiated and collaboration

of roles of the members of the research unit, and this influences dedication of resources and responsibilities, and ability to achieve and measure impact of the work. This will allow the team to integrate learning from what they have learnt to date over the last 10-20 years, and to create a point of departure of what is left to learn and the major research enquiries.

Other issues

Relationship between research and teaching is not an explicit part of the assessment criteria.

Reflection from IMPROVE and School of Health and Welfare

The international group of evaluators was very engaged, had a broad expertise and experience in the emerging field of improvement science on all system levels, which lead to very constructive and helpful dialogues during the visit. In the dialogues and the written feedback, the group underlined that the overall mission for IMPROVE, to contribute to knowledge on improvement, leadership development, and innovation in the health and welfare systems is crucial and timely and internationally unique. IMPROVE's ambition to ensure that research findings help inform and solve problems, taking shared responsibility for the achievement of improvement in care – was seen as a distinctive feature, and should continue be central to all research strategy. Collaboration was seen as one of the main assets of IMPROVE, both in relation to its connections to policy and practice partnerships as its links to the national and international research community.

Areas for IMPROVE and School of Health and Welfare to work on to further improve the quality of research and co-production

A learning from the review is that IMPROVE has a good potential to use many small projects to a thematic higher quality cross-project research that reflects potential to learn from the work in the region and to compare and contrast with national and international research. This could involve a retrospective analysis of what people have been researching and then try to pin down the unique contribution to our main fields of research, improvement science and co-

production. This approach could highlight what IMPROVE provides in these areas regarding; over-riding research questions, areas of methodological strength and focuses, where it takes place (RJC, Sweden and internationally) and how it specifically contributes to the main areas and strategies in IMPROVE. From this analysis we can build on and refine what is already accomplished and set directions for a refined vision and questions to address and develop a small number of key priority areas in improvement science and make a plan for strategic recruitments. An additional strength and strategic area is the societal impact gained which could be more explicitly shown and developed.

The ARC evaluation also puts an emphasis on using our unique close partnership with the RJC, internationally known for its consistent work with improvement and innovation and the municipalities in the region, which all have a deep experience in coproduction with citizens. Here we need to continue and review ongoing processes for relationships with stakeholders in the region/municipalities and others. We can act to further develop the interactive research model to include all partners in co-production (e.g citizens and end users). Additional action is to compose a rigorous partnership and stake holder mapping, locally, nationally and internationally.

It is also of importance to articulate what is distinctive about IMPROVE's research and its impact, e.g. its partnerships/collaboration with practice and policy stakeholders and its deep connection to educational programs. The strength of integrating our research results into and our impact through the Master program of quality improvement and leadership, our courses on coaching for improvement, leadership and process development (Advanced Training Program) and patient safety courses were not thoroughly described.

Tension between high-quality research and co-production

Potentially there is a tension, so it has to be balanced consciously. There may be difficulties in getting funding and being able to publish, depending on the funders/journals' level of understanding of improvement and coproduction in research, or having an understanding of how practice/research partnerships and coproduction in itself can affect the research process. Co-production and interactive approaches often take longer time in the research process which creates a need for long-term funding opportunities and stability in partnerships. On the other hand, a trend suggest that such research is becoming more and higher valued continuously, since it includes direct impact in the process itself and also has value for democratization in society. In IMPROVE, the research approach is with stakeholders/partners not on and participatory research on "how to coproduce" is an important focus area.

Areas for JU to work with to support high-quality research and co-production

Strengthen the infrastructure and staffing in support structures (economy, Human Resources, marketing and grants office) and initiate a dialogue at HHJ and JU levels on how those processes can be developed to become smooth, instead of slow and bureaucratic. Another action is to ensure that all members of IMPROVE are informed of current research process routines and current level of infrastructural support, to ensure processes to work as smooth as possible, and to clarify improvement areas. The evaluators also saw that JU as a whole has very impressive regional, national and international connections and that IMPROVE fits well into JU´s strategic goals. Internationally, there is a shortage of researcher with competence in improvement science and thus there needs to be a long-term strategy for capacity building. With the strengths that were highlighted and the encouraging advice on how to overcome weaker parts we perceived this evaluation very positive and hopeful for the future.


0.25
FN22
0.65
FN22
1.25
1.0
0.5

Lifelong Learning

Description of Lifelong Learning including impact cases

The current mission of the research area LIFELONG LEARNING has developed as a result of a number of distinct historical contingencies:

In the year 2000, the Swedish Government issued a competitive call to Swedish universities with teacher education to host and develop a National Centre for Lifelong Learning. The School of Education and Communication won the bid in 2001. The center was named *Encell – The national centre for lifelong learning* and was tasked to be *the overall national body responsible for conducting research as well as knowledge dissemination within adult education and learning*. A center director, a web-editor, researchers and project coordinators, and five doctoral students in education were hired, and many collaborative research projects were initiated. A web page, www.encell.se was launched to serve as Encell's primary communication channel. Later on, Facebook, Twitter, a monthly newsletter and a report series were added, as well as the hosting and organizing of international conferences.

In 2010, the School of Education and Communication reorganized its research activities in distinct research areas. The research area *Lifelong Learning* was formed. Besides fulfilling the research mission of Encell, the group was assigned the task of conducting research within *human resource management*, to support the newly formed Human Resources program, which offers a bachelor's degree in either psychology or management. Encell's designated research budget was cut, however, so maintaining research productivity now became conditional on securing external research grants. This requires a fortuitous match between skills and interests and the particular calls available at any point in time. So, besides securing grants for studies of aspects of adult learning, these circumstances made us expand our research remit to studies in areas such as university-society collaboration or, as detailed below, gender studies.

Building on our feminist theory expertise – we teach the course "Gender & Work" at the HR program – we won a very large grant from the Swedish Science Foundation in 2012 designated for building strong research groups in feminist research. It was followed by two other substantial projects in 2016, in the field of feminist entrepreneurship studies. This formed the basis for the research group *Embla* (www.emblaresearch.se) which now gathers feminist scholars from Swedish as well as international universities. The Lifelong learning group has since integrated a gender and intersectional perspective in its research on adult and lifelong learning and on HR and leadership.

In 2017, Jönköping University Foundation issued a call for strategic research investments. The research area Lifelong Learning was in 2018 awarded a large grant to build a research unit at the newly started Institute for Education Leadership at the School of Education and Communication. A professor and two post-docs will be hired in 2019 to conduct research within the institute, and these, as well as the institute (which also organizes training and conferences for school directors and education leaders), will become part of the research area Lifelong Learning. The current research mission of Lifelong Learning is thus a broad one: to conduct research within adult education and learning, within human resource management, and, from 2018, within education leadership. We are further a group comprised of scholars of different disciplinary backgrounds – education, psychology, and management – and with different individual interests and strengths, that we build upon in interdisciplinary collaboration. What unites us is a common interest in the learning and development of adults, and/or the organization of learning and development for adults; in education or learning at work, and in formal or informal settings. We also share a common approach: as social science researchers, we tend to take the perspective of the less privileged. We aim at giving the less privileged a voice through qualitative studies, support our data with quantitative studies, or use methods such as discourse analysis to study how they are positioned in policy or professional practices.

Our current research projects are organized in three thematic areas:

1. Adult and lifelong learning
2. HR and leadership
3. Gender, equality and inclusion

The division in three themes is heuristic – in reality they overlap. Issues of adult learning are also part of HR and leadership, and issues of equality and inclusion are relevant and important within both areas. That said, in the following we briefly present selected past and present projects under the three headings.

Research environment and infrastructure

The group is managed by a professor, assisted by a coordinator. Since Encell, the National center for lifelong learning (comprised of a director and a web-editor, the latter also serving as our coordinator) is part of Lifelong Learning, Encell's director is in practice also part of the management group. We organize research seminars on a regular basis, in which members present working papers for comments, critique and discussion. Papers in progress are sent out to participants beforehand, so attendants come well prepared. These seminars serve as our in-house quality control mechanism. We use the seminars to discuss applications for research funds in the same manner.

On a less frequent basis, we organize seminars in which members or invited guests present finished research. All our seminars are open for all researchers at the university. Twice annually we go somewhere else for longer workshops. These have ranged from lunch-to-lunch workshop in the vicinity, to week-long writing workshops in faraway places. These workshops have been very productive – at one of them we came up with the idea of writing an anthology on HR, and before we returned to Sweden the book was already structured, a book proposal was drafted, and contributors were invited. At the end of the year we meet to report and discuss what we have achieved during the year and consolidate our plans for the coming year(s). We have a document which is a combined annual report and annual plan, that we update regularly: when an article in the "plan" part is published, we move it to the "report" part. We find this document helpful to keep track of the myriad different activities that this group of scholars is involved in. The document for 2017 is attached.

So far, we make up just one research unit – but collaborative subgroups are formed on a temporary basis, depending on which research project people are working on at any point in time. These small subgroups often involve people from other research units at the School of Education and Communication as well, or people from other universities. The research cooperation within

Embla with collaborators from five Swedish and three international universities is a case in point, and so is the project on older people's digital competencies, which is a collaboration between three Swedish universities.

Staffing at the School of Education is largely a result of teaching needs, not research, but we still think that we have a strong and well composed research group. We expect two of our assistant professors in Education to be promoted to associate professors shortly. We also expect the three new members that we are hiring for the Institute for Education Leadership to make up a very substantial addition to our research unit, particularly since these are primarily research positions. The age distribution of the group is good, which guarantees continuity over time.

We do need more doctoral students – both to create a lively and growing research environment, and to provide opportunities for our current staff to supervise doctoral dissertations. Hiring doctoral students is conditional on receiving external financing, however.

Infrastructure, facilities and funding

As social science researchers we do not need much in terms of material equipment, save our offices and computers. But a very important infrastructure feature is the fact that most of us have offices in the same corridor. The value of talking in the line at the copy machine or easily popping in to each other's offices cannot be overestimated! Our librarians probably go beyond their call of duty, and often provide concrete help in terms of literature searches, or publication advice.

Encell, the National Centre for Lifelong Learning is part of the overall Lifelong Learning group but has its own budget and mission. Encell is a natural channel for our communication with society, and the research communication/knowledge dissemination and networking that is provided by Encell's director and web editor often leads to new research ideas, or projects, sometimes also funding, as well as new research collaborations. Encell's web-editor works primarily with research communication through the web and social media, but she also assists with administrative coordination for the whole research group.

Collaboration with society within Lifelong Learning

As social science researchers, we are primarily engaged in knowledge production and in the dissemination of knowledge through our publications, through contract education or lectures for various stakeholders, and – in some cases – through interactive research. *But we cannot know what the actual impact of our efforts is.* The kind of detail asked for above is not possible to deliver. In the following, we therefore report what we are able to report: we provide an overview of collaborative projects of different sorts, usually involving both academia, national as well as international, and stakeholders from society, like for example: ***Ministry of Education*** (commissioned Encell), ***Lärarförbundet*** (The Teacher's Union), the ***Nordic network for adult learning*** (NVL), the ***Swedish Interactive Research Association*** (SIRA), ***Folkbildningsrådet*** (FBR), the adult education unit in ***Jönköping Municipality***, ***ARENA (***about learning organizations), ***Braheskolan*** (the folk high school at Visingsö), ***Men's Health Society*** in Denmark, ***ALMI*** (provide advice and financing), ***Leader*** and ***Coompanion*** (they channel EU-money), ***municipal business development centers, Jönköping county council***, ***Jönköping municipality, International Centre for Innovation in Education (ICIE)***, ***Mid-Sweden Chamber of Commerce, National Association for Education Leaders, Statens Institutionsstyrelse***, ***Swedish Agency for Youth and Civil Society (MUCF***), ***UNICEF Sweden, International Centre for Innovation in Education (ICIE)***, ***Mid-Sweden Chamber of Commerce, National Association for Education Leaders***

Our research on gender and entrepreneurship is on-going, long-term, includes several different projects and has involved researchers from four other Swedish universities (SLU, LiU, SU LnU), and five international universities (Lancaster and Nottingham, UK; Dundalk, Ireland; Tromsö, Norway, and Simmons College, Boston, USA). One of these research projects was funded by ***Vinnova***, Sweden's Innovation Agency, part of a larger endeavor to make more women start businesses and resulted in a book on the situation for women entrepreneurs in Sweden.

Impact cases

Description of Impact Case 1: The IT-track

The aim of the study was to gain knowledge about how to tailor successful educational programs for students associated with disabilities, in this case high-functioning autism, so that their employability and integration on the labor market are improved. The societal context was formulated by the fact that exclusion and discrimination of people associated with disabilities incurs considerable individual and societal costs. Breaking down the alienation of this marginalized group, so that they can enter the regular labor market, is a major challenge. The context of the study was the IT-track program, where 15 students were recruited. It was project based and planned for the period 2012-2015. The impact has been documented at several levels, concerning i) the design of successful education for people with disabilities, ii) sustainable structures, iii) knowledge and expertise, iv) broader offer of education for people with disabilities. The beneficiaries of the study are people with disabilities, instructors, stakeholders and policymakers. The results show that the design of the IT-track was primordial to offer the students an experience of participation and alignment. 13 students in the group report that the IT-track was fully adapted to their needs and circumstances, and they experienced being part of a meaningful and participatory social context for the first time in their lives. Of the twelve students who completed their education, five had made transitions to employment and three held internship places. Necessary adjustments at the workplace were identified, such as, clear structure of the work that was to be performed, acknowledgment and understanding of each student, individual work places. The positive experiences of the program design led to improved well-being and a decreased need for home support and medication. In addition, the IT-track offered an avenue to move out of their family home, and, thus, had an impact on the students' independency and family relations.

Research activity and impact

The responsible researchers were PhD Joel Hedegaard and Ass. Prof. Martin Hugo, School of Education and Communication, Jönköping University. The study was inspired by ethnographic methodology, in order to gain knowledge about the students' lived experiences. By taking part in the practice, observing

what happens, listening to what is said, and by asking questions, we developed an understanding of the participants' experiences and learning in this context. The present study was limited to the delivery of the IT-track in the autumn of 2014 and a follow up study in the autumn of 2016. Data were collected in four ways: (a) participant observation and natural conversations in the autumn of 2014, (b) 14 research interviews with students, (c) one focus group interview with the staff, and (d) a follow up interview two years later with the occupational therapist/coordinator. Participant observation and natural conversations were conducted by the two researchers together. Fourteen of the 15 students who were enrolled in the project during the autumn of 2014 took part in interviews. The study proved to be unique in that we interacted with and followed the students, rather than studying them "from outside". The dissemination in society included a range of publications, such as student literature in methodology, national and international publications in anthologies and peer-reviewed journals in the disability field. The study's results on why the IT-track was successful have also been widely covered in branch journals and social media. Dissemination has led to an awareness among stakeholders that knowledge and expertise is needed for finding solutions to societal exclusion of people with disabilities. Today, the researchers are demanded in a range of contexts to support competence enhancement in the field. Moreover, the study has been the necessary leverage to make the IT-track a permanent education, and to broaden the educational offer for people with disabilities. In addition, besides preventing individual stigmatization, breaking down this alienation is estimated to allow for social savings of between SEK 11-14 million (approximately USD 1.2-1-6 million) for each young individual that is subsequently included in society.

Voices from the stakeholder

Contact person: Eva Klangbeck, development leader and former coordinator for the IT-track

Description of the impact in the organization

The staff in the IT-track were not aware of that social learning would be as important as the theoretical aspect. The study has offered insight into various aspects of the program's success and been able to demonstrate the importance of adequate education for people with disabilities. Through the study, the IT-track has become a permanent activity. We would find it incredibly fun and beneficial to do a similar study again to compare the results. Are the answers

we received just the group interviewed or do current students have the same experiences? We would also like to follow up students who completed their studies. What does their everyday life look like today? Are they working? What difference did the IT track make in their lives?

Description of Impact Case 2: ICT and senior citizens

The aim of the study was to develop knowledge about ICT uses among senior citizens, and about how this group is included and participate in an increasingly digitalized society. The context is formulated by current digitalization processes in Sweden. The level of access to ICT is high in Sweden compared to the rest of the Western world, although inequities between groups are observed. The motive of the study is formulated by the fact that the Western world faces a challenge with an ageing population. Digitalization has come to be perceived as one solution to the problem, since it has the potential to improve contacts with and services to an ageing population. The impact has been documented in several contexts: on research and policy levels, in associations and the public debate, as well as in contexts where the results can be pursued for further and deeper impact, such as among elderly people and in education. The beneficiaries are elderly retired citizens, leaders and policy makers, for whom the results are valuable for knowledgeable decision-making, stakeholders on the ICT market, and NGO:s. The results show that 20% of the respondent's lack access to ICT, and, consequently, 80% have some kind of device. However, 14% have only one device. They constitute a category that is not digitally excluded, but they are nevertheless not fully included, insofar as their technological opportunities are limited. Furthermore, individuals' resources are not constant. They vary over the life cycle. Among average senior citizens, resources seem to decrease with age, reduced income, social networks, physical capacity, and cognitive abilities. In an ever-changing digital landscape, those who are not capable of updating their technology and digital literacy skills will be gradually excluded. The results point to a societal problem in the aftermath of the digital shift, which has not been envisaged by the market and stakeholders, neither sufficiently explored in research on ICT uses.

Research activity and impact

Participating researchers were PhD Ulli Samuelsson (SEC/JU), Prof. Tobias Olsson (MaU) and PhD Dino Viscovi (LnU). A postal questionnaire was sent to a simple random sample of 2000 Swedish citizens aged 65–85, in the autumn of 2015. 1264 questionnaires were returned, giving a response rate of 63%. 1200 persons responded by mail, only 64 digitally, that is, 5%. Data derived from this nationwide survey elucidate general patterns of: (a) degrees of information and communication (ICT) access and (b) ICT-literacy among Swedish senior citizens. The overall patterns of access and literacy were analyzed in the light of senior citizens' assets, conceptualized as material, discursive, and social resources, as well as age and gender. Except for research dissemination in academic reviews and at international conferences, on an EU level and beyond, the very foundation of the study targets societal change at national and local levels, which demands long-term endeavors. For example, the researchers intend to pursue qualitative studies, in order to gain in-depth knowledge about senior citizens attitudes to and actual uses of ICT. However, besides dissemination in a range of media and networks, societal impact is immediately observed through a debate article (*Dagens Nyheter*), citing the surprising result that 20% among senior citizens did not have access to IT, and, moreover, that this is a figure that is not expected to decrease over the years, as younger IT-literate cohorts grow older. The effects of the article are tangibles, since the communication has instilled several initiatives and investments, with the aim to enhance senior citizens ICT-literacy and access to new technology. Organizations and municipalities as well as the Swedish state are now launching educational efforts, ICT-guides, and public ICT-centers.

Voices from the stakeholder

Contact person: Thomas Thörn, Information Officer
Organisation: SeniorNet, Växjö:

Description of the impact in the organization

The association SeniorNet Växjö, reports that the study has been a guide to SeniorNet Växjö's business development, and the main evidence-base for new business areas and structures for reaching out to interest groups in digital exclusion. Co-created research between SeniorNet and academia is under development, and collaborations with authorities and concomitant networks are initiated.

Evaluation and grading from the expert panel

The expert panel for Lifelong Learning consisted of:

Satya Brink, PhD, International Consultant, Research, Policy Analysis and Strategic Policy Advice, Canada

Airi Rovio-Johansson, Professor of Educational Sciences, Gothenburg Research Institute (GRI), University of Gothenburg, Sweden

Kjell Rubenson, Professor, Department of Educational Studies, The University of British Columbia, Canada

Yukiko Sawano, Professor, Department of Education, University of the Sacred Heart, Tokyo, Japan

Bernhard Schmidt-Hertha, Professor for educational science, Department of Adult Education/Further Education, University of Tübingen, Germany

General assessment of Lifelong Learning

The LL-unit is missing core funding and is underfunded in both money and time for research. The LL-unit has the potential to increase the university's profile. Strong in research but lacking cohesiveness in the knowledge production of the LL group. For Jönköping University (JU) the LL group is an important asset. Accordingly, the research needs support for long term sustainability and growth.

Strengths

There are areas with international visibility and other areas with national impact.

Weaknesses

The lack of clear mission and strategic plan. The strategic plan should be long-term and link to the coming new strategy of the university.

Suggestions for further development

For LL:
Develop a limited number of core research areas. See below. Operationalize the long term strategic plan of the LL group with annual goals and activities to show progress.

For JU:
The funding for the LL group should be aligned with the new long-term strategic plan of JU. The present performance based funding formula must take into account the variations in respect of wide mandate, publication tradition and requirement for outreach, between different units in the university.

Quality of research

We have assessed the LL's quality of research in relation to the present conditions. The LL group performance is uneven as can be expected with only two full professors, none of them having more than 50 % research time and the six assistant professors, being in an early stage of their research career, have to teach 100% and are lacking time for research in their positions. Accordingly, this group has in total no more than two full time equivalents (FTE) for research.

Strengths

The LL group is in the top tier world-wide in Gender Studies. In the area of Talent Management, they have made important contributions to the scholarly literature. They have laid the foundation for a promising research program in older adults' and intergenerational learning and disability studies. A common thread for the research of the LL group is "inclusion".

Weaknesses

The lack of resources has resulted in too many research projects with a limited scope in terms of research focus, time and resources. The research in general within the LL group consists of too many disparate short term funded activities. The group is very reliant on the reputation of a few senior individual researchers in their field.

Suggestions for further development

LL group needs to give more attention to the relationship between separate projects to advance knowledge and build a platform for further development of the group.

Grading scale

It's *very good* in particular in the view of the fact that the group has in total no more than two full time equivalents (FTE) for research, but at the same is in the top tier world-wide in Gender Studies and made important contributions to the scholarly literature in the area of Talent Management.

Productivity

Given the resources the productivity is very good. They have given a lot of attention to the choice of journals in which they publish and how to get their message out.

Strengths

The balance between publishing in high quality journals, other journals, newsletters and book chapters reflects their mandate and the variety of stakeholder- and target groups. This strategy has given the LL group a broad visibility. In view of the fact that they only have 2,3 FTE's, their publication in high ranking journals and citation score exceeds what could be expected.

Weaknesses

They don't have any resources for PhD students. There is a lack of faculty research time for assistant professors. Project driven funding results in inconsistency in research output and publication patterns.

Suggestions for further development

Develop an application for a research school focusing on older adults' learning. This could be a way not only to recruit Ph.D students but also to increase sustainable international exchanges. Finding synergies between research projects could result in increased publications in high-ranking journals.

Grading scale

Recognizing that they are unable to have any PhD students, but having two coming promotions, and that their publication in high ranking journals and citation score exceeds what could be expected it is *excellent*.

Research environment and infrastructure

This is not a planned group but a consequence of circumstances.

Strengths

A heterogeneous group with a good age and gender balance; good interactions within the LL group; cross disciplinary bridges were based on a critical mass of scholars and broad methodological knowledge across research areas.

Weaknesses

Dependence of project funding; lack of a strategic plan. Not so much ethnic or cultural diversity among the staff.

Suggestions for further development

The seminar series could be used in a more strategic future-oriented way, not solely for paper production. This could complement the current working seminars.

Grading scale

Good
LL is a heterogeneous group with a good age and gender balance with good interactions but there is not so much ethnic or cultural diversity among the staff.

Networks and collaborations

Very extensive and very broad collaboration both national and international.

Strengths

A readiness to collaborate nationally and internationally.

Weaknesses

Too wide spread. The contacts are often short termed, project based, and individual and don't benefit the entire LL group.

Suggestions for further development

Strategic planning to select collaborators; need to have a long-term focus; strengthen the internal cooperation with the university and in the School of Education and Communication; national and international collaboration in line with the strategic planning; the Research-school could help to establish and strengthen national and international collaborations and also bring international faculty to Jönköping.

Grading scale

Very good.
LL has a very extensive and broad collaboration both national and international, but it is too wide spread and don't always benefit the entire LL group. They do have a readiness to collaborate nationally and internationally.

Co-production and external cooperation

Relevance of the applied research projects which meet the demands of regional and national stakeholders.

Strengths

Collaborations on the national level, and especially with the municipality level; a diversity of partners.

Weaknesses

Project oriented and linked to individual researchers; not enough collaborations with key national collaboration partners.

Suggestions for further development

Need to develop a strategic plan that identifies national bodies for long-term collaboration. The LL group should broaden the number of national collaborators in the area of disability studies and deepen the relationship with the Folkbildning [Popular adult education], both education and scientific training.

Grading scale

Good
Relevance of the applied research projects which meet the demands of regional and national stakeholders and with collaborations on the national (municipal) but they are project oriented and linked to individual researchers; not enough collaborations with key national collaboration partners.

Impact

Long and short-term impact of research of the nature that LL is involved in, is very difficult to assess. Responsive to improve gender equality and inclusion. Strong international impact as exemplified by high citation score in the area of gender equality. For the high functioning autism group and marginalized groups there was important impact resulting in a permanent training program. High visibility in the public press that has been noticed in the policy community for the research on older adults and IT.

Strengths

Responsive to improve gender equality and inclusion. Strong international impact as exemplified by high citation score in the area of gender equality.

Weaknesses

Lack of systematic evaluation of impact of various research projects.

Suggestions for further development

Set an impact protocol that could be used across projects and time.

Grading scale

Good

Even though it seems there is long and short-term impact of research of LL it is very difficult to assess.

Strategies for development of Lifelong Learning

Lack of long-term strategic plan.

Strengths

There is a readiness to consider a more cohesive and long-term plan and systematic evaluations of projects.

Weaknesses

Project based research. Missing strategic approach for application for funds. Therefore, it appears as ad hoc and opportunistic.

Suggestions for further development

Building on the discussion during the evaluation that identified possible areas such as: older learners' and intergenerational learning, disability studies and gender and entrepreneurship. Future hiring and collaborators should be related to the strategic plan, while protecting academic autonomy.

Grading scale

Good to insufficient
Even though there is a readiness to consider a more cohesive and long-term plan and systematic evaluations of projects there is a lack of long-term strategic plan. The research is project based and miss a strategic approach for application for funds.

Other issues

Need for a recognizable identity for the LL unit and for the sub groups, combined with a broader sustainable funding.

Reflection from Lifelong Learning and School of Education and Communication

The evaluators rated the quality of research and research productivity of LL as *very good* and *excellent*. They identified LL as an important asset for JU. They identified the lack of faculty funding and ensuing dependence on short term project financing as the major weakness. They suggested LL to select a strategic focus area, and to develop strategic collaboration with national partners and build a doctoral school in the area. They also suggested that JU provides long-term, strategic faculty funding for such an effort. LLs current focus on school leadership and older adult's learning are promising fields for such a focused strategy. A doctoral school requires solid and long-term faculty funding, however.

Areas for Lifelong Learning and School of Education and Communication to work on to further improve the quality of research and co-production

There is an HLK-specific challenge: a narrow focus may be easily implemented at a large research university with a critical mass of people within the same area, but at HLK it risks excluding people. HLKs 73 PhDs cover 24 disciplines – a requirement for providing teacher education from pre-school to upper secondary school and three programs in addition. Getting such a diverse group of scholars to focus on just a few areas is not possible or even desirable, since we want to draw on the strength of the entire research staff. Diversity must therefore be allowed, and liaisons be built with colleagues within JU and at other universities. A dialogue with the management of HLK regarding HLKs general research strategy and the connection to JUs overall strategy is desirable.

The evaluation covered only one of HLKs five research units, and a very small one at that if counting full time equivalents of research (only 2!) and was perhaps a bit of an overkill. Evaluating HLKs research in its entirety, and not just one unit, would produce a different picture. One would find collaborative research - there are no clear dividing lines between the different units. If including the other units, we find that several of LLs research themes are represented. LLs research on education for young adults with high functioning autism is supported by the research areas CHILD and CCD, for example.

Gender and diversity are also the themes of the research unit LPS, as is digitalization. The contexts differ, but the questions are similar. Our study of integration of Syrians is a collaborative project between LL and LPS. Future evaluations should therefore look at HLK as the unit.

Tension between high-quality research and co-production

Research and co-production are both time-consuming tasks, and they require different sets of skills. It is unusual that a person is skilled at both, or even enjoys both. If wanting to accomplish both, the units must be staffed accordingly, paid time must be allocated accordingly, and evaluation systems must follow suit. The current situation is that research is rewarded, but co-production is just expected to somehow happen. Co-production does not add merit in the formal promotion system. Our experience is that co-produced research may be both practical, useful and implementable, but it does not make its way into the highly ranked journals without extensive efforts.

Areas for JU to work with to support high-quality research and co-production

Long-term, strategic faculty funding to support strategic focus area, and to develop strategic collaboration with national partners and build a doctoral school in the area.

SPARK

Description of SPARK including impact cases

SPARK is Jönköping University's research and education environment with a focus on the area *knowledge intensive product realization.* SPARK is a KK-environment, belonging to a comprehensive program offered by the Swedish Knowledge Foundation aiming to develop research profiled and co-producing universities.

The motivation for starting SPARK was the need for theoretical and practical understanding on how to improve the development of products and processes to increase industrial competitiveness. As described in the Government's strategy for new industrialization[3], Sweden's prosperity is built on innovative and successful export companies that time and again have managed to renew and reorganize production and products to keep pace with changing markets. Accordingly, there is a need to strengthen companies' capacity for change and competitiveness and to utilize the opportunities with becoming more connected, more automated, and knowledge-intensive.

The importance of knowledge intensive product realization, regionally, is confirmed by OECD which has identified a need for increased knowledge content in the products that are manufactured, as well as in the processes used to produce them. *The OECD territorial review of the Småland-Blekinge region*[4], concludes that the Småland-Blekinge region needs to shift towards higher-tech and more knowledge-intensive production to sustain

[3] Smart industry - a strategy for new industrialisation for Sweden (2016), https://www.government.se/498615/contentassets/3be3b6421c034b038dae4a7ad75f2f54/nist_statsformat_160420_eng_webb.pdf

[4] OECD Territorial Reviews: Småland-Blekinge (2012), http://www.oecd.org/cfe/regional-policy/49903081.pdf

competitiveness in the face of mounting competition from developing countries in low and medium-low-tech manufacturing.

The *Regional Development Strategy for Region Jönköping*[5] confirms the above analysis by stating that there is a need to increase value added and increase knowledge content in products and services to continue to have a strong industry cluster in the region. The strategy concludes that, while the competitive advantage in the region was previously low cost, major advantages today are considered as the product's features and properties, e.g. the knowledge content.

A background to the start of the development of SPARK within JU, is the established degree-awarding powers in the area industrial product realization, that was granted JU in 2010. Product realization[6] can be defined as a process by which a new product idea is conceived, investigated, taken through the design process, manufactured, marketed and supported through obsolescence. Efficient product realization subsequently requires a holistic and multidisciplinary approach with a combination of competences including e.g. market requirements, technological capabilities, and resources to define new product designs and the requisite manufacturing and field support processes.

The importance of an increased knowledge focus within product realization area is argued by many scholars, for example, Davenport and Prusak[7] who state that global corporations have outsourced much of the labor of manufacturing, to countries where the cost of labor is still relatively low, in their search for increased competitiveness. They conclude that the knowledge-based activities of developing products and processes are becoming the

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[5] RUS - REGIONAL UTVECKLINGSSTRATEGI FÖR REGION JÖNKÖPING » 2025 (2013), https://utveckling.rjl.se/globalassets/utveckling-i-jonkopings-lan/strategier-och-handlingsplaner/rus-regional-utvecklingsstrategi-for-jonkopings-lan.pdf

6 The Competitive Edge, Research Priorities for U.S. Manufacturing (1991), The Committee on Analysis of Research Directions and Needs in U.S. Manufacturing

7 Davenport, T., Prusak, L., 1998, Working Knowledge: How Organizations Manage What They Know, Harvard Business School Press

primary internal functions of firms, and the ones with the greatest potential for providing a competitive advantage for the firm.

Based on the above discussions, SPARK has decided to focus on **knowledge intensive** product realization. The reasons for this are, on one hand, to develop the established research profile within industrial product realization, and on the other hand, utilize the possibilities of integrating related knowledge and competence within other existing research groups/departments at the university.

The vision of SPARK is to develop a nationally leading and internationally competitive research and education environment within the area *knowledge intensive product realization* at Jönköping University. This environment will, through continuous co-production between the university and partner companies, support the development of increased knowledge content in products and processes and thereby contribute to increased global competitiveness of Swedish industry.

In SPARK's strategy, the long-term goals that should be fulfilled by 2026 are:

1. Achieved substantial international involvement and acknowledgement.
2. Established a portfolio of strategic industrial partners and stakeholders in multiple application areas.
3. Characterized by strong connections between different research directions that are collaborating within the overall scope of knowledge intensive product realization, allowing high degree of multidisciplinary research.
4. Established solid links between research and second and third cycle education.
5. Attracted high level of external funding from a range of regional, national and international sources. The objective is that no individual source contribute to more than 50 percent of the overall external funding.
6. Significantly increased a positive impact on businesses participating in projects related to the environment.
7. Contributed to a higher educational level in the region.
8. Established a lean and efficient quality system, constantly improving the quality of deliveries in projects within the environment, as well as related activities at Jönköping University.

Research environment and infrastructure

SPARK is led by a professor, assisted by an operational team to manage the operational work and to be responsible for the development of management and support processes within SPARK.

A Management Team develops proposals for strategic development, review and prioritize project proposals, and anchor work within JU organization. Its work is led by the program manager and the group consists of representatives from departments/groups conducting research and education, relevant to the environment.

There is a Steering Committee acting on behalf of the president of Jönköping University to lead and monitor the overall and long-term development of the environment. An Advisory Board is connected to the SC and provides an external and independent view on strategies, operational plan and progress for the development of the environment towards the goals.

Within SPARK there are several laboratories supporting research in different ways. Research within materials and manufacturing have extensive equipment for performing experiments, measuring mechanical and physical properties of materials and studying microstructures. To study the complex relationships between material properties, microstructure, manufacturing process and component design a wide range of equipment is needed.

Within product development there are technical support for design and development of products e.g. 3D-printers for polymers. A new addition to the experimental labs is a SLM metal 3D printer.

Other infrastructure within SPARK is a laboratory within the School of Health and Welfare that has a state-of-the-art human movement laboratory. Equipment within this laboratory allows researchers and students to model human movement in three dimensions, to analyze the forces acting on the body and to record muscle activity during task performance. Using a combination of equipment within our laboratory, we can diagnose the underlying cause of movement abnormalities, evaluate the outcomes of various interventions and to document change in movement patterns over time.

External collaboration

SPARK's mission is to contribute to the region's business community supporting the development of increased knowledge content in products and processes. Research and educational programs are operated in close cooperation with the companies. SPARK has thus a clear focus towards co-production-oriented research and education in various application areas, within its core competences.

SPARK has a focus on developing the competence that Swedish manufacturing companies need to be successful in the future. This entails two things: co-development of new educational programs with industry and collaboration between companies and our students on different levels. There are several ways to work together with students at Jönköping University. Through internships, student projects and final theses, the companies have an opportunity to connect with our students and find future employees. One example of this is a mandatory industry placement course in all engineering bachelor and master programs.

Within SPARK, five industrial companies have established formally documented strategic partnership to the environment. The partner companies are Husqvarna Group, Scania, Fagerhult, SAAB, and Kongsberg Automotive. These companies agreed to establish closer links with Jönköping University and SPARK based on historically very good relations with the university, both through research projects and through students doing their internship or thesis work in their organizations. These strategic partnerships enable long-term development of both research and education within SPARK. A portfolio of strategic partners is essential to make the environment nationally leading and internationally competitive within its scope.

Within SPARK the engagement with surrounding companies is extended outside the borders of Sweden. There are international campuses in South East Asia and Brazil where our students conduct industrial placement courses or final thesis projects with local companies (mostly Swedish companies). There is ongoing work to build up similar activities in the US, with support from Husqvarna and Volvo Car. A strategy is to increase research cooperation through these international campuses and established contacts.

Impact cases

Description of Impact Case 1: Thule

The impact case Thule has been generated from research focusing on digitalization and automation of engineering processes which have led to the development of supportive computer tools that guides engineers in their everyday work when developing new variants of Thule's car roof racks. The computer tool is used today on an everyday basis worldwide by all engineers involved in the development of new variants of car roof racks (in total that is 10 engineers, in Sweden, USA, and Japan).

The software has enabled reuse of components through a geometric search algorithm. Previously engineers searched manually for components to reuse which took up to two days (often this process was neglected due to the time consumption). Now it takes two minutes to perform the search. Since the software is integrated with the CAD-system that the engineers are working with it is accessible and used for every new roof rack variant. This has in turn cut the lead-time dramatically for projects since fewer tools must be developed. It has also cut the tooling budget for roof rack variants with 80%. Furthermore, it has increased the number of roof rack variants developed, increasing the market to other depending products such as roof boxes and bike carriers.

Research activity leading to impact

The governing research questions have concerned flexible product platforms, and the digitalization and automation of engineering processes. Research projects during 2012-2017 that have led to the impact are listed below. The development of demonstrators and the researchers' presence at Thule is seen as a key to the impact.

Implementation of computer systems for engineering design automation (2011-2013). This project focused on the implementation of computer systems for engineering design automation. The project resulted in methods for visualization of case base, overview and evaluation of CBR-algorithms (Case Based Reasoning), and a CBR method to match complex geometries (double curved surfaces) through curvature analysis.

Challenge Fluctuating and Conflicting Requirements by Set-Based Engineering (2013-2016). To reach a feasible solution, adaptation to adjacent systems is also necessary while efficient production must be ensured to keep costs low. The project resulted in a better understanding of these challenges and a new method for increasing the ability to efficiently develop and describe adaptive technology solutions and adapt them in the product development projects to meet the changing and conflicting requirements, called Design Platforms. Demonstrators were developed at three of the companies involved in the project. At Thule the demonstrator involved automation of FEM-simulations.

Efficient Implementation and Management of Systems for Design and Manufacture of Custom Engineered Products (2014-2017). Based on the identified industrial need to make increasing and more effective use of systems supporting customization of engineered products this project focused on how to support efficient implementation and management of such systems. The industrial partners that were involved in this project have all faced the problems and challenges of bringing a principle technical system solution into operation as well as support its management. This is pointed out as the major obstacles for not taking fully advantage of the investment that would significantly sharpen their competitive edge. The project developed methods, models and tools that allowing companies to efficiently implement and manage automated design and production preparation systems supporting an engineer-to-order business model. The project produced demonstrators for three of the companies involved in the project. At Thule the demonstrator was as computer tool to capture design rationale during early design phases.

Platform Models for Agile Product Development: Building an Ability to Adapt (on going). This project investigates the industrial needs in relation to the scientific state of the art, expand the knowledge in the area and develop a new platform approach based on demonstrators developed by industry. The results of this project will add valuable knowledge to the area of platform development and means for efficient customization within an ETO business model. The expected long-term effects for industry include increased customization options towards customers, improved ability to master fluctuations in requirements, shorter lead-time in development and quicker introduction of new technologies. Demonstrators are developed at three of the

companies involved in the project. At Thule the demonstrator involves the automation manufacturing tooling development.

Description of Impact Case 2: TASS

This impact case is based on research to solve industrial relevant research questions ending up in applications beneficial for both industrial partners and for extending the research frontier within cast iron materials and manufacturing.

Based on basic research, conducted within the research group, it became clear that many devices and instruments used to investigate shrinkage porosity formation mechanisms are unable to find a robust answer to the problem. Instruments also include a significant level of measuring anisotropy causing difficulties for correct conclusion. Based on this, a novel concept of material sampling, measurement and mathematical analyzing model have been developed together with development of a prototype instrument within one of the research projects. Based on the application area, the novel instrument was named Thermodynamic analyses of solidification and solid-state transformation (TASS). Two distinguished versions have been built. The one for industrial application have been tested in the heavy industrial environment and the second one was equipped with the state-of-the-art sensors aimed for accurate research experiment in laboratory environment.

The benefit of the industrial version of the TASS instrument is the ability to predict and prevent shrinkage porosity formation tendency in the production process. The laboratory version of the TASS instrument is considered beneficial for researching the shrinkage porosity formation mechanisms of all cast alloy grades. Furthermore, the instrument serves as provider of thermos-physical data and solidification models necessary as input data for numerical simulation methods of the solidification and solid-state transformation of cast alloys. Improved input data and models in simulation algorithms increase the prediction accuracy of shrinkage porosity formation at newly designed cast components.

Two patent applications were initiated in 2015 with the scope to adapt the measuring instruments for both industrial applications and advanced laboratory research. The School of Engineering/SPARK in collaboration with

Science Park at Jönköping University started an investigation process to test if the patented instruments and the concept behind the instrument would be suitable for commercialization.

Research activity leading to impact

Cast iron is one of the oldest and most used technical construction materials in building our civilization. Beside good material properties and environmental qualities, complex manufacturing related mechanisms cause property delimitations. Beyond the uncontrolled mechanisms the cast material users anticipate extended application areas which needs to be researched. One of the property delimitations are caused by shrinkage porosity formation, a result of the complex transition process from liquid to solid state at production of a cast component. Efforts have been dedicated historically to understand and avoid this phenomenon.

A long-term work flow of research has been conducted on the shrinkage porosity formation mechanisms in cast iron within the area of foundry technology of cast iron at the department of Materials & Manufacturing at Jönköping University. Research projects in collaboration between the Materials & Manufacturing department at JU and Swedish casting developer, producer and user companies such Volvo AB and Scania CV AB have been addressed during the long-term period with respect to material grades (Lamellar Graphite Iron, Compacted graphite Iron and Spherical Graphite Iron) and technology readiness level. The basic readiness level is mainly focusing on the identification of the problem including basic phenomenon. The advanced readiness level includes both methodology development for the specific observations necessary for advanced investigations and detailed study of the phenomena. The present impact case is based on the work flow through the Lamellar Graphite Iron grade where the applied readiness level has been reached in the Vast Iron project. At this stage the research activity and the outcoming results are brought in connection with the industrial process ready for application.

Evaluation and grading from the expert panel

The expert panel for SPARK consisted of:

Torbjørn Digernes, former Rector and Professor, Department of Marine Technology, Norwegian University of Science and Technology

Erik Höglund, former Pro-Vice-Chancellor and Professor, Department of Engineering Sciences and Mathematics, Luleå University of Technology, Sweden

Gunilla Jönson, former Dean and Professor in packaging logistics, Faculty of Engineering, Lund University, Sweden

Håkan Wiklund, Pro-Vice-Chancellor and Professor in Quality Technology and Management, Mid Sweden University

General assessment

Summary of recommendations

The expert panel has tried to establish a holistic basis for the recommendations and interprets the overall objective of SPARK at JU should be twofold:

- Improve the academic capacity and level of the institution
- Improve/extend the capability of the institution to conduct industrial cooperation

The expert panel considers that for society, the candidates that the institution educate are equally important as the research outcomes, maybe even more so, since they have a 30-40 years career in front of them, where they will create value for society. Students represent an important dissemination channel for new research results, and student projects and theses can be used as resources in the research activity, typically in industry cooperation, and integrated in doctorate projects. Therefore, SPARK´s strategy should integrate the education dimension of the institution.

The expert panel strongly recommends that the duality between academic strength and industrial societal relevance be maintained in developing the

content of SPARK. In particular, one should avoid that academic orientation in the research is strived for to the detriment of the institution's ability to deliver relevant research results to society. This trend of «academic drift» is not uncommon in institutions aspiring for full university status and should be avoided. Theoretical content that enhances the industrial state-of-the-art is very welcome.

SPARK should also increase the institution's ability to educate candidates that are well prepared to create value in society through insight in knowledge from the research front.

This thinking is the foundation for our recommendations.
Because of this chapter's intent to integrate our recommendations under a holistic perspective, many of the recommendations found under separate headings elsewhere, appear also here.

Recommendations for the future development

Selecting focus areas for the development of the research portfolio

Several considerations must be taken when choosing strategic focus for the research.

Building on the strong areas in the existing research environment should be the starting point. Use them to complement the portfolio with new fields that will improve the impact in society. In the strongest areas, the ambition should be to take national and international positions.

With the profile that SPARK has, it is important to build relations to industrial networks for new research fields. At the same time, it is important that a share of the research is sufficiently ahead of industrial state-of-the-art that the institution has competence to offer when industry is ready to ask for it. Enabling technologies, with the potential to create paradigm shifts should be in focus.

It is important to be able to link together the necessary disciplinary fields to create forceful projects that involves the knowledge fields necessary to break new ground, and for industry to exploit the full potential of the results. Mobilizing competencies across departments in the School of engineering and

in other schools at the institution is recommended. The thematic research areas defined can be instruments to develop multi-disciplinarity. The thematic areas may have to be revised underway – they should not become fixed structures in such a way that they limit future flexibility.

It is also important to avoid fragmentation of the research environment into unrelated fields that do not mutually strengthen each other. Find ways to stimulate interaction between the disciplines within SPARK and ensure that it benefits the individuals in their academic careen

Investing heavily in fields where there already are strong institutions in the region should be avoided. In such fields, it is more efficient to seek cooperation with (regional) partners.

Publication strategy

Publication for academic impact requires use of peer reviewed channels.
Citation impact measured at individual paper level is a more reliable academic impact indicator than the journal/conference impact factor. There are many papers in high impact journal that get low citations, so the journal does not guarantee attention, only quality of the published work do that.

Open access channels are recommended when well recognized such channels exist.

For industrial impact, channels, which are known to attract industrial readers, should be preferred. Often, they are not the same as those who attract academics.

It is recommended to seek a balance between quantity and quality. It is not recommended to increase quantity at the cost of quality, e.g. measured as citation impact. The general tendency here can be monitored over time through bibliometric indicators. The time lag in the citation data makes it necessary to measure over several years to find a reliable trend.

Strengthen doctorate education

The doctorate education as a component of the research activity is smaller than what one finds at top institutions. The capacity to supervise doctorate students

has been increased through recruiting more full professors and associate professors. This capacity should be utilized.

The profile of the doctorate education should be towards producing candidates, doctors or licentiates, with industry relevant competence.

Industrial companies should be motivated to integrate and fund doctorate candidates in the projects they participate. By including doctorate education as a part of the project, one ensures that there is competence to continue the knowledge development after the project, either by the candidate becoming employees in the company, or at the university. The direct funding in the projects from industry is much lower than one normally sees in comparable research internationally. Using such funding to create competence in the form of trained researchers, in addition to the knowledge generated, will speed up the adoption of the research results in industry. It ensures that both missions of the KK-foundation are pursued.

A mechanism to strengthen doctoral education could be a common SPARK PhD School.

Using student work as contributions in the research

It is recommended to use student work actively as contributions in research projects and industrial cooperation projects. Master students' projects can support the work of doctorate candidates. Students are particularly well suited to open doors to SME companies.

The expert panel's impression is that education at master level need to be increased.

Funding profile

The profile of the total funding of SPARK over the 10-year period should be adjusted to the development stage that the project is in. In the early stage, emphasis should be on strengthening the academic base, and where relevant, building new subgroups for fields that are not adequately covered with the existing staff.

In the later stage, doctorate education should be ramped up to give the new academics larger research groups.

Doctorate students and postdocs are temporary staff, and through that type of positions, one can adjust the research capacity to variations in funding level. With a higher share of temporary positions, one avoids to increase the fixed academic staff beyond what is sustainable in the long run. It would be preferable if the KK-funding profile could be adjusted in this way over the duration of the SPARK effort. If doctoral schools can be used as funding mechanism for doctorate education, this would have the intended effect.

Recruitment to top level academic positions

A part of the full professors should have industrial experience, among other to avoid "academic drift", and balance the development of the academic performance and industrial relevance.

Adjunct professors from industry should be used as co-advisors for doctorate products to ensure industrial relevance and provide the candidate with understanding of how companies work.

To quickly build high academic level in new focus areas, recruitment of top-level academics from other institutions is recommended when possible. To be attractive for such professors, one should be prepared to give them starting packages, which includes 2-4 PhD/postdoc candidates and supplementary research equipment for the scientific field addressed.

Organization and Culture

Give the governance structure a mandate to execute strategic governance, and resources to implement it. Seed money to build networks, facilitate processes, and co-fund strategic initiatives are ingredients in this.

Ensure that the creativity and ownership emanating from of bottom-up initiatives are tapped into, at the same time as top-down strategical guidelines are followed.

Some promising «wild ideas» should also be allowed to be brought forward.

When cross/multi-disciplinary initiatives are required, make sure that all relevant groups/disciplines have a place at the table already from the initiation of the project ideas. All contributors must be able to voice their perspectives. Make good use of industrial reference groups, and academic advisory groups from international colleague institutions. A certain continuity in academic advisory groups is recommended, as this will allow your peers to monitor progress.

It is important to foster a culture that accepts strategic governance. This is created by wise management that listens to the troops and justifies their decisions. In an academic environment, military style command lines do not work well.

Building trust - internally and externally – is important. Trust between people is a necessary ingredient to create successful projects. Trust is built on mutual respect. Good dialogue and demonstration that your partner's views and contributions are valued are key components. This is particularly important in cross-disciplinary settings.

Young scientists are particularly vulnerable if they step outside the traditional boundaries of their discipline. Implement a culture that encourages this and makes it possible for this staff segment to develop their careers pursuing such work.

Project leaders that have the personal properties required to be champions for new initiatives are an important asset - they are hard to come by

- independent, open minded, a mindset to deliver
- acceptance among peers and industrial partners
- International and national contact nets

International engagement must be a part of the culture. It should be made an organizational matter to gain membership in winning consortia for EU-projects. The project leaders and key scientists are your agents in this effort. A key to succeed in this effort is to make personal contact nets institutional assets through sharing information about key contacts.

To foster new research leader, a system to mentor young researchers using experienced staff members should be put in place.

More balanced gender composition is also a key asset for diverse and productive research groups, and a strategy to move in this direction is necessary.

Quality of research

Some research environments within SPARK are more mature than other younger environments, and as a whole, the SPARK environment is still under construction. Before we can compare SPARK with internationally leading research environments, a long-term and goal-oriented commitment to SPARK and its strategic plan is required.

Today SPARK has not produced many journal publications or conference contributions as an integrated research environment. The number of publications vary greatly between the ingoing research groups, both in number and distribution between journal articles and conference contributions. Some of the groups are in the international forefront regarding scientific activity and reputation while other groups still have a way to walk before they reach the international level. The bibliometric ranks both field normalized impact and average field normalized citation rate to 1.0, meaning that the groups publish on an international average level. The numbers for joint authorship, annual productivity per senior full time equivalent (FTE) is satisfactory. The growth in the production of publications seem to follow the growth of staff and funding.

Based on the total number of publications and citations and the journals´ impact factors the SPARK group should have a potential to advance in the international ranking, provided they can integrate their research and benefit from that. A common publication strategy, focusing on interdisciplinary collaboration within SPARK, does not exist today but can be a useful tool to increase both the number of journal contributions, conference contributions and, maybe most important, citation impact. The strategy should consider where the main target groups for the research are to be found.

Industry-near research like SPARK is conducting does not always have the same academic impact as basic research. If the goal is to be among the top international groups, more emphasis must be on peer reviewed journal papers. One way of doing this can be to increase the number of industrially oriented PhD students, which today is low compared to senior staff.

The national and international exchange of staff is rather low based on the statistics on "International networks and collaboration" and a strategy to increase this should be worked out. When it comes to "participation in the academic community", including e.g., plenary talks, opponent for PhD thesis etc. i.e., short-term outreach the statistics is satisfactory. However, the numbers are the sums of all participating research units and does not reflect the individual groups nor the integrated SPARK environment.

Strengths

SPARK as a whole is nationally positioned but parts of SPARK are internationally established and the systematic work in those groups leading to that position can be used as a role model for work within SPARK.

The ambition of SPARK to increase international cooperation is a strength.
There is a positive trend regarding scientific publications and citations during the period 2012-2017. This is also the case for the number of publications in WoS/Norwegian list, journals field normalized impact and the number of most cited publications in WoS.

The interaction with companies is a strong tool for national and international positioning and for creating value in society.

Weaknesses

So far, the number of common publications in SPARK is limited because it has only existed about 1, 5 years. This obviously affects the scientific maturity of SPARK as a whole and hence the quality and scope of research. Today the separate research teams mainly produce the publications.

The international programs SPARK is involved in may not always provide engagement enough that benefit JU´s strive for international recognition in

research. The university must interact with top universities that share the SPARK vison.

The number of citations in relation to FTE is decreasing.

The international ambition is somewhat fuzzy. On page 6, it says, “internationally competitive research” and a few lines down on the same page “international involvement”. On p 21, it says, “become an international university”. The ambition should be clearly stated.

International staff exchange is low and should be increased.

SPARK lacks a publication strategy.

Suggestions for further development

Identify strong international partners, which can help SPARK to increase their international visibility in both education and research.

SPARK, as a whole should have a strategy for publication with focus on interdisciplinary collaboration between Spark’s different thematic areas. Increase the number of publications in peer reviewed journals, but advice against shift attention towards academic indicators if it comes at the cost of industrial relevance.

All participating research disciplines in SPARK should be highly regarded irrespectively of research group.

Different research cultures within SPARK should be harmonized for increased joint publications.

Engage more doctoral students to increase industry cooperation and number of publications. The senior staff capacity for supervision exists.

An increase in high quality production per scientific staff member will be necessary to reach top international level.

Do not increase volume/number of publications with a risk of low number of citations – Better with a strategy that increases the number of citations.

Grading scale and motivation to the grade

Good

Productivity

Regarding publications, citations etc this is commented under the previous paragraph, “Quality of research”. The focus under this heading is on PhDs, assistant and associate professors.

SPARK´s productivity has increased over the period and there are several signs that show positive development. However, it is unclear how the different parts of SPARK develop. Overall, productivity is at a good level, but there is development potential in the overall research environment.

For SPARK as a whole there has been a strong focus on recruitment of senior staff, especially professors, while the recruitment of assistant and associate professors has been moderate. In addition, the numbers of PhD students has increased somewhat during 2012-2017, but the number of dissertations on PhD- and licentiate level is still on a low level compared to the number of PhDs. This may be explained by the fact that many of the PhD´s are newly recruited and have not yet reached their final stage. A common PhD research school will be a good way to join the different groups belonging to SPARK.

The number of promoted assistant and associate professors has also been low during 2012-2017. Career plans should be developed to make it possible for assistant and associate professors to increase their time for research with the aim of promotion to the next academic level.

One way of expanding the number of PhD students and increase the industrial engagement could be to employ more industrial PhD students.

Low internal financing of senior staff and limited in-cash industrial contributions make it difficult to allow assistant and associate professors more time for research. In addition, it limits the possibility to employ more PhD students.

The low in-cash contribution from industry is surprising and ways of increasing this should be found.

More PhD students should be employed. The ratio between number of PhD students and senior staff is about 1.2 which is very low for a research group.
It is difficult to establish a baseline for SPARK since the demarcation of SPARK within JTH/HHJ is not clear.

Strengths

The number of senior staff within SPARK has been growing steadily and is quite strong today.

SPARK participates in all areas of publication, articles, books etc.
Selected research fields have high productivity.

Weaknesses

There is a large difference in productivity between the different research groups within SPARK.

Limited production of people with a high academic degree to the society. Relatively few PhD students compared to senior researchers. Very few licentiate- and PhD exams.

Low in-cash financing from industry limiting the possibility to employ more PhD students and limits the possibilities for assistant and associate professors to devote more time to research.

Suggestions for further development

Initiate a common SPARK PhD school.

Develop career plans for assistant and associate professors making it possible for them to engage more in research and proceed their career.

Increase the number of industrial and academic PhD students.

Increase the in-cash contributions from industry. Today this is at a surprisingly low level in relation to the benefits of the companies.
Ensure that the different research groups within SPARK have a good chance to develop in order for the whole SPARK to become strong.

Grading scale and motivation to the grade

Good

Research environment and infrastructure

The overall impression of the research environment is that it seems to be working well in both cultural and infrastructural aspects. The management team seem to have motivated and engaged most of the staff in SPARK activities and commitment and the formal organization of the SPARK structure is clear. However, the industrial involvement at the different organizational levels seem to be very limited. Steps should be taken in order to have more company engagement since one of the major goals for SPARK is to be a research arena for industrial coproduction. The structured way of working with establishing new research projects is impressive and seems to give a very good pay back in terms of approved research grants. In this process, companies are highly involved.

The initial way of working in five thematic areas can be fruitful provided all five have reasonable progress in order to support the vision of SPARK, however this may need resource allocation and redistribution between the areas, a process that may cause frustration in the groups. Today most of the activities seem to be initiated from bottom-up ideas while top-down strategies are less obvious. The long-term question is if SPARK will narrow down the vision and thus the number of thematic areas in order to reach an international top position based on the most prominent groups. This is a very important question for the top management.

The **profile and diversity of the staff**: A number of research and thematic area leaders have been recruited and appointed. Most of the newly recruited staff has been on associate or full professor level, a strategic decision which seem relevant considering that a strong environment must be built from the top, i.e., by senior researchers. The KK foundation has been, and is, a (too)

large funding source together with the university itself. It is important to find other financing sources, like EU, the Swedish Energy Agency, and the Swedish Foundation for Strategic Research etc. In-cash financing from companies should increase, considering the great benefits that companies receive from the research being conducted. One way of increasing industrial involvement and senior capacity would be to increase the number of adjunct professors. Today there seem to be only one adjunct professor but considering the large group of companies committed to SPARK there should be great possibilities to increase the number. This will definitely have a positive influence on knowledge transfer in both directions industry – academy.

Regarding **resources and activities**, the research groups participating in SPARK seem to be well financed, mainly from the KK Foundation. The activities show good growth in the research groups, but from a very varying starting position. Some of the groups have more or less reached the vision of SPARK, but others have quite a bit left.

The availability and quality of infrastructure seems very good, with up to date laboratories, adequate administrative and other type of support.

As a **research environment**, the different research groups within SPARK have so far had relatively few multidisciplinary joint projects. Today not all individual researchers seem to be engaged in SPARK. Stimulating joint projects is important to reach the SPARK vision and utilizing the full strength of SPARK. The management group plays an important role in finding ways to build a creative and including culture. A part of this can be to promote multidisciplinary projects and initiate activities that get the staff to know each other both as persons and as researchers. Different types of incentives may also promote cooperation. A common respect for different scientific disciplines is crucial for successful joint projects.

Looking at **outreach activities**, several groups today have extensive international collaboration as well as industrial collaboration. On the undergraduate level, the university has an impressive number of agreements for student exchange and consequently has a large number of foreign students on campus. The SPARK environment should develop a strategic plan for internalization based on identifying top research groups and ways to interact

with them. It should also be possible to invite researchers from outside SPARK in case some projects need this.

Demographically the SPARK environment today has a large number of professors and more are being recruited. The age span in the senior group is good with a number of younger members that can develop SPARK for a long time. The number of PhD students is low compared to the senior staff, only about 1.2 PhD student per possible supervisor. This may lead to recruiting problems in the future for both the academic environment as well as the industrial partners. The above is also true for post docs. One major issue that has to be handled is the strong gender imbalance in both the group of professors and the PhD student group. The university has a gender equality plan, but the SPARK management do not seem to have a clear idea of how to implement it in SPARK.

The SPARK **leadership** seem to be working quite well. The review group noticed a strong support for both the prefect and the research leader. The knowledge about and engagement in SPARK in the staff group seemed, with some exceptions, to be good.

The research infrastructure available through **collaboration networks** with companies is often used in joint projects to experimentally validate models and theories. This is an established way of cooperation for the researchers and both academia and industry seem to benefit from the arrangement.

Strengths

Positive cooperation and leadership. Strong group of senior staff, especially professors. Good age span in the group.

Some of the research groups are already internationally renowned in their field. Their way of working systematically could serve as role models for the other groups.

Good access to lab facilities including the possibility to utilize test equipment owned by co-operating companies.
Structured process for identifying new KKS projects. Similar processes could be used for other applications provided they are not too time consuming.

Positive attitude in the staff towards collaboration within SPARK.

Weaknesses

Very few industrial PhD students and adjunct professors. The number of PhD students has a lower volume than one should expect from a top international research environment (30 qualified doctorate advisors, 44 doctoral students).
A relatively weak industrial representation in the organizational structure.
(Too) strong dependence on KK Foundation as financing source.

Very varying strengths between the research groups in SPARK. So far relatively few joint SPARK projects. Strong gender imbalance on both professor and PhD student level

Suggestions for further development

Make sure to develop the cooperation with society and industry and prioritize areas where available resources make the best impact.

Develop a plan for internationalization including cooperation with top universities that can help SPARK grow scientifically.

Develop a plan to decrease the gender imbalance.

Develop a long-term strategy and action plan to join the research groups and five thematic areas into one strong SPARK. Use the thematic areas as a mechanism to generate cross-disciplinary research. Stimulate and prioritize multidisciplinary joint projects. Create initiatives and support the thematic area leaders. Today there is a risk for silos.

Widen the number of financing sources, e.g., EU, SSF, Energy agency, VR etc.

Strengthen doctoral education both in number of PhD students and by e.g. a joint research school.

The structured way of establishing projects, (application procedure) should be implemented in the SPARK structure if it is not too time consuming.
Clarify the mandate and decision power of the steering committee.

Grading scale and motivation to the grade

Very Good

Networks and collaborations

SPARK will benefit from the strong international education profile that JU has. But it must be recognized that the international campuses has been built for the benefit of the students. This is not enough for SPARK. The research possibilities at the international campuses should be identified and approached. This will involve only some of the present campuses.

An increase of international research contribution should be encouraged through participation in EU-programs. Another way to accomplish this is through international competence recruitment, which should be encouraged. It could be through guest positions and not always through permanent employments.

International research and collaboration connected to the education should be strengthen through EU-programs.

The partner companies have international experience that should be utilized, which should make it possible to identify the most important collaborations in each research area and how they contribute to the SPARK vision.

The partners in product development must recognize that development from initiation to implementation takes time, five years are not unusual to reach benefits for involved companies.
The conclusion is that both international research and industry collaboration need focus and attention in the long-term strategy. This is also valid for education and society and how it may support SPARK.

Strengths

JU has well recognized international educational cooperation as well as a national academic network in research. The national cooperation with both large and small companies is excellent in both research and education.

Education includes students in research and collaboration with industry that benefit know-how development that will benefit the society as a whole.

The employment of adjunct professionals from industry/society to support education is good to facilitate practical experience in the teaching.

Weaknesses

The EU-cooperation is too weak and must be developed.

The number of visits abroad and number of incoming visitors is quite low and should be increased if the ambition to be an international player is to be reached.

The SPARK vison does not focus on collaboration and networks. The present vision is rather focused on academic research and to accomplish the international level of the research carried out.

Suggestions for further development

The SPARK vison must be developed concerning an explicit focus on networks and collaboration.

The strategy that shall be developed to meet the vision needs to establish a portfolio of strategic industrial partners and stakeholders in single and multiple application areas as well as identifying the best collaboration partners to work with (not just the good enough) and recognize/respect academic as well as industrial/societal partners from different disciplines.
The management should also build a strategy to increase the industry/society connection through adjunct staff as the students need a good connection to industry/society in both research and education.

The management of SPARK has to consider both research and educational aspects in net-work and collaboration development and find a good balance.

Grading scale and motivation to the grade

Good

Co-production and external cooperation

The industrial cooperation is excellent on a national level. The international cooperation should be developed with respect to partner co-operations. In addition, SPARK must meet the needs of the surrounding society and identify the possibilities to do the same for the society.

JU has established cooperation with relevant and committed industry partners and several promising projects based on co-production have been carried out. These partners seem to be pleased with the cooperation so far, as they have developed into strategic partnerships in SPARK.

The agreements with companies and the strong support from the region are also very positive. It can be safely assumed that the industrial input to the definition of the project content contributes decisively to quality of the research measured as industrial relevance. The societal input should also be evaluated in the same way.

In addition, there are industrial co-authorships between academy and industry that show know-how build up for both parties and should be encouraged. The cooperation with other academic disciplines could be developed.
However, the relationship doctorate students funded by industry/society and industrial/societal partners is low. The number of adjunct industrial/societal researchers is also low.

Strengths

The cooperation with industry is good and the industrial partners seem committed and relevant. In addition, the collaborations cover the research areas of SPARK.
Industrial relevance is ensured and strong value creation to industrial partners are reported. The long-term commitment between industry and academy gives results.

Weaknesses

International industry/societal collaboration is weak.

Suggestions for further development

Become partner in international projects through for example EU-programs and build a strategy for international/societal collaboration.

Increase the number of industrially connected adjunct professors and PhD students.

Grading scale and motivation to the grade

Good

Impact

The research environment as a whole is new and under development, although some research areas have a higher degree of maturity. It is therefore too early to comment on the impact of the research community on society.

Nevertheless, the expert panel still wishes to emphasize that the two impact cases that have been presented to the expert panel are impressive and show that there is a good future potential concerning the impact of SPARK. The cases also show that there are methods and practices that can be implemented in SPARK to strengthen this area.

It can be inferred from the engagement of a wide range of industrial companies that they find the results from the project cooperation to be valuable to them. These results are usually exploited within the companies, without need to use the IPR management support system.

Strengths

The impact cases show very useful results for the companies participating in the project.

SPARK already has regional anchorage and regional significance today. This means that SPARK is demanded by working life, which is promising for the continuation of the project.

The model for coproduction is structured and clear.

Weaknesses

The number of patents is low.
It is too early to evaluate impact on society.

Suggestions for further development

The expert panel strongly recommends that the duality between academic strength and industrial societal relevance is maintained in developing the content of SPARK. In particular one should avoid that academic orientation in the research is strived for to the detriment of the institution's ability to deliver relevant research results to society.

Ensure that interesting results reach a broad audience, not just academia through journals.

Grading scale and motivation to the grade

No grade can be given for the SPARK project as a whole – it is too early to show real impact.

Strategies for development of SPARK

The vision of SPARK is clear when it comes to the international ambition. However, it does not explicitly focus on collaboration and coproduction, rather on education and academic research with an international focus.

Strategies exist but they are relatively preliminary and there is no history showing strategy work over time. The strategies are very ambitious but seem to be slightly vague when it comes to the interpretation of the vision.

The management of SPARK has to consider both coproduction and research/education and find a good balance between these areas. Strategies must be developed to handle this balance.

The SPARK management should also recruit more adjunct professors and / or adjunct lecturers to strengthen industrial relations and expanding research groups (*Competence plan*).

It is desirable to address how multi-disciplinary projects are ensured, and how the new thematic areas are to be used in this respect.

Strengths

The strategy for the coming three years is very ambitious, and the action points are relevant.

SPARK's annual conference, the SPARK Award and the planned seminar series in SPARK are good initiatives for building a common SPARK culture.

Weaknesses

Strategies are relatively preliminary and there is no history showing strategy work over time. They seem to be slightly vague when it comes to the interpretation of the vision.

Students represent an important dissemination channel for new research results and SPARK can do more to strengthen these resources in the research activity.

Suggestions for further development

The SPARK strategy should integrate the education dimension of the institution.

The management team should take enough room for long-term research projects initiated by the researchers in order to renew the tool- boxes used to solve industrial problems now and in the future.

The SPARK research environments should identify which universities that are in the international top and start co-operating with them in order to lift the overall quality of research and by that make the SPARK vision come true.
The management team should ensure that the balance between projects initiated by industry and the research group is good.

The vision requires strong continuous updates to accomplish the vision.
Work systematically with planning and monitoring of the financial strategy and plan for strengthening and broadening external funding (*Financial strategy and plan*).

Grading scale and motivation to the grade

Good

Over all grading

Research	Good
Productivity	Good
Research environment	Very good
Networks	Good
Co-production	Good
Impact	No grade given
Strategies and plans	Good

Reflection from SPARK and School of Engineering

The assessment from the expert panel has provided very valuable input to the development of SPARK and the formulation of the coming strategy for the years 2020-2022.

The overall input from the expert panel to increase the integration of the education in SPARK is believed to be a very important. There is a large potential in involving students in dissemination for new research results, as resources in the research projects, and integrated in doctorate projects.

The integration of research and education will thus be a strategic development area e.g. by increasing the use student work actively as contributions in research projects and industrial cooperation projects. Students are particularly well suited to open doors to SME companies.

The expert panel also recommend that the duality between academic strength and industrial societal relevance be maintained in developing the content of SPARK. This input from the panel confirms the ambitions and ongoing development within SPARK. A conclusion is that SPARK should continuously evaluate and actively prioritize activities based on keeping the balance between industrial relevance and academic focus.

Connected to this, is the ambition to establish a portfolio of strategic industrial partners and stakeholders in single and multiple application areas as well as identifying the best collaboration partners to work with and recognize/respect academic as well as industrial/societal partners from different disciplines.

Research and co-production require different sets of skills. It is thus important to develop competence, processes, and methods bridging research and co-production. A strategic goal in SPARK is thus the development existing models and processes for co-productive research to improve the dissemination of the results and societal impact.

Some of the other conclusions and coming actions based on the reflections from the assessment from the expert panel are;

- Link together the necessary disciplinary fields to create forceful projects that involves the knowledge fields necessary to break new ground, and for industry to exploit the full potential of the results. Still, it is important to avoid fragmentation of the research environment into unrelated fields that do not mutually strengthen each other.
- Develop a publication strategy in SPARK with a focus on citations not only volume,
- Establish a joint SPARK research school,
- Increase the number of international partners through new networks and increased cooperation with a possibility to increase of EU projects and for strengthening and broadening external funding in general,
- Focus on increasing the number of adjunct resources and number of industrial PhDs,
- Better support for career development of researchers and a more balanced gender composition within SPARK.


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JU overarching reflection

The four research environments that were included in this Assessment of Research and Co-production (ARC-18) have their background in different disciplines, as well as their expert panels. They are also placed organizationally at different schools with distinct prerequisites and they vary in size (number of included researchers), history and tradition of performing research. Due to these differences it is not optimal to compare them. However, it is possible to get a picture of strengths and improvement areas on a JU-level. There are fundamentals that need to function in order to perform research and co-production of high quality. The experts have pointed out some of these fundamentals, which are reflected on from a JU-perspective.

Policy for research and co-production

The existence (or non-existence) of a *policy (strategy) for research and co-production* is one area that needs to be considered from a JU-perspective. The research environments that have a well-defined strategy for research do get credit for this in the evaluation, whereas those that do not have a policy are recommended to develop one. Furthermore, the experts state that the policy and principals for research for each research environment must be defined in relation to the JU-overarching policy for research. The issue that is raised, both from the external experts and in the reflections from the research environments, is the somewhat diffuse relation of the policy at the JU- and school-level and the research performed in the environments. To strengthen the research and co-production at JU, it is important to have a well-defined strategy in the research environment, but also that it is related to clearly defined policy and principles for research on JU- and school-level. The experts point out a somewhat blurred relation between the JU-policy of research and the strategies in the different research environments, so it is necessary to both define the JU-policy and to make it visible and well-known among researchers. The policy at JU level needs to be wide-ranging and inclusive to allow for the differences in the research at the various schools and research environments. However, it is important that the JU-policy indicates directions for the research environments, to guide their respective strategies.

According to the evaluations in this ARC18, the JU-policy of research should encourage the schools and research environments to have strategies that include:

- focus in the research including a publication strategy
- relevant and high-qualitative regional, national and international collaboration
- integration between research and education

Focus in research and co-production

The importance of *focus* in research and co-production is mentioned by all expert panels in this ARC. Once again, those research environments that have a clear focus in their research are rated as having high quality of research, but when there is no clear focus, the evaluators have difficulties assessing the quality. When there is a defined focus in the research environment, it is also easier to work together, to find relevant collaborators and to grow in impact and quality of research. The opposite may occur with a lack of focus, which is also mentioned by the external evaluators, meaning that when the research is too disparate it is difficult to understand what the research environment is studying. When the focus is undefined it is also difficult to find relevant collaborators and to have an impact in society. In this discussion one must add the question of multidisciplinarity. Most of the research environments include researchers from different professions and disciplines, which may be a strength, but it can also cause difficulties in finding focus. It is important to define the area of research together, and to find a way that suits as many as possible without being too unfocused. A research strategy – on JU-, school- and research environment-level -- should therefore encourage focus, including the perspective of multidisciplinarity, which increases reliability of the investigation of a research question by examining it from different viewpoints simultaneously.

Collaboration and impact

As understood, *collaboration* of various types is important for research, and among other considerations it is a way to ensure relevance in research and to disseminate the results. The expert panels have mentioned collaboration from

different perspectives, and with different comments, since the various research environments have distinctive strengths in collaborations. Overall one can conclude that the research at JU received very good grades when it comes to collaborations, even if the different environments have diverse strengths in their collaborations. International collaborations enhance research in terms of international relevance, opportunities for funding and international recognition. National (and regional) collaborations are also important for relevance and co-production. In the discussion about collaboration, and co-production, one must also mention the comments from the experts about the eventual tension between collaboration/co-production and high-quality research in terms of publications in the highly cited journals. It is not necessarily a contradiction, but some of the experts commented on the risks involved. If the collaboration is mutual relevant it should not be a problem, but it raises the importance of having relevant and high-quality collaborations, rather than a large number of collaborations. The different research environments received different suggestions for improvement when it comes to collaborations. It is important that these different strengths and improvement suggestions for collaboration are encouraged and recognized in the research policy.

In relation to the discussion about collaboration and co-production, the experts raised the question: What is impact and how do we measure it? It is a highly relevant question. In this ARC, we used impact cases to illustrate various viewpoints, but there is no clear definition on a national level of the meaning of impact. Given that impact is an important part of research and co-production, there is a need for a definition of impact and a policy for how to measure it.

Integration of research and education

Integration of research and education is not evaluated explicitly in this ARC, but it is still mentioned by several of the experts. The integration of research and education is mostly mentioned in positive terms, but also as an suggestion for improvement. The relation between research and education can be a way for the research environments to identify and define a focus. According to the Higher Education Audience (*Högskolelag (1992:1434)) 3 §* work must be conducted so that there is a close connection between research and education. In other words, the integration between research and education is an important area, and JU need to consider both how to follow-up the integration but also how to encourage it. The experts give several suggestions on how to improve integration, but also highlight some good examples in the research environments that can be used to further develop the integration of research and education.

Infrastructure

The different research environments have different prerequisites to perform research and co-production, and they are organized in different ways, nevertheless the experts identified *infrastructure* as a common area for improvement. For example, the experts had problems understanding who is working actively in the different environments, which of course also makes it difficult to evaluate the production of publications and/or number of collaborations. Marketing of research is another issue raised by several of the expert panels. Marketing of research on the website and other channels is essential to demonstrate the strengths and qualities in the different research groups. Collaborators of different types, regional, national and international, should be able to get a clear picture of the JU-research just by looking at the website of JU. An effective website would enhance the opportunities for relevant collaborations. In order to ensure this, there must be support from, for example, our marketing department, so that the researchers can focus on their research and feel confident that the marketing of their research is effective. Infrastructure and support of different types are, in other words, indirectly very important for the quality of research and co-production.

Quality assurance system for research

The process of performing the ARC18 has provided JU with experiences and suggestions for the development of a *quality assurance system for research*. Even if some of the aspects are followed up annually, like bibliometrics, funding/grants, and PhD-students, there are other aspects that need to be developed. The ARC18 raises some important questions for a future quality assurance system for research. One of the issues concerns the question of *how to measure impact*. As mentioned, the ARC18 used impact cases but also an illustration of collaborations and co-production, to identify impact. The impact cases are illuminated from different perspectives including the researcher's description, research output as in publications but also a description of the collaborators' (stakeholders') perspectives. This way of describing impact took a lot of resources into an account, and yet some of the experts had questions on whether this is the best way to illustrate or identify impact. Further discussion and reflection of how to measure impact are therefore necessary for the future quality assurance system for research. Also, it is necessary to ensure a positive relationship between research and education (Higher Education Audience (*Högskolelag (1992:1434) 3 §).* A strategy for implementation and follow-up should be in any future quality assurance system for research. Up to this day it is common to count number of staff (full, associate-, and assistant-, professors) in courses, but it is uncertain if that is enough to ensure the integration between research and education.

One important step of a *quality assurance system for research* is to regularly perform external evaluations, such as this ARC, in combination with yearly follow-ups of selected parameters. The ARC18 has provided very good experiences, insight and knowledge, that will inform the next external evaluation of research and co-production.

Appendix 1

Self-evaluation template ARC18

Introduction

The following document describes the research and collaboration of defined units of assessment (UoA) at the university. The document includes indicators on research activities, research initiatives and collaboration in research in relation to academic, business, or public partners. The document also includes a qualitative self-assessment of the strengths, weaknesses, opportunities and challenges of the UoA. The indicators aim to describe research activities in specific areas as well as in multi-disciplinary fields and include elements such as a description of contributions to the research field, research environment and infrastructure, research output, impact, engagement and co-operation with society (organizations within business and public sector, non-governmental organizations and the public) and opportunities for renewal and actions for successful development. The document is structured in two parts:

Part A – Strategic information about the UoA (general description)
Part B – Quantitative data describing the UoA (general information, research output and co-operation with surrounding society)

The parts are complementary. Information provided in one of the parts should be used to support and deepen the information presented in the others.
ARC18 at JU generally assesses the period from January 2012 to the end of December 2017, although some of the indicators cover a shorter period of time. The expert panels are asked to assess the quality of research and collaboration at the UoA in an international perspective based on the instructions given in the *Terms of reference*. In particular, the panels are asked to identify **strong research activities**, **strong collaboration with society** and **potentially interesting opportunities for development**.

Part A: Strategic information from the unit of assessment (UoA)

In this part of the evaluation package, the UoA communicates information on organization, co-operation and strategies chosen to ensure that relevant, high-quality research is conducted.

Table 0 – Name of the UoA	
Name of unit of assessment	
Co-ordinator of unit of assessment	

A1. Description of the research in the UoA

This is an overview of the current research areas, including primary missions and goals, within the UoA (max. four pages, in template format).

A2. Summary of the scientific results

This qualitative summary of the most important scientific results of the UoA should reflect the breadth of the research and make reference to no more than 30 publications (Table A2.1) and other research outputs (Table A2.2). The summary should include comments to the publication and a citation profile as presented in section B2.2, including the coverage of output from staff no longer affiliated to the UoA.

Table A2.1. Selected peer-reviewed publications[1]

[1] Publications should be listed in Harvard format. DOi=The Digital Object identifier system. Scientific publications are added in the following format: DOi: 10.1016/j. tibtech.2007.05.002. To assist the expert panel, the listed publications should be made available as PDF documents. Where the publication takes the form of a book, two copies should be provided.

Table A2.2. Other major research outputs[1]			
Type of output	Main person responsible	Description	Date when it became publicly available

[1] There is a maximum number of research output submissions allowed. The number of key research outputs, whether publication or other research output, is limited to the total number of professors within a UoA multiplied by four. The amount should be four in case the UoA does not have a professor. Internationally acknowledged research outputs include new materials, products and processes, patents, software, computer code, standards documents, evidence synthesis including systematic reviews, analyses, meta-analyses, research-based clinical case studies that add new knowledge, physical artifacts such as images, materials products and processes, prototypes, digital artifacts such as datasets, software, film and other non-print media etc.

A3. Research environment and infrastructure

In this section, the UoA presents the research environment that constitutes the context and development of its research.

A3.1 Organization of the UoA

A description of how the UoA is organized; how research is managed and quality-secured; a presentation of research groups; how fund-raising efforts are structured. (Max. two pages for UoA and an additional half page per group.)

A3.2 Personnel

Present a general analysis of staff related to personnel tables in section B1.1 (max. one page).

A3.3 Infrastructure, facilities and funding:

Provide a description of the infrastructure of the UoA (not the general infrastructure of the university) that is used to carry out research (such as laboratories, specific ICT-support, infrastructure for fund raising, collaboration with society, etc., max. three pages).

A4. The impact of engagement and co-operation with society

In this section, the UoA describes its efforts to collaborate with society to ensure that research conducted has an impact on society. The section aims to provide the basis for a holistic and situated evaluation of research impact.

A4.1. Collaboration with society in the UoA

Give an overview of the most promising current collaboration, including primary missions and goals. Describe how current collaboration affects the quality of research. Include evidence and specific details/examples relevant to the UoA rather than broad and vague statements (Max. four pages.)

A4.2 External collaborations and contributions that support the research within the UoA

Describe supporting key external research collaborations and contributions from actors outside the UoA. Describe facilities and advanced equipment at partner organizations that are used by the UoA. (Max. one page.)

A4.3 Innovation activities

The UoA describes the most significant innovations during 2012–2017 which have made impact (i.e., a change) on society (max. three pages). Examples of innovation are products, designs, processes, methods, etc. The innovations can be realized within the university or by a partner and listed at the end (not included in the three pages) and should not be more than 15 pages.

A5. Self-assessment and future development

In this section the UoA should provide a self-assessment of its present opportunities for improvements. What does the UoA aim to achieve, e.g. in terms of activities within the UoA, external networking, interdisciplinary activities, joint publications and funding?

A5.1 Self-assessment of the UoA

Based on the quantitative data (Part B) and qualitative assessment above, list strengths, weaknesses, opportunities and challenges of the UoA and of the research conducted. Strengths and weaknesses refer to properties of the UoA, whereas opportunities and challenges normally refer to external factors. Propose actions that would improve the quality of the research. Consider both purely academic factors and factors related to co-operation with external partners.
The UoA must grade, on a scale of 1–8, and motivate their opportunities and ability for:

- recruiting qualified staff and PhD students,
- attracting external research funding,
- the international positioning of the UoA.

Here, 1 means poor and 8 means excellent.

Apply a long-term perspective to the strategic planning of the UoA and what priorities will be made regarding future research (max. ten pages).

Part B: Quantitative data of the UoA

In this part of the evaluation package, questions and tables are presented in three sections which contain quantifiable information about the UoA in support of the statements made in Part A above.
B1: Research environment and infrastructure
B2: Research output
B3: The impact of engagement and co-operation with society.

B1. Research environment and infrastructure

B1.1 Staff statistics

Provide information of the number of individuals and full-time equivalents (FTE) of the staff's research activity. The 'M' columns show values for men and 'W' for women. The number of individuals refers to 31 December each year, whereas FTE is integrated over the whole year.

Table B1.1.1. Number of individuals and full-time equivalents of permanent research staff

Year	2012		2013		2014		2015		2016		2017	
Staff[1]	M	W	M	W	M	W	M	W	M	W	M	W
Professor												
FTE												
Assoc. prof. (Lecturer and docent)												
FTE												
Assist. prof. (Lecturer, researcher)												
FTE												
Lecturer (Adjunct)												
FTE												
Total Individuals												
Total FTE												

[1] Professor denotes persons employed as full professors. Associate professor denotes staff members qualified to act as principal advisor for PhD students (docent appointment or similar). Assistant professors denote the rest of staff with a PhD.

Table B1.1.2. Number of individuals and full-time equivalents of temporary research staff												
Year	2012		2013		2014		2015		2016		2017	
Staff[1]	T	W	T	W	T	W	T	W	T	W	T	W
Guest profs												
FTE												
Adjunct profs												
FTE												
Assistant professor												
FTE												
Post-Docs and research assistants												
FTE												
PhD students												
FTE												
Total individuals												
Total FTE												

Table B1.1.3. Other staff supporting research in UoA												
Year	2012		2013		2014		2015		2016		2017	
Staff	T	W	T	W	T	W	T	W	T	W	T	W
Research assistant/ technician												
FTE												
Administrator												
FTE												
Total individuals												
Total FTE												

[1] Fixed term and visiting research staff. Staff is included in the research output as well as in the bibliometric analysis.

B1.2 Research funding

Sources of research funding and amounts given to the UoA annually during 2012–2017.

Table B.1.2.1. External funding (money spent in SEK)						
	2012	2013	2014	2015	2016	2017
Research Councils (VR, FAS, Formas etc.)						
Swedish Foundations (e.g. Wallenberg, SSF, Vinnova, RJ, KK, Swedish Energy Agency etc.)						
EU						
Other public bodies (e.g. county councils, municipalities, etc.)						
Direct external funding from industry.						
Others (please specify)						
TOTAL						

Table B.1.2.2. Total Research Funding						
	2012	2013	2014	2015	2016	2017
Total external funding (from Table B.1.2.1.)						
Faculty funding (governmental funding)						
Percentage external funding						
Research as competence development						
TOTAL						

B1.3 Major international collaborations

Each UoA should record the number of major international activities undertaken with partners outside of Sweden during **2012–2017** by permanent research staff.

Table B1.3.1 International networks and collaborations	
Number of collaborative institutions[1]	
Number of research visits abroad (one week to one month duration)	
Number of research visits abroad (of at least one month duration)	
Number of visiting researchers (one week to one month duration)	
Number of visiting researchers (of at least one month duration)	
Number of funded international research consortia projects	

[1] Research collaborations given here are limited to those with joint research grants in excess of 100kSEK/year and/or joint publications with the UoA.

B1.3.2 Name of project granted and role of UoA			
Project title	Funding body	Role (co-ordinator/partner)	Start year

B1.3.3 Other major international activities according to the tradition of the research field[1]	Total No.

1 Please specify: scientific expeditions, field work etc. and list below including duration. A maximum of five examples in total may be provided.

B1.4. Participation in scientific community

UoA's activities undertaken during 2012–2017 that illustrate high quality leadership interactions with their scientific peers.

B1.4.1 Participation in academic community	Number
Plenary or keynote talk at international conferences	
Assignment as expert in research councils and foundations	
Assignment as expert evaluator for position of professor, associate professor (docent) and lecturer	
Assignment as opponent for PhD thesis	
Assignment as member of examination board for PhD thesis	
Assignment as editor or member of editorial board for journal	
Assignment as reviewer for international journal	
Member of national scientific councils	
Member of international scientific councils	
Chair of program committee (international conferences)	
Member of program committee (international conferences)	

B1.5 Recruitments

Number of recruited research staff, men (M) and women (W) during 2012–2017.

B1.5.1 Recruitments	Number	
	M	W
Recruitments with doctoral degree from another Swedish university		
Recruitments with a doctoral degree from outside Sweden		
Recruitment with doctoral degree from own university		
TOTAL		

B2. Research Output

B2.1 Promotions and degrees

This section quantifies the development of scientific staff during 2012 to 2017, distinguishing men (M) and women (W).

B2.1.1. Doctoral degrees awarded and promotion of researchers												
	2012		2013		2014		2015		2016		2017	
	M	W	M	W	M	W	M	W	M	W	M	W
No. Doctoral degrees												
No. Docent promotions												
No. Professor promotions												
TOTAL												

B2.2 Publications

Publications and other research output achieved during 2012–2017 to provide the publication profile of the UoA.

Table B2.2.1: Total number of scientific publications produced by the UoA. Please specify citation index in each publication list.								
Publication types	2012	2013	2014	2015	2016	2017	Total	Period average
Article in journal, peer reviewed								
Article in journal, not peer reviewed								
Article in journal, book review								
Article in journal, review								
Book								
Edited book								
Chapter in book								
Conference paper (peer reviewed)								
Conference paper (not peer reviewed)								
Thesis, doctoral								
Thesis, licentiate[1]								
Thesis, master								
Report								
Other scientific publication								

[1] Licentiate is a Swedish and Finnish academic degree at graduate level corresponding to approx. half of a Swedish PhD.

Table B2.2.2. Aggregate publication information								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of publications in DiVA								
Number of publications in Web of Science								
Number of publications in Web of Science, author fractionalized								
Web of Science visibility (per cent of publications included)								
Journals´ field normalized impact								
Journal Impact Factor								
Norwegian score								
Norwegian score fractionalized								
Publications in level 1 journal – Norwegian list								
Publications in level 2 journal – Norwegian list								
Publications in level 1 conference – Norwegian list								
Publications in level 1 book publishers								
Publications in level 2 book publishers								

Table B2.2.3. Citation indicators										
	2012	2013	2014	2015	2016	2017	2012	2013	Total	Period average
Total number of citations										
Number of citations, author fractionalized										
Citations per publication										
Share of publications not cited										
Average field normalized citation rate										
Share of publications among the 10 per cent most cited in the field										
Share of publications among the 25 per cent most cited in the field										

Table B2.2.4. Authorship								
	2012	2013	2014	2015	2016	2017	Total	Period average
Average no. authors per publication								
Average no. countries per publication								

Table B2.2.5. Role of key scholars								
	2012	2013	2014	2015	2016	2017	Total	Period average
Share of publications by three most active authors								

Table B2.2.6. Productivity								
	2012	2013	2014	2015	2016	2017	Total	Total/ Annual average
Number of publications in relation to total funding (MSEK).								
Number of publications in relation to FTEs								
Number of citations in relation to FTEs								

B2.3 Innovation output

As well as engaging with society through contract research or education, researchers today sometimes patent their findings, commercializing these through multiple routes. Researchers also form companies based either on patents or other forms of intellectual property, e.g. materials, software or experience. These activities, often referred to as 'innovation activities', are listed in the tables below for the years 2007–2012.

B2.3.1. Patents[1]			
Patent number2	Short description	Person(s) involved at UoA	Date of registration

[1] Data should match that held by DiVA.
[2] Awarded patents only, not patent applications.

B2.3.2. Founded companies[1]				
Company name	Founder(s) from the UoA	Company type	Date of formation	Current status

[1] All eligible companies must be a direct result of the university's research activities and have, or have had, an annual income in access of 100k SEK.

B3. The impact of engagement and co-operation between research and society

This section presents activities related to co-operation between research and society and the impact of such activities. It includes the unit's general approach to enabling impact and engagement from its research, and also specific examples of impacts that have been underpinned by research undertaken by the UoA.

B3.1 PhD degrees

The number of doctoral degrees (PhD, etc.) earned within the UoA during 2012–2017 when the awardee was employed externally. Number of men ('M') and number of women ('W') are recorded per year.

Table B3.1.1. Doctoral degrees awarded to students employed externally												
	2012		2013		2014		2015		2016		2017	
	M	W	M	W	M	W	M	W	M	W	M	W
Number of doctoral degrees												

B3.2 Major research related co-operation with society

Activities regarding research related co-operation with society should be entered into one of three categories in the table below: Table 3.2.1 lists mobility between academia and non-academic society, such as exchanged lectures with external (non-academic) organizations, the engagement of adjunct professors, and externally financed PhD students in collaborative research projects with partners from industry or other organizations in society; Table 3.2.2 includes the number of publications co-authored with individuals outside of academic institutions, and popular publications aimed at the general public; Table 3.2.3 counts the number of external partners of the UoA divided between SME, large enterprises, and non-industrial partners; Table 3.2.4 summarizes the amount of *in kind* funding from industry and non-industrial organizations in society.

Table 3.2.1: Mobility between academia and society						
	2012	2013	2014	2015	2016	2017
No. of collaborative doctoral students[1]						
No. of temporary research positions outside university[2]						
No. of adjunct researchers						

[1]Number of doctoral students in the UoA who are financed by non-academic external partners. Note that this does not mean doctoral students who are financed by any non-academic funding body, but students who are financed by external partners of the UoA (e.g. industry or public sector organizations).
[2]Permanent UoA personnel who leave the university for non-academic society.

Table 3.2.2: Outreach activities						
	2012	2013	2014	2015	2016	2017
No. of scientific publications with representatives from society (not academia)						
No. of popular science publications (popular science magazines, including those on the internet)						

Table 3.2.3: Collaborative organizations (please provide description in A3.1.)						
	2012	2013	2014	2015	2016	2017
No. of partners from industry (SME)[1]						
No. of partners from industry (non- SME)						
No. of partners from society excl. industry and academia						

[1]enterprise with no more than 250 employees and an annual turnover not exceeding 50M €.

Table 3.2.4: Indirect external funding (in M SEK)						
	2012	2013	2014	2015	2016	2017
Indirect funding from non-industrial organizations in society (in kind[1])						
Indirect external funding from industry (in kind)						

[1]value of working hours done by external partners, value of equipment, databases, software, laboratories etc. that external partners provide in joint research projects.

Part C: Case descriptions

C.1. Impact case

The number of cases required in each submission is two (max.). The case should have been carried out during the period 1 January 2012 to 31 December 2017. Each case must provide details not only of the academic impact e.g. publications in highly ranked journals, but also describe the impact of the exemplary research on society (e.g. economy, industry, society, culture, public policy or services, health, the environment or quality of life, beyond academia).

Table C1.1.2 Template for impact cases (maximum four pages)
Title of case
Describe and provide evidence of the specific impact, including: - an explanation of the nature of the impact, - how far-reaching the impact is/who the beneficiaries are, - how significant the benefits are.
Explain how the UoA research activity contributed or led to the impact, including: - an outline of what the underpinning research was, when this was undertaken and by whom, - what efforts were made by staff in the unit to exploit or apply the findings or secure the impact through its research expertise, - acknowledgement of any other significant factors or contributions to the impact.
Provide references to: - key research outputs evidencing the impact (list of publications, patents etc.), - other external reports or documents, or contact details of a user that could corroborate the impact and contribution of the UoA.
Any other aspect the UoA wants to highlight.

Appendix 2

Evaluation template for expert panel

Instructions to the experts in ARC18

Assessment of research and coproduction 2018 (ARC18) at Jönköping University (JU) aims to provide means to strengthen the quality of the scientific activities at the university by offering reliable background material for future strategic decisions. The evaluation will also support the leadership of the research environment in their work on formulating plans for future research. The evaluation is aimed at assessing performance and prospects of the UoA as a whole, not individual scientists.

Objectives and criteria of the evaluation

The expert panel for ARC18 is constituted by both national and international experts in the field of the UoA research and should work as a group to attain a collective assessment, making use of the complementary expertise among the members.

The expert panel is asked to assess the quality of research and co-production with external partners of the UoA in a national and international perspective. In particular, the panel should identify strong research areas and areas that have potential to grow strong. The aim is to probe the standing of the research within the UoA in national and international perspective, reflecting also the quality and potential. The assessment shall be based both on the written self-evaluation and the presentations given to the panel at the site visit. However, to facilitate the joint assessment, we would like each member of the panel to make an assessment of the self-evaluation, prior to the site visit.

Rate the quality of the research in the seven dimensions listed below using the grades "Excellent", "Very Good", "Good" and "Insufficient". See more details on the grading scale system at the end of this document. (The panel is welcome

to adjust the criteria depending on the assessment dimension and nature of the research area as long as you document and motivate it in your report.)

Below you will find an evaluation template to guide your assessment. It starts with giving an overall assessment of the UoA, followed by seven dimensions which the panel is asked to grade. Please submit your comments (including strengths and weaknesses) and recommendations on improvements and further development. You will probably have further questions to clarify and ensure your grades. Please, formulate these remaining questions, so that we can prepare for the site visit in the very best way.

1. General assessment of the UoA

Give a *brief* account of the overall impression of the research conducted in the UoA.

……
Strengths

……
Weaknesses

……
Suggestions for further development

……
Remaining questions to ensure the assessment

……

2. Quality of research

Quality of research includes the international visibility and the impact to the scientific community (e.g. in terms of citations) and publications in leading journals and/or monographs. The ability of the UoA to achieve and present clear scientific analyses and new results should also be considered. The assessment should reflect the position of the UoA in relation to the internationally leading research units.

Give a brief reflection of the position of the UoA in relation to the internationally leading research units.

……
Strengths

……
Weaknesses
……
Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale
(*Choose one*) Excellent/Very Good/Good/Insufficient

3. Productivity

Productivity relates to the total volume of scientific publications of the UoA. The quantification of production is evaluated by means of bibliometric indicators, the number of licentiate and PhD degrees awarded, and promotions of docents and professors. Productivity and its impact should be judged in relation to the number of researchers and the time they can use for research in the UoA.

Give a brief reflection of the productivity of the UoA.
……
Strengths
……
Weaknesses
……
Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale
(*Choose one*) Excellent/Very Good/Good/Insufficient

4. Research environment and infrastructure

Comment on the research environment, its organization, staff profile and diversity, resources and activities. Comment on the adequacy and availability of the infrastructure. Also comment on the research environment with respect to internal coherence, multi- and interdisciplinary activities, outreach

activities, demographic, gender profile and leadership. The research infrastructure can be available through collaboration networks. If this is the case, please comment on this and the UoAs' ability to make use of these external resources.

Give a brief reflection of the research environment, its organization, staff profile and diversity, resources and activities of the UoA.
……
Strengths
……
Weaknesses
……
Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale
(*Choose one*) Excellent/Very Good/Good/Insufficient

5. Networks and collaborations

Comment on the extension, quality, and intensity of collaboration that the UoA has in national and international academic networks. To what degree are the academic partners integrated with the UoA and contribute with their competence to the joint research?

Give a brief reflection of the extension, quality, and intensity of collaboration that the UoA has in national and international academic networks.
……
Strengths
……
Weaknesses
……
Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale

(*Choose one*) Excellent/Very Good/Good/Insufficient

6. Co-production and external cooperation

Comment on the extension and quality of national and international collaborations with non-academic partners and society. To what degree are the non-academic partners integrated with the UoA and contribute with their competence to the research? Evaluate the contribution of the partners. Do the co-production and cooperation improve the conditions for and quality of the research?

Give a brief reflection of the extension and quality of national and international collaborations with non-academic partners and society of the UoA.

……
Strengths
……
Weaknesses
……
Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale
(*Choose one*) Excellent/Very Good/Good/Insufficient

7. Impact

Comment on the impact of the UoAs' research on society. Specifically evaluate the significance that the impact cases presented by the UoA have had for society and the non-academic partners.

Give a brief reflection of the UoA's research on society.

……
Strengths
……
Weaknesses
……

Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale
(*Choose one*) Excellent/Very Good/Good/Insufficient

8. Strategies for development of the UoA

Assess the visions and strategies of the UoA as well as their feasibility and prospect for success.
Give a brief assessment of the visions and strategies of the UoA.
……
Strengths
……
Weaknesses
……
Suggestions for further development
……
Remaining questions to ensure the assessment
……
Grading scale
(*Choose one*) Excellent/Very Good/Good/Insufficient

Give recommendations for further improvement of any aspect of the research quality of the UoA.
……
Remaining questions
……

9. Other issues

Make other appropriate comments and/or remaining questions
……

Grading Scale

	Quality	Productivity	Infrastructure	Collaborations	Coproduction	Impact	Renewal
Excellent	Wide international attention, most prominent channels, world leading research.	Very high number of PhDs, promotions, and publications in relation to UoA resources. The emphasis is on the number of publications.	Leadership, constitution of staff, activity, ability to attract external funding is excellent in all aspects.	The national and international collaboration is wide and relevant with very high quality partners. Academic partners that contribute to the research.	The collaboration with very high quality partners is wide and relevant regarding partner contribution to joint research. The research has high value with strategic importance for the external partners.	The research has international reach and is of high significance to society.	Strong, clear visions, and realizable strategies. Very promising junior faculty activities.
Very Good	International attention, recognized channels, nationally leading research.	Above average number of PhDs, promotions, and publications in relation to UoA resources. The emphasis is on the number of publications.	Leadership, constitution of staff, activity, ability to attract external funding is very good in most aspects.	The national and international collaboration is wide and relevant with high quality partners. Academic partners that contribute to the research.	The collaboration with high quality partners is wide and relevant regarding partner contribution to joint research. The research has a high value for the external partners.	The research has international reach and is of significance to society.	Clear visions, and realizable strategies. Promising junior faculty activities.

	Quality	Productivity	Infrastructure	Collaborations	Coproduction	Impact	Renewal
Good	National attention, recognized channels, near the research front.	Average number of PhDs, promotions, and publications in relation to UoA resources. The emphasis is on the number of publications.	Leadership, constitution of staff, activity, ability to attract external funding is satisfactory in all aspects.	The collaboration is wide and relevant. Academic partners contribute to some extent to the research.	Relevant collaboration partners. Non-academic partners contribute to the research. The research has value for the external partners.	The research has national reach and is of some significance to society.	Visions and strategies need some development. Sufficient junior faculty activities.
Insufficient	The research is insufficient and reports have not gained wide circulation or do not receive national and international attention.	Clearly below average number of PhDs, promotions, and publications in relation to UoA resources. The emphasis is on the number of publications.	Leadership, constitution of staff, activity, ability to attract external funding is clearly unsatisfactory in several aspects.	The collaboration is insuffiently developed.	The collaboration is insuffiently developed.	Lack of reach, or minor significance of research to society.	Unrealistic or lacking visions and strategies.

Appendix 3
Part B: Quantitative data of CeFEO

In this part of the evaluation package, questions and tables are presented in three sections which contain quantifiable information about CeFEO in support of the statements made in Part A above. Due to a change of organization at JU it was not possible to collect data for the earlier years in some cases.
B1: Research environment and infrastructure
B2: Research output
B3: The impact of engagement and co-operation with society.

B1. Research environment and infrastructure

B1.1 Staff statistics

Information of the number of individuals and full-time equivalents (FTE) of the staff's research activity. The 'M' columns show values for men and 'W' for women. The number of individuals refers to 31 December each year, whereas FTE is integrated over the whole year.

Table B1.1.1. Number of individuals and full-time equivalents of permanent research staff

Year	2012		2013		2014		2015		2016		2017	
Staff[1]	M	W	M	W	M	W	M	W	M	W	M	W
Professor					3	3	4	3	4	3	3	5
FTE[2]									1,76	1,36	1,19	1,49
Assoc. prof. (Lecturer and docent)					3	1	3	2	2	2	2	3
FTE[2]									0,37	0,40	0,47	0,67
Assist. prof. (Lecturer, researcher)					3	1	3	2	6	4	6	5
FTE[2]									1,30	0,39	0,99	0,65
Lecturer (Adjunct)												
FTE												
Total Individuals					9	5	10	7	12	9	11	13
Total FTE[2]									3,43	2,15	2,65	2,81
Total FTE research time[3]									3,3	1,75	3,87	2,11

1. Professor denotes persons employed as full professors. Associate professor denotes staff members qualified to act as principal advisor for PhD students (docent appointment or similar). Assistant professors denote the rest of staff with a PhD.
2. According to HR and payroll records for CeFEO.
3. Internal funded research time according to working plans.

Table B1.1.2. Other staff supporting research in CeFEO												
Year	2012		2013		2014		2015		2016		2017	
Staff	M	W	M	W	M	W	M	W	M	W	M	W
Research assistant/ technician						1	2					
FTE												
Administrator						2		2		2		2
FTE										0,59		1,2
Total individuals						3	2	2		2		2
Total FTE										0,59		1,2

[1] Fixed term and visiting research staff. Staff is included in the research output as well as in the bibliometric analysis.

B1.2 Research funding

Sources of research funding and amounts given to CeFEO annually during 2012–2017. Based on records from CeFEOs documentation.

Table B.1.2.1. Research Funding Granted

Source	Year	Amount	CeFEO project members
Carl-Olof & Jenz Hamrin's Foundation	2012	11 250 000	Leif Melin/Mattias Nordqvist
Handelsbanken (Browaldh)	2012-2016	2 200 000	Ethel Brundin/Mattias Nordqvist/Francesco Chirico
Handelsbanken	2017	2 500 000	Kajsa Haag/Hanna Almlöf /Massimo Bau'
Swedish Research Council	2017	4 960 000	Markus Plate/Ethel Brundin
Torsten Söderberg Foundation	2012	1 517 000	Lars-Göran Sund/Kajsa Haag/Hanna Almlöf
Ragnar Söderberg Foundation	2013	2 943 598	Karin Hellerstedt/Mattias Nordqvist/Anna Jenkins
Tillväxtanalys (applied research projects)	2012	250 000	Mattias Nordqvist/Karin Hellerstedt
Tillväxtanalys (applied research project)	2013	250 000	Mattias Nordqvist/Karin Hellerstedt
Knowledge Foundation/KK	2017	2 908 800	Christina Keller/Mattias Nordqvist/Kajsa Haag/Massimo Bau'
Swedish Research Council	2016	4 500 000	Lucia Naldi/Magdalena Markowska
Jordbruksverket (applied research project)	2013	400 000	Lucia Naldi/Marcela Ramirez-Pasillas
EU/Education and Culture DG Lifelong learning	2014	320 000	Massimo Bau'/Annika Hall
Henry och Sylvia Toft's Foundation	2012-2016	1 282 491	Mattias Nordqvist
Henry och Sylvia Toft's Foundation	2017	1 066 000	Mattias Nordqvist/Ibrahim Malki

Based on records from economy department.

Table B.1.2.2. External funding (money spent in SEK)						
	2012	2013	2014	2015	2016	2017
Research Councils and authorities (VR, FAS, Formas, Vinnova, Swedish Energy Agency etc.)					0	171 767
Swedish Foundations (e.g. Wallenberg, SSF, RJ, KK, etc.)						
EU, (TVV)			37 363	88 813		
Other public bodies (e.g. county councils, municipalities, etc.)						
Direct external funding from industry.						
Others (please specify)			6 871 979	5 899 734	5 003 203	2 365 982
TOTAL			6 909 342	5 988 546	5 003 203	2 537 749
Specify Others						
Hamrinstiftelsen			4 660 287	4 980 989	4 213 555	1 171 812
Handelsbanken						12 222
Ragnar Söderbergs stiftelse			596 095	539 139	158 215	541 193
Tore Browaldhs stiftelse			40 719	51 153	183 374	
Torsten Söderbergs stiftelse			129 243	185 424	124 971	19 559
Tillväxtverket			0	0		
Henry och Sylvia Toft Stiftelse			1 282 491			
KKS			95 405	106 095		
Family Owned Business Inst						
Övrigt Internt			31 624	9 699		
Styrelseakademin, Falun Borlänge-regionen					123 088	530 142
JIBS Seed funding					200 000	84 336

Based on records from economy department.

Table B.1.2.3. Total Research Funding (money spent in SEK)						
	2012	2013	2014	2015	2016	2017
Total external funding (from Table B.1.2.1.)			6 909 342	5 988 546	5 003 203	2 537 749
Faculty funding (governmental funding)			6 805 892	5 650 488	8 064 592	9 004 929
Percentage external funding			50,38%	51,45%	38,29%	21,99%
Research as competence development			0	0	0	0
TOTAL			13 715 234	11 639 034	13 067 795	11 542 678

B1.3 Major international collaborations

Major international activities undertaken with partners outside of Sweden during 2012–2017 by permanent research staff. Based on records from economy department.

Table B1.3.1 International networks and collaborations	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Number of collaborative institutions[1]			5	2	2	2

[1] Research collaborations given here are limited to those with joint research grants in excess of 100kSEK/year and/or joint publications with CeFEO.

B1.4 Recruitments

Number of recruited research staff, men (M) and women (W) during 2012–2017 based on HR records.

B1.5.1 Recruitments	Number	
	M	W
Recruitments with doctoral degree from another Swedish university	-	-
Recruitments with a doctoral degree from outside Sweden	6	-
Recruitment with doctoral degree from own university	3	4
Recruitment of PhD-students	4	2
TOTAL	13	6

B2. Research Output

B2.1 Promotions and degrees

This section quantifies the development of scientific staff during 2012 to 2017, distinguishing men (M) and women (W).

B2.1.1. Doctoral degrees awarded and promotion of researchers												
	2012		2013		2014		2015		2016		2017	
	M	W	M	W	M	W	M	W	M	W	M	W
No. Doctoral degrees			1				1		3		1	
No. Docent promotions	1							1				
No. Professor promotions						1			1			
TOTAL	1	0	1	0	0	1	1	1	4	0	1	0

B2.2 Publications

Publications and other research output achieved during 2012–2017 to provide the publication profile of CeFEO.

Table B2.2.1: Total number of scientific publications produced by CeFEO.								
Publication types	2012	2013	2014	2015	2016	2017	Total	Period average
Article in journal, peer reviewed	16	25	22	15	19	23	120	20,0
Article in journal, not peer reviewed	3	2	4	2	1	2	14	2,3
Article in journal, book review	1	1	0	0	0	0	2	0,3
Article in journal, review	0	0	0	1	0	2	3	0,5
Book	1	2	0	0	0	2	5	0,8
Edited book	2	0	3	6	2	2	15	2,5
Chapter in book	19	17	7	21	9	12	85	14,2
Conference paper (peer reviewed)	1	7	7	10	4	3	32	5,3
Conference paper (not peer reviewed)	15	14	27	18	20	26	120	20
Thesis, doctoral	1	1	1	1	3	1	8	1,3
Thesis, licentiate[1]	0	0	0	0	0	0	0	0
Thesis, master	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Report	2	1	12	5	3	4	27	4,5
Other scientific publication	0	5	1	0	2	0	8	1,3

[1] Licentiate is a Swedish and Finnish academic degree at graduate level corresponding to approx. half of a Swedish PhD.

Table B2.2.2. Aggregate publication information								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of publications in DiVA	61	75	84	79	63	77	439	73,2
Number of publications in Web of Science	12	12	14	15	16	23	92	15,3
Number of publications in Web of Science, author fractionalized	7,2	5,8	8,8	7,2	9,1	13,3	51,4	8,6
Web of Science visibility (per cent of publications included)	56,3%	45,8%	73,7	75,0%	64,7%	72,7%		64,0%
Journals´ field normalized impact	1,06	1,54	1,25	1,05	1,00	1,24	7,14	1,20
Journal Impact Factor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Norwegian score	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Norwegian score fractionalized	28,1	25,4	15,9	25,6	14,5	28,7	138,1	23,0
Publications in level 1 journal – Norwegian list	15	19	19	12	17	20	102	17,0
Publications in level 2 journal – Norwegian list	2	6	1	6	1	4	20	3,3
Publications in level 1 conference[1] – Norwegian list	0	0	0	2	1	1	4	0,7
Publications in level 1 book publishers	13	3	3	3	2	3	27	4,5
Publications in level 2 book publishers	4	10	3	14	2	11	44	7,3

[1] Please note that conference papers might be underreported in DiVA for the time period.

Table B2.2.3. Citation indicators								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of citations	234	243	154	61	38	4	734	122,3
Number of citations, author fractionalized	100,8	113,8	89,2	22,5	14,4	2,5	343,3	57,2
Citations per publication	7,3	10,1	4,4	1,8	0,7	0,06		4,9
Share of publications not cited	25%	8%	0%	20%	44%	87%		37%
Average field normalized citation rate (full counts)	1,89	2,37	1,60	1,28	1,76	N/A		1,76 (based on 5 years)
Share of publications (no. of publications) among the 10 per cent most cited in the field *(full counts)*	30,0% (3,0)	39,4% (4,3)	21,4% (3,0)	13,1% (1,6)	36,4% (4,0)	N/A (N/A)	N/A (15,9)	27,4% (2,7)
Share of publications among the 25 per cent most cited in the field *(full counts)*	40,0% (4,0)	70,3% (7,7)	66,7% (9,3)	37,3% (4,5)	51,0% (5,6)	N/A (N/A)	N/A (31,2)	53,7 (5,2)

Table B2.2.4. Authorship								
	2012	2013	2014	2015	2016	2017	Total	Period average
Average no. authors per publication	N/A	N/A	N/A	N/A	N/A	N/A		3,1
Average no. countries per publication	N/A	N/A	N/A	N/A	N/A	N/A		2,2

Table B2.2.5. Role of key scholars							
	2012	2013	2014	2015	2016	2017	Period average
Share of publications by the three key (most active) scholars (*full counts*)[1]	90%	54,5%	50%	58,3%	54,5%	43,8%	58,5%
Chirico, F.[2]	10%	18,2%	35,7%	20%	13,3%	19,0%	19,4%
Nordqvist, M.[2]	50%	27,3%	14,3%	20%	13,3%	9,5%	22,4%
Stephan, A.[2]	40%	9,1%	7,1%	6,7%	20%	9,5%	15,4%
Share of publications by the three key (most active) scholars *(fractional counts)*[3]	69,6%	35,5%	36,4%	29,9%	34,4%	19,7%	37,6%
Chirico, F.[4]	4,8%	16,1%	18,4%	9,1%	9,7%	8,0%	11,0%
Nordqvist, M.[4]	44,9%	14,5%	6,6%	13,9%	14,0%	6,6%	16,8%
Stephan, A.[4]	19,9%	4,8%	11,4%	7,0%	10,7%	5,2%	9,8%

[1] Based on Web of Science articles. Full counts, each publication is worth as one.
[2] Share of publications by each of the three key scholars, full counts. Based on Web of Science articles. N.B. Full counts can implicate one article being counted more than once, thus the total share when adding each scholar's percentage might result in a number higher than the collective share.
[3] Based on Web of Science articles. Fractional counts, each publication divided by number of authors.
[4] Share of publications by each of the three key scholars, fractional counts. Based on Web of Science articles.

Collaborative network

See figure 1 and 2 below for an overview of the collaborative network of co-authors and countries.

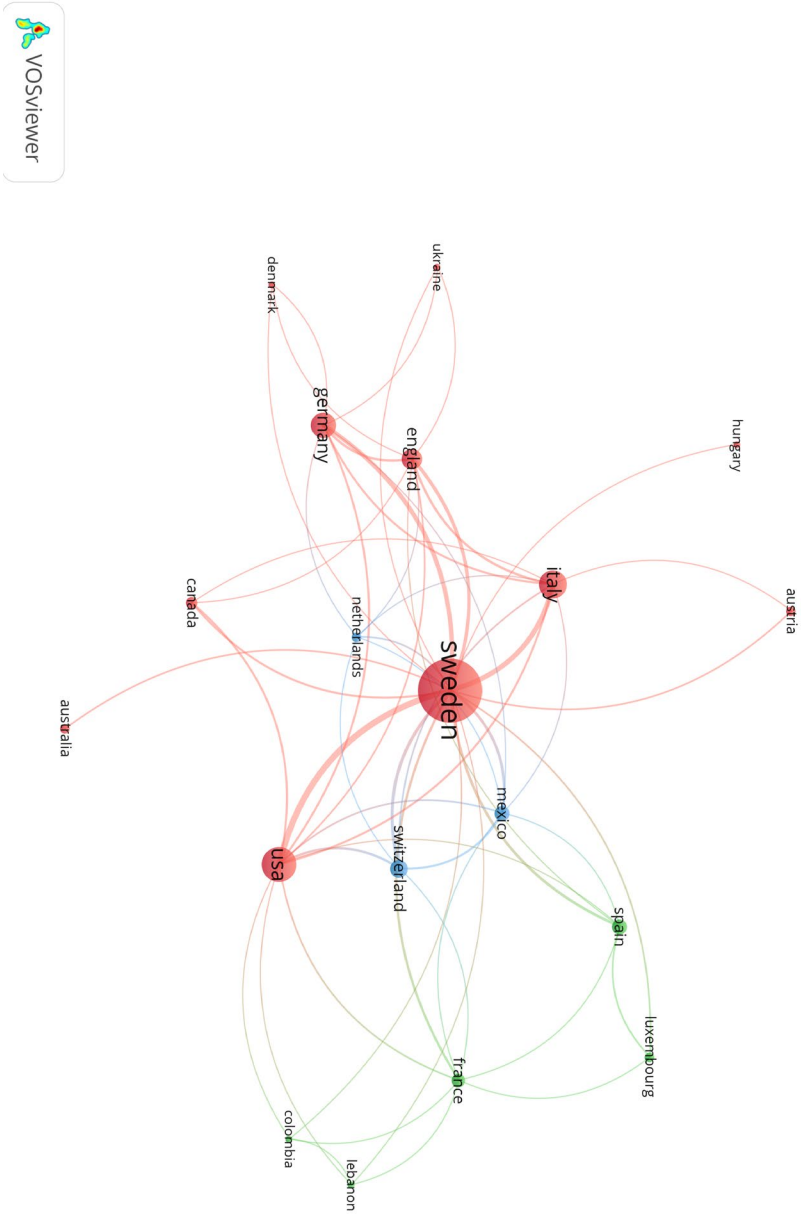
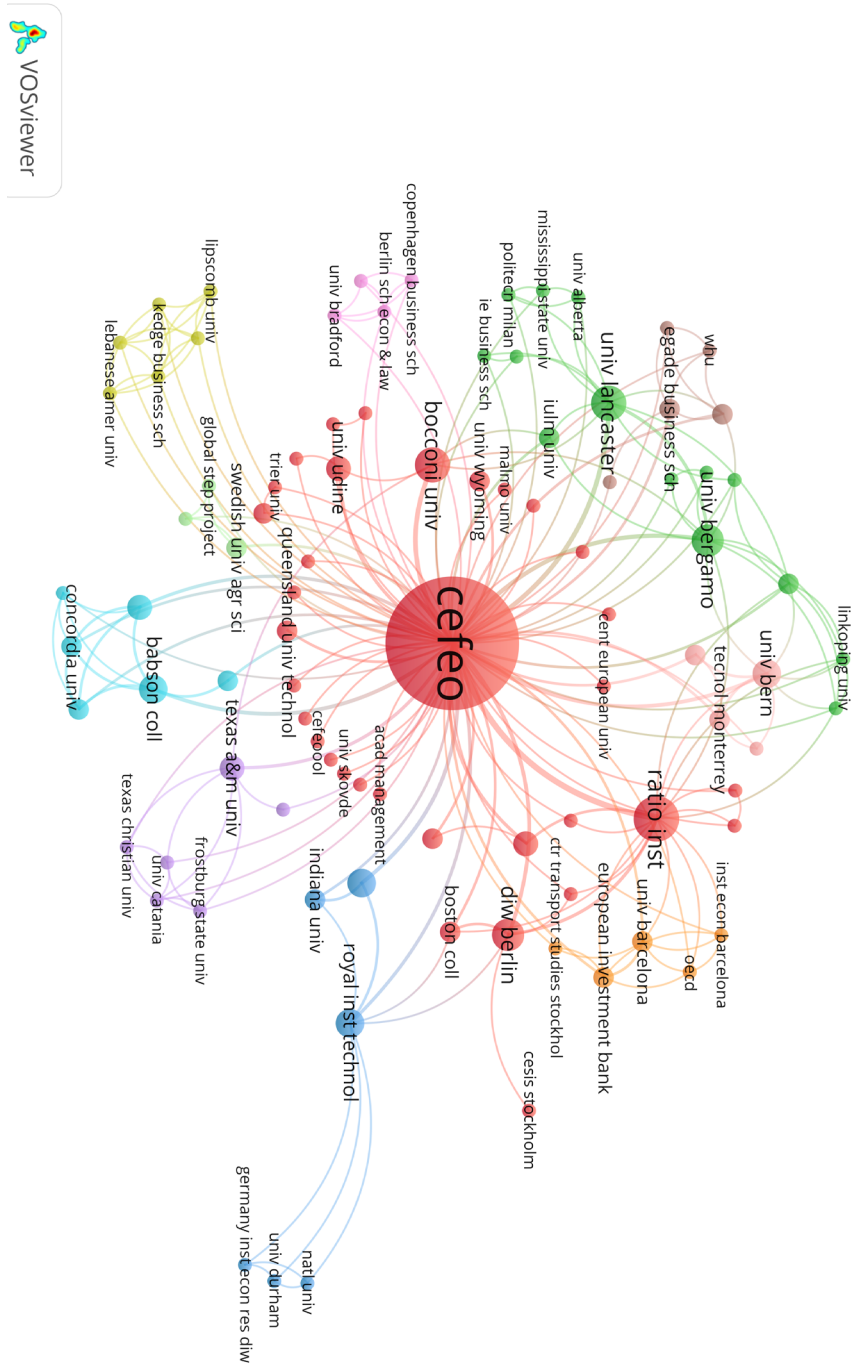


Figure 1. Collaborative countries, based on co-authored articles in Web of Science, 2012-2017

Figure 2. Collaborative network, based on co-authored articles in Web of Science, 2012-2017



B3. Major research related co-operation with society

Activities regarding research related co-operation with society is described in table 3.1 and includes the number of publications co-authored with individuals outside of academic institutions, and popular publications aimed at the general public.

Table 3.1. Co-publishing - Internationally and with Swedish non-university organizations

		Swe. non-univ.		*International*	
	P-full	*Count*	*Share*	*Count*	*Share*
2012	10	0	0.0%	8	80.0%
2013	11	3	27.3%	8	72.7%
2014	14	3	21.4%	9	64.3%
2015	12	2	16.7%	8	66.7%
2016	11	4	36.4%	7	63.6%
2017	16	2	12.5%	9	56.3%
Total	74	14	18.9%	49	66.2%

Appendix 4

Part B: Quantitative data of IMPROVE

In this part of the evaluation package, questions and tables are presented in three sections which contain quantifiable information about IMPROVE in support of the statements made in Part A above. Due to a change of organization at JU it was not possible to collect data for the earlier years in some cases.

B1: Research environment and infrastructure

B2: Research output

B3: The impact of engagement and co-operation with society.

B1. Research environment and infrastructure

B1.1 Staff statistics

The 'M' columns show values for men and 'W' for women. The number of individuals refers to 31 December each year, whereas FTE is integrated over the whole year.

Table B1.1.1. Number of individuals and full-time equivalents of permanent research staff

Year	2012		2013		2014		2015		2016		2017	
Staff[1]	M	W	M	W	M	W	M	W	M	W	M	W
Professor					1		1		1		1	
FTE									0,3		0,3	
Assoc. prof. (Lecturer and docent)		1		1		1		1		1		1
FTE										0,6		0,76
Assist. prof. (Lecturer, researcher)	3		3	2	3	4	3	5	2	6	1	7
FTE									0,86	2,4	0,24	2,05
Lecturer (Adjunct)	1	4	1	4	1	4	1	4		2		5
FTE										0,2		0,23

Total Individuals	4	5	4	7	5	9	5	10	2	9	1	13
Total FTE									1,16	3,2	0,54	3,04

[1] Professor denotes persons employed as full professors. Associate professor denotes staff members qualified to act as principal advisor for PhD students (docent appointment or similar). Assistant professors denote the rest of staff with a PhD.

Table B1.1.2. Number of individuals and full-time equivalents of temporary research staff

Year	2012		2013		2014		2015		2016		2017	
Staff[1]	M	W	M	W	M	W	M	W	M	W	M	W
Guest profs									1			
FTE									0,1			
Adjunct profs									1		1	
FTE									0,01		0,03	
Assistant professor												
FTE												
Post-Docs and research assistants												
FTE												
PhD students												
FTE												
Total individuals									2		1	
Total FTE									0,11		0,03	

Table B1.1.3. Other staff supporting research in IMPROVE

Year	2012		2013		2014		2015		2016		2017	
Staff	M	W	M	W	M	W	M	W	M	W	M	W
Research assistant/ technician												
FTE												
Administrator		1		1		1		1		1	1	2
FTE										1	0,5	0,77
Total individuals		1		1		1		1		1	1	2
Total FTE										1	0,5	0,77

[1] Fixed term and visiting research staff. Staff is included in the research output as well as in the bibliometric analysis.

B1.2 Research funding

Sources of research funding and amounts given to IMPROVE annually during 2012–2017.

Table B.1.2.1. External funding (money spent in SEK)						
	2012	2013	2014	2015	2016	2017
Research Councils and authorities (VR, FAS, Formas, Vinnova, Swedish Energy Agency etc.)	-	403	1 474	2 280	1 852	1 222
Swedish Foundations (e.g. Wallenberg, SSF, RJ, KK, etc.)	-	0	0	0	0	1 213
EU	-	1 427	445	0	0	255
Other public bodies (e.g. county councils, municipalities, etc.)	-	1 549	1 488	2 903	3 161	2 829
Direct external funding from industry.	-	0	0	0	0	0
Others (please specify)	-	0	0	689***	1 010**	1 400*
TOTAL	-	3 379	3 407	5 872	6 023	6 919

*AFA försäkring
**935 tkr AFA, 75 tkr Anslag från stiftelsen
***AFA försäkring

Table B.1.2.2. Total Research Funding						
	2012	2013	2014	2015	2016	2017
Total external funding (from Table B.1.2.1.)	-	3 379	3 407	5 872	6 023	6 919
Faculty funding (governmental funding)	-	1 500	1 525	1 771	1 596	1 636
Percentage external funding	-	31	31	23	21	19
Research as competence development	-	-	-	-	-	-
TOTAL	-	4 879	4 932	7 643	7 619	8 555

B1.3 Major international collaborations

The number of major international activities undertaken with partners outside of Sweden during 2012–2017 by permanent research staff.

Table B1.3.1 International networks and collaborations	
Number of collaborative institutions[1]	
Number of research visits abroad (one week to one month duration)	22
Number of research visits abroad (of at least one month duration)	
Number of visiting researchers (one week to one month duration)	4
Number of visiting researchers (of at least one month duration)	

Number of funded international research consortia projects	1

[1] Research collaborations given here are limited to those with joint research grants in excess of 100kSEK/year and/or joint publications with IMPROVE.

Table B1.3.2 Other major international activities according to the tradition of the research field
Improvement Science Development Group hosted and financed by The Health Foundation, UK Guest professor Glenn Robert was Chairman of the network, Boel Andersson Gäre only member from Nordic Countries. Boel Andersson Gäre and Paul Batalden international evaluator for constitution of research institute for improvements science

B1.4. Participation in scientific community

IMPROVE activities undertaken during 2012–2017 that illustrate high quality leadership interactions with their scientific peers.

Table B1.4.1 Participation in academic community	Number
Plenary or keynote talk at international conferences	25
Assignment as expert in research councils and foundations	21
Assignment as expert evaluator for position of professor, associate professor (docent) and lecturer	5
Assignment as opponent for PhD thesis	11
Assignment as member of examination board for PhD thesis	27
Assignment as editor or member of editorial board for journal	3
Assignment as reviewer for international journal	161
Member of national scientific councils	7
Member of international scientific councils	3
Chair of program committee (international conferences)	2
Member of program committee (international conferences)	24

B1.5 Recruitments

Number of recruited research staff, men (M) and women (W) during 2012–2017.

Table B1.5.1 Recruitments	Number	
	M	W
Recruitments with doctoral degree from another Swedish university	1	2
Recruitments with a doctoral degree from outside Sweden		4
Recruitment with doctoral degree from own university		
TOTAL	1	6

B2. Research Output

B2.1 Promotions and degrees

This section quantifies the development of scientific staff during 2012 to 2017, distinguishing men (M) and women (W).

Table B2.1.1. Doctoral degrees awarded and promotion of researchers												
	2012		2013		2014		2015		2016		2017	
	M	W	M	W	M	W	M	W	M	W	M	W
No. Doctoral degrees		2										
No. Docent promotions					1			1	1			2
No. Professor promotions	1											
TOTAL	1	2			1			1	1			2

B2.2 Publications

Publications and other research output achieved during 2012–2017 to provide the publication profile of IMPROVE. Please note that conference publications and popular science publications might be underreported. For descriptions of indicators, see appendix 1.

Table B2.2.1: Total number of scientific publications produced by IMPROVE. Please specify citation index in each publication list.								
Publication types	2012	2013	2014	2015	2016	2017	Total	Period average
Article in journal, peer reviewed	37	20	21	17	33	38	166	27,7
Article in journal, not peer reviewed	0	1	0	1	3	9	14	2,3
Article in journal, review	0	0	0	1	0	1	2	0,3
Book	0	0	0	0	0	0	0	0
Edited book	2	1	0	1	1	0	5	0,8
Chapter in book	5	0	1	6	6	4	22	3,7
Conference paper (peer reviewed)	1	2	5	3	5	4	20	3,3
Conference paper (not peer reviewed)	5	6	5	8	11	14	49	8,2
Thesis, doctoral	3	4	3	1	2	1	14	2,3
Thesis, licentiate[1]	1	0	0	0	1	0	2	0,3
Report	0	0	3	1	3	2	9	1,5

[1] Licentiate is a Swedish and Finnish academic degree at graduate level corresponding to approx. half of a Swedish PhD.

Table B2.2.2. Aggregate publication information								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of publications in DiVA	52	33	39	40	64	75	303	50,5
Number of publications in Web of Science	27	18	12	17	29	40	143	23,8
Number of publications in Web of Science, author fractionalized	11,4	5,4	4,3	5,3	11,6	13,1	50,0	8,3
Web of Science visibility (per cent of all publications included)	51,9	54,4	30,8	42,5	45,3	53,3		46,4
Web of Science visibility (per cent of all peer reviewed journal articles included)	73,0	90,0	57,1	88,9	72,7	76,9		76,4
Scopus visibility (per cent of all peer reviewed journal articles included)	89,2	95,0	76,2	89,5	76,5	66,0		82,1
Journals´ field normalized impact	0,99	1,05	1,22	0,79	0,94	0,96	N/A	0,98
Norwegian score	57,8	25,0	23,0	22,0	46,8	61,5	236,1	39,4
Norwegian score fractionalized	25,9	6,8	9,7	7,5	19,3	22,1	91,3	15,2
Publications in level 1 journal – Norwegian list	28	16	11	16	26	40	137	22,8
Publications in level 2 journal – Norwegian list	9	3	4	2	6	6	30	5
Publications in level 1 book publishers – Norwegian list	4	0	0	0	4	5	13	21,2
Publications in level 2 book publishers – Norwegian list	0	0	0	0	0	0	0	0

Table B2.2.3. Citation indicators								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of citations[1]	197	123	77	35	119	18	569	94,8
Number of citations, author fractionalized[1]	85,4	35,8	24,0	11,9	19,2	3,9		
Citations per publication[1]	7,3	3,7	2,0	0,9	1,9	0,2		2,7
Share of publications not cited	3,7%	0%	0%	31,3%	30,4%	70,3 %		29,3%
Average field normalized citation rate *(full counts)*	0,86	0,93	1,10	0,59	2,60	N/A		1,2 (based on 5 years)
Share (no. of publications) of publications among the 10 per cent most cited in the field (*full counts*)	7,4% (2,0)	5,6% (1,0)	16,7% (2,0)	7,1% (1,0)	19,0% (4,0)	N/A	N/A (10,0)	10,9% (2,0)
Share of publications among the 25 per cent most cited in the field	13,0 % (3,5)	25,3% (4,6)	37,8% (4,5)	14,3% (2,0)	25,6% (5,4)	N/A	N/A	21,7% (20,0)

[1] Note that the descending number of citations for each year, 2012-2017, is natural since it takes time for citations to accumulate.

[2] Note that the ascending percentage of publications not cited each year, 2012-2017, is natural since it takes time for citations to accumulate and less articles are cited the newer they are.

Table B2.2.4. Authorship							
	2012	2013	2014	2015	2016	2017	Period average
Average no. authors per publication	N/A	N/A	N/A	N/A	N/A	N/A	4,9
Average no. countries per publication	N/A	N/A	N/A	N/A	N/A	N/A	1,4

Table B2.2.5. Role of key scholars							
	2012	2013	2014	2015	2016	2017	Period average
Share of publications by three most active authors *(full count)*	19,0 %	17,0 %	18,9 %	17,1 %	22,2 %	28,7 %	20,5%

B3. The impact of engagement and co-operation between research and society

This section presents activities related to co-operation between research and society and the impact of such activities. It includes the unit's general approach to enabling impact and engagement from its research, and also specific examples of impacts that have been underpinned by research undertaken by IMPROVE.

B3.1 PhD degrees

The number of doctoral degrees (PhD, etc.) earned within IMPROVE during 2012–2017 when the awardee was employed externally. Number of men ('M') and number of women ('W') are recorded per year.

Table B3.1.1. Doctoral degrees awarded to students employed externally												
	2012		2013		2014		2015		2016		2017	
	M	W	M	W	M	W	M	W	M	W	M	W
Number of doctoral degrees		2		3	1	2		1	1	1		1

B3.2 Major research related co-operation with society

Table 3.2.1 lists mobility between academia and non-academic society, such as exchanged lectures with external (non-academic) organizations, the engagement of adjunct professors, and externally financed PhD students in collaborative research projects with partners from industry or other organizations in society; Table 3.2.2 includes the number of publications co-authored with individuals outside of academic institutions, and popular publications aimed at the general public; Table 3.2.3 counts the number of external partners of IMPROVE divided between SME, large enterprises, and non-industrial partners.

Table 3.2.1: Mobility between academia and society						
	2012	2013	2014	2015	2016	2017
No. of collaborative doctoral students[1]	10	10	9	10	11	11
No. of temporary research positions outside university[2]				1	2	2
No. affiliated reserachers			2	2	8	12
No. of adjunct researchers	3	3	3	3	3	3

[1]Number of doctoral students in IMPROVE who are financed by non-academic external partners. Note that this does not mean doctoral students who are financed by any non-academic funding body, but students who are financed by external partners of IMPROVE (e.g. industry or public sector organizations).
[2]Permanent IMPROVE personnel who leave the university for non-academic society.

Table 3.2.2: Collaborative organizations (please provide description in A3.1.)						
	2012	2013	2014	2015	2016	2017
No. of partners from industry (SME)[1]						
No. of partners from industry (non- SME)			1	1	1	3
No. of partners from society excl. industry and academia	4	4	4	5	5	6

[1]enterprise with no more than 250 employees and an annual turnover not exceeding 50M €.

Table 3.2.3: Indirect external funding (in M SEK)						
	2012	2013	2014	2015	2016	2017
Indirect funding from non-industrial organizations in society (in kind[1])	1,5	1,5	1,5	1,5	1,5	1,5
Indirect external funding from industry (in kind)						3,168

[1]value of working hours done by external partners, value of equipment, databases, software, laboratories etc. that external partners provide in joint research projects.

Appendix 5

PART B: Quantitative data of Lifelong Learning

In this part of the self-evaluation, questions and tables are presented in three sections which contain quantifiable information about Lifelong Learning in support of the statements made in Part A above. Due to a change of organization at JU it was not possible to collect data for the earlier years in some cases.
B1: Research environment and infrastructure
B2: Research output
B3: The impact of engagement and co-operation with society.

1.1 Research environment and infrastructure

1.1.1 Staff statistics

Number of individuals and full-time equivalents (FTE) of the staff's research activity. The 'M' columns show values for men and 'W' for women. The number of individuals refers to 31 December each year, whereas FTE is integrated over the whole year.

Table B1.1.1. Number of individuals and full-time equivalents of permanent research staff

Year	2012		2013		2014		2015		2016		2017	
Staff[1]	M	W	M	W	M	W	M	W	M	W	M	W
Professor	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
FTE									1,00	1,00	1,00	1,00
Assoc. prof. (Lecturer and docent)												
FTE												
Assist. prof. (Lecturer, researcher)	4,00	4,50	5,00	4,50	3,50	6,00	5,00	6,67	4,08	6,08	5,00	6,67
FTE									2,93	5,93	3,85	5,95
Lecturer (Adjunct)												
FTE												
Total Individuals	5,00	5,50	6,00	5,50	4,50	7,00	6,00	7,67	5,08	7,08	6,00	7,67
Total FTE*									3,93	6,93	4,85	6,95
Total FTE research									1,8		2,1	

[1] Professor denotes persons employed as full professors. Associate professor denotes staff members qualified to act as principal advisor for PhD students (docent appointment or similar). Assistant professors denote the rest of staff with a PhD.

*FTE refers to *all* tasks, including teaching and service. In our last two annual reports, we have calculated how many FTE our paid *research* time – internal and external – amounts to. In 2016, it was 1,8 FTE and in 2017 it was 2,1. The pattern has been similar in previous years. A proxy of 2 FTEs annually can be used for 2012 – 2015.

The yearly statistics above include people who have been employed at the School of Education and Communication 2012-2017 even if they only recently joined Lifelong Learning – they are thus a bit over-reported.

Table B1.1.2. Number of individuals and full-time equivalents of temporary research staff

Year	2012		2013		2014		2015		2016		2017	
Staff1	M	W	M	W	M	W	M	W	M	W	M	W
Guest profs												
FTE												
Adjunct profs												
FTE												
Assistant professor												
FTE												
Post-Docs and research assistants	0,25	0,25	1,00	1,00	0,75	0,75						
FTE												
PhD students	6,08	4,08	4,58	2,58	2,00	1,17	0,58	0,58				
FTE												
Total individuals	6,33	4,33	5,58	3,58	2,75	1,92	0,58	0,58	0,00	0,00	0,00	0,00
Total FTE									0,00	0,00	0,00	0,00

Table B1.1.3. Other staff supporting research in UoA

Year	2012		2013		2014		2015		2016		2017	
Staff	M	W	M	W	M	W	M	W	M	W	M	W
Research assistant/ Technician*	5,17	2,17	5,42	1,92	8,42	5,83	6,58	3,58	6,67	2,75	3,67	2,58
FTE									5,67	2,67	3,53	2,58
Administrator	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
FTE									1,00	1,00	0,84	0,84
Total individuals	6,17	3,17	6,42	2,92	9,42	6,83	7,58	4,58	7,67	3,75	4,67	3,58
Total FTE									6,67	3,67	4,37	3,42

*In the university's records, this category of personell includes assistants commissioned to help with research tasks, but also – and mostly – temporary teaching staff, not actually engaged in research, so these figures are overreported.

In addition, we have two affilated scholars that contribute to our research production on a voluntary, non-paid basis. They are former employees, now retired from paid work, but still very productive.

1.1.2 Research funding

Sources of research funding and amounts given to Lifelong Learning annually during 2012–2017.

Table B.1.2.1. External funding (money *spent* in SEK, thousand)

	2012	2013	2014	2015	2016	2017
Research Councils and authorities (VR, FAS, Formas, Vinnova, Swedish Energy Agency etc.)	1 829	1 795	3 022	3 160	1 815	1 407
Swedish Foundations (e.g. Wallenberg, SSF,RJ, KK, etc.)						1 779
EU	152	512	586	132	81	
Other public bodies (e.g. county councils, municipalities, etc.)	90	38	119	153	28	125
Direct external funding from industry.					141	47
Others (please specify)	55*					
TOTAL	2 128	2 346	3 729	3 446	2 068	3 361

*International program office

Table B.1.2.2. Total Research Funding / Sums in SEK, thousand

	2012	2013	2014	2015	2016	2017
Total external funding (from Table B.1.2.1.)	2 128	2 346	3 729	3 446	2 068	3 361
Faculty funding (governmental funding)	1 695	1 184	1 940	1 862	1 320	1 592
Percentage external funding	126 %	198 %	192 %	185 %	156 %	211 %
Research as compe-tence development	28	29	17	14	147	153
TOTAL	3 852	3 559	5 686	5 322	3 535	5 107

Table B.1.2.3 – External funding – money awarded 2012-2017, SEK

While the tables above show money spent annually, the following table shows grants awarded, allocated either to year awarded or to the first project year. In many cases we have several co-applicants from other institutions. Some of it is also managed elsewhere – we are the co-applicants. The table consequently does *not* provide any information about money spent annually for Lifelong Learnings's researchers, but it indicates success in grants awarded, as well as collaboration with others.

Table B.1.2.3. External funding: Money awarded, allocated to first project year
People marked in bold indicates members of Lifelong Learning

Project name	2012	2013	2014	2015	2016	2017	**Head applicant**	**Co-applicants**
Research Councils (VR, FAS, Formas etc.)								
Conference contribution for ELOS: Education and learning of older adults				84 000			**Bjursell**	
Mumpreneurs in the intersection of gender, business and the Swedish welfare state				4 500 000			**Ahl**	JIBS
Senior's digital inclusion (Forte)			3 600 000				Lund Univ	**Samuelsson**
Entrepreneurship, gender and economic growth: challenges to feminist theory	8 000 000						**Ahl**	LiU,SU,SLU
Swedish Foundations (e.g. Wallenberg, SSF, Vinnova, RJ, KK,)								
Education for adults with disabilites - leadership and participation						150 300	**Bjursell**	
To lead ecuation for adults with disabilities						300 000	**Bjursell**	
Blogg: Learning in working life					192 200		**Bjursell**	
KLOSS - Knowledge exchange and learning about strategic coproduction			1 105 650				Jönköping Univ.	**Bjusell**
Women's entrepreneurship for rural development (Kamprad)					5 000 000		**Ahl**	LiU,SU,SLU
Gendered Smart Housing (Vinnova)			300 000				LnU	**Ahl**
EU								
ESF-project: SMILE - Strategic mentorship: integration, learning and equality					882 500		Sävsjö komm.	**Bjursell**
ECIL: European Certificate in intergeneration Learning	535 000						**Boström**	
ESF-project Immigrant women's integration through business startups					190 000		Business Gnosjö	**Kilhammar**
ESF-project: the IT-track			243 800				**Hedegaard**	
ESF-project: Labor market inclusion (RUSta)		448 000					**Hedegaard**	
Other public bodies (e.g. county councils, municipalities, etc.)								
Performance measurement in adult education - on assignment from the Swedish Ministry of Education			986 400				**Bjursell**	
Implementation of co-workship: Jönköping Municipality		150 000					**Kilhamamr**	
Direct external funding from industry., associations etc.								
Cooperation witin a centre for educaiton leadership						100 000	**Bjursell**	
Citizenship and chronic illness					550 000		(UK)	**Gillberg**
Others (please specify)								
Grant from Jönköping Univ. Foundation for the Institute for Education Leadership						11 000 000	**Rapp, Ahl, Bjursell**	
TOTAL	**8 535 000**	**598 000**	**6 235 850**	**4 584 000**	**6 814 700**	**11 550 300**		
Total awarded 2012-2017						**38 317 850**		

1.1.3 Major international collaborations

*Number of major international activities undertaken with partners outside of Sweden during **2012–2017** by permanent research staff.*

Table B1.3.1 International networks and collaborations	
Number of collaborative institutions[1]	5
Number of research visits abroad (one week to one month duration)	11
Number of research visits abroad (of at least one month duration)	2
Number of visiting researchers (one week to one month duration)	10
Number of visiting researchers (of at least one month duration)	3
Number of funded international research consortia projects	3

1 Research collaborations given here are limited to those with joint research grants in excess of 100kSEK/year and/or joint publications with the Lifelong Learning.

Table B1.3.3 Other major international activities according to the tradition of the research field	Total No.
Data collection in Turkey, 2016 and 2017: interviews. 4 weeks each	2
Production of lifelong learning material in five languages. 3-5 days each	4
Data collection in New Zealand: interviews. 2 weeks.	2
Working with OECD in Paris on Lifelong Learning policy documents, 1 week	4

1.1.4 Participation in scientific community

Lifelongs Learning's activities undertaken during 2012–2017 that illustrate high quality leadership interactions with their scientific peers.

B1.4.1 Participation in academic community	Number
Plenary or keynote talk at international conferences	13
Assignment as expert in research councils and foundations	3
Assignment as expert evaluator for position of professor, associate professor (docent) and lecturer	5
Assignment as opponent for PhD thesis	5
Assignment as member of examination board for PhD thesis	10
Assignment as editor or member of editorial board for journal	18
Assignment as reviewer for international journal	94
Member of national scientific councils	60
Member of international scientific councils	36
Chair of program committee (international conferences)	17
Member of program committee (international conferences)	12

We interpret category 2 as reviewer of project applications only.
We interpret categories 8 and 9 as any scientific council – not just those granting research money.

1.1.5 Recruitments

Number of recruited research staff, men (M) and women (W) during 2012–2017.

We have recruited several men, which now makes our group gender balanced.

B1.5.1 Recruitments	**Number**	
	M	W
Recruitments with doctoral degree from another Swedish university	1	1
Recruitments with a doctoral degree from outside Sweden	1	
Recruitment with doctoral degree from own university	3	1
TOTAL	5	2

1.2 Research Output

1.2.1 Promotions and degrees

This section quantifies the development of scientific staff during 2012 to 2017, distinguishing men (M) and women (W).

B2.1.1. Doctoral degrees awarded and promotion of researchers												
	2012		2013		2014		2015		2016		2017	
	M	W	M	W	M	W	M	W	M	W	M	W
No. Doctoral degrees				2		3		1				
No. Docent promotions										1		
No. Professor promotions												
TOTAL												

1.2.2 Publications

The number of publications in DiVA published 2012-2017 of the following document types:

Table B2.2.1: Total number of scientific publications produced by Lifelong Learning.

Publication types	2012	2013	2014	2015	2016	2017	Total	Period average
Article in journal, peer reviewed	8	5	9	7	3	8	40	6,7
Article in journal, not peer reviewed	4	1	0	0	0	0	5	0,8
Article in journal, book review	1	0	1	0	0	1	3	0,5
Book	1	1	0	0	1	1	4	0,7
Edited book	1	0	3	0	0	1	5	0,8
Chapter in book	6	3	5	5	2	20	41	6,8
Conference paper (peer reviewed)	10	10	6	11	7	16	60	10
Conference paper (not peer reviewed)	12	5	0	0	4	5	26	4,3
Thesis, doctoral	0	0	3	1	0	0	4	0,7
Report	1	1	0	3	1	4	10	1,7

Total number of publications in DiVA

The total number of publications in DiVA published 2012-2017 of the document types listed above.

Table B2.2.2. Aggregate publication information								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of publications in DiVA	39	27	32	32	20	58	208	34,7
Number of publications in Web of Science	3	0	1	3	3	8	18	3,0
Number of publications in Web of Science, author fractionalized	2,5	0	0,5	2	1,6	5,3	11,9	2,0
Web of Science visibility (per cent of publications included)	7,7	0	3,1	9,4	15,0	13,8		8,2
Web of Science visibility (per cent of all peer reviewed journal articles included)	12,5	0	11,1	42,9	100	87,5		42,3
Scopus visibility (per cent of all peer reviewed journal articles included)	50	20	55,6	42,9	100	62,5		55,2
Journals´ field normalized impact	0,83	-	0,98	2,51	0,97	0,34		1,1
Norwegian score	16,4	9,1	10,4	6,7	8,7	17,2	68,5	11,4
Norwegian score fractionalized	15,2	7,9	7,5	4,9	4,0	13,8	53,2	8,9
Publications in level 1 journal – Norwegian list	8	2	7	4	3	4	28	4,7
Publications in level 1 book publishers	3	4	2	1	2	16	28	4,7
Publications in level 2 book publishers	2	0	2	2	0	2	8	1,3

Table B2.2.3. Citation indicators								
	2012	2013	2014	2015	2016	2017	Total	Period average
Total number of citations	43	0	2	3	17	1	66	11
Number of citations, author fractionalized	21,5	0	1	1,5	5,6	0,3	29,8	5,0
Citations per publication	14,3	0	2	1	5,7	0,1		3,9
Share of publications not cited	66,7%	0%	0%	66,7%	33,3%	87,5%		42,4 %
Average field normalized citation rate *(full counts)*	3,56	0	0,51	0,63	2,02	N/A		1,3

Table B2.2.4. Authorship								
	2012	2013	2014	2015	2016	2017	Total	Period average
Average no. authors per publication	N/A	N/A	N/A	N/A	N/A	N/A		3,2
Average no. countries per publication	N/A	N/A	N/A	N/A	N/A	N/A		1,5

Share of publications by 3 most active authors

Table B2.2.5. Role of key scholars								
	2012	2013	2014	2015	2016	2017	Total	Period average
Share of publications by three most active authors *(full count)*	54,6 %	48,5 %	38,5 %	38,5 %	66,7	44,2 %		48,5%

The indicator shows the share of publications in DiVA authored or co-authored by the 3 authors with the most publications during the analyzed time period, i.e. 2012-2017. The percentages are based on all publications in DiVA. The percentages are based on full counts.

	Share of publicatons (full)			*Share of publicatons (frac)*		
	Ahl, H.	*Bjursell, C.*	*Boström, A.*	*Bjursell, C.*	*Boström, A.*	*Persson, R.*
2012	13.6%	20.5%	20.5%	20.6%	24.8%	8.3%
2013	15.2%	12.1%	21.2%	10.9%	24.3%	11.5%
2014	10.3%	17.9%	10.3%	20.6%	13.9%	13.9%
2015	7.7%	28.2%	2.6%	29.8%	1.3%	23.5%
2016	23.8%	42.9%	.	51.3%	.	14.0%
2017	16.9%	18.2%	9.1%	17.6%	12.0%	15.9%

1.3 Engagement and co-operation between research and society

This section presents activities related to co-operation between research and society and the impact of such activities. It includes the unit's general approach to enabling impact and engagement from its research, and also specific examples of impacts that have been underpinned by research undertaken by the UoA.

1.3.1 PhD degrees

The number of doctoral degrees (PhD, etc.) earned within the UoA during 2012–2017 when the awardee was employed externally.
We do not have any finished PhDs in this category. There is one in process.

1.3.2 Major research related co-operation with society

Activities regarding research related co-operation with society should be entered into one of three categories in the table below: Table 3.2.1 includes the number of publications co-authored with individuals outside of academic institutions, and popular publications aimed at the general public; Table 3.2.2 counts the number of external partners of the UoA divided between SME, large enterprises, and non-industrial partners.

Table 3.2.1: Outreach activities						
	2012	2013	2014	2015	2016	2017
No. of scientific publications with representatives from society (not academia)	We have no scientific publications "proper" in this category, but a number of *popular* science publications (such as a book on learning in older life).					
No. of popular science publications (popular science magazines, including those on the internet)	**50**	**56**	**52**	**66**	**97**	**116**

Table 3.2.2: Collaborative organizations (please provide description in A3.1.)						
	2012	2013	2014	2015	2016	2017
No. of partners from society and industry	**24**	**19**	**25**	**29**	**23**	**22**

Appendix 6

PART B: Quantitative data of SPARK

In this part of the evaluation package, questions and tables are presented in three sections containing quantifiable information about the SPARK in support of the statements made in Part A above.
B1: Research environment and infrastructure
B2: Research output
B3: The impact of engagement and co-operation with society.

1.4 Research environment and infrastructure

1.4.1 Staff statistics

Provide information of the number of individuals and full-time equivalents (FTE) of the staff's research activity. The 'M' columns show values for men and 'W' for women. The number of individuals refers to 31 December each year, whereas FTE is integrated over the whole year.

Table B1.1.1. Number of individuals and full-time equivalents of permanent research staff

Year	**2012**		**2013**		**2014**		**2015**		**2016**		**2017**	
Staff[1]	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**
Professors	8	0	8	0	11	1	13	1	14	2	19	2
FTE	5,7	0	6,3	0	9,3	1	10,5	1	11,5	1,8	15,1	1,8
Assoc. prof. (Docent)	7	1	8	1	7	0	6	2	10	1	8	1
FTE	5,4	1	6,25	1	5,35	0	5,15	1,5	7,15	1	7,5	1
Assist.prof. (Universitetslektor)	20	8	24	12	23	14	23	16	27	16	30	15
FTE	18,2	7,3	20,7	10,5	21,4	11,5	21,9	14,4	24,4	15	27,6	13,6
Lecturers (Adjunkt)	13	10	13	8	13	7	15	9	18	10	20	10
FTE	12,4	8,4	11,8	6,1	12,5	6,3	13,9	7	17,5	8,3	19,3	9,2

Total Individuals	48	19	53	21	54	22	57	28	69	29	77	28
Total FTE	41,7	16,7	45,1	17,6	48,6	18,8	51,5	23,9	60,6	26,1	69,5	25,6

[1] Professor denotes persons employed as full professors. Associate professor denotes staff members qualified to act as principal advisor for PhD students (docent appointment or similar). Assistant professors denote the rest of staff with a PhD.

Table B1.1.2. Number of individuals and full-time equivalents of temporary research staff

Year	**2012**		**2013**		**2014**		**2015**		**2016**		**2017**	
Staff[1]	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**
Guest profs	0	0	0	0	0	0	3	0	2	0	2	0
FTE	0	0	0	0	0	0	0,4	0	0,25	0	0,2	0
Adjunct profs	0	0	1	0	1	0	0	0	1	0	1	0
FTE	0	0	0,2	0	0,2	0	0	0	0,2	0	0,2	0
Assistant professors	0	0	0	0	0	0	0	0	0	0	0	0
FTE	0	0	0	0	0	0	0	0	0	0	0	0
Post-Docs	1	1	3	1	4	0	3	0	1	1	1	2
FTE	1	1	3	1	4	0	3	0	1	1	1	2
PhD students[2]	13	7	17	11	26	12	26	14	29	14	33	11
FTE	13	7	17	11	26	12	26	14	29	14	33	11
Total individuals	14	8	21	12	31	12	32	14	33	15	37	14
Total FTE	14,0	8,0	20,2	12,0	30,2	12,0	29,4	14,0	30,5	15,0	34,4	13,0

Table B1.1.3. Staff supporting research - permanent and temporary research staff

Year	**2012**		**2013**		**2014**		**2015**		**2016**		**2017**	
Staff[1]	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**
Research assistants/ technicians	19	5	24	4	27	4	27	4	24	5	21	5
FTE	16,9	4	20,4	3,5	24	4	24,9	4	23,3	5	20,5	5
Administrators	4	3	4	2	5	3	7	3	7	4	7	7
FTE	4	3	4	2	5	2,5	7	3	7	4	7	7
Total individuals	23	8	28	6	32	7	34	7	31	9	28	12
Total FTE	21	7	24,4	5,5	29	6,5	31,9	7	30,3	9	27,5	12

[1] Fixed term and visiting research staff. Staff is included in the research output as well as in the bibliometric analysis.

[2] PhD students at JTH and at other HEI employed at JTH

1.4.2 Research funding

Sources of research funding and amounts given to SPARK annually during 2012–2017.

Table B.1.2.1. External funding (money spent in SEK)						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Research Councils (VR, FAS, Formas etc.)			2 178 464	2 819 407	1 781 127	1 552 751
Swedish Foundations (e.g. Wallenberg, SSF, Vinnova, RJ, KK, Swedish Energy Agency etc.)			26 846 198	38 575 147	38 491 327	37 645 920
EU			1 270 925	377 286	2 372 293	2 407 356
Other public bodies (e.g. county councils, municipalities, etc.)			1 498 413	3 490 820	5 408 388	5 778 076
Direct external funding from industry.			431 485	208 495	1 173 475	693 225
Others (please specify)			260 414	1 732 292	3 413 837	4 055 157
TOTAL			32 485 899	47 203 447	52 640 447	52 132 485

Table B.1.2.2. Total Research Funding						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Total external funding (from Table B.1.2.1.)			32 485 899	47 203 447	52 640 447	52 132 485
Faculty funding (governmental funding)			25 246 800	24 528 000	27 314 996	28 250 992
Percentage external funding			56%	66%	66%	65%
Research as competence development						
TOTAL			57 732 699	71 731 447	79 955 443	80 383 477

1.4.3 Major international collaborations

The number of major international activities undertaken with partners outside Sweden during **2012–2017** by permanent research staff.

Table B1.3.1 International networks and collaborations	
Number of collaborative institutions[1]	46
Number of research visits abroad (1 week to 1 month duration)	18
Number of research visits abroad (of at least 1 month duration)	4
Number of visiting researchers (one week to 1 month duration)	7
Number of visiting researchers (of at least 1 month duration)	8 (+ 19 visiting PhD students)
Number of funded international research consortia projects	12

[1] Research collaborations given here are limited to those with joint research grants in excess of 100kSEK/year and/or joint publications with SPARK.

B1.3.2 Name of granted project and role of SPARK (projects in portfolio - March 2018)			
Project title	**Funding body**	**Role (coordinator/ partner)**	**Start year**
PEOPLE	Regional funding	Coordinator	2014
Gjutmagistern 3.0	KKS - Expertkompetens	Coordinator	2014
ProWOOD	KKS "Företags forskarskolor 13"	Coordinator	2014
VastIRON	KKS - HÖG 14	Coordinator	2015
HINT	Regional funding	Coordinator	2015
PdEAM	Regional funding	Coordinator	2015
Reshoring II	Regional funding	Coordinator	2015
Adding - 2	Vinnova (genom Swerea)	Partner	2015
E-Minds	EU via COST	Partner	2015
MACS	Vinnova (genom Swerea)	Partner	2015
Hinder och drivkrafter för en digitaliseringsdriven branschutveckling	Smart Built Environment - Vinnova, Energimyndigheten och Formas	Coordinator	2016
Reshoring I	KKS - HÖG 15	Coordinator	2016
ProAct	Regional funding	Coordinator	2016
NGFS	Regional funding	Coordinator	2016
Datamine	Regional funding	Coordinator	2016
FullCorr	Åforsk	Coordinator	2016
IKT/BIM	Svenssons Stift., Reg.forskn	Coordinator	2016
PROCETS	EU, H2020	Partner	2016
Smart Built Environment (SBE) - Measurement methods	Formas	Coordinator	2016
Barriers and drivers for a digitally driven industry development	Formas	Coordinator	2016
ReOPTIC	Vinnova - Lighter	Coordinator	2016
Extreme	Vinnova	Coordinator	2016

Mulitkriterieanalys för en hållbar byggprocess	Formas	Coordinator	2017
FliPP	KKS - Prospekt	Coordinator	2017
AusCGI	KKS - Prospekt	Coordinator	2017
KOPability	KKS – HÖG 16	Coordinator	2017
DesiRe	KKS – HÖG 16	Coordinator	2017
Viskleken	KKS – HÖG 16	Coordinator	2017
ToolAddict	KKS – HÖG 16	Coordinator	2017
Distinct	KKS – HÖG 16	Coordinator	2017
PolyComp	KKS - Strategisk rekrytering	Coordinator	2017
CompCAST Plus	KKS - Profil	Coordinator	2017
ProWOOD+	KKS - "Företags forskarskolor + 17"	Coordinator	2017
COPE	KKS - Mälardalens Högskola	Partner	2017
PREMIUM	KKS - Mälardalens Högskola	Partner	2017
Metallkompetens	Vinnova	Coordinator	2017
mCBEES	EU, H2020 MCSA	Partner	2017
Alight	Vinnova - Metalliska Material	Coordinator	2017
Produktion av nästa generations drivlinor i Sverige	Vinnova UDI	Partner	2017
Optiheat	Vinnova	Coordinator	2017
Alutemp	Vinnova	Coordinator	2017
Hohsin Kanri Accelerator	Vinnova	Partner	2017
ChromeSurf	KKS – HÖG 17	Coordinator	2018
Innovate	KKS – HÖG 17	Coordinator	2018
ODISSEE2	KKS – HÖG 17	Coordinator	2018
FunDiSco	KKS – HÖG 17	Coordinator	2018
TopCut	KKS - Prospekt	Coordinator	2018
Innovation Runway	Tillväxtverket	Partner	2018

B1.3.3 Other major international activities according to the tradition of the research field[1]	Total No.
N/A	

[1] Please specify: scientific expeditions, field work etc. and list below including duration.

1.4.4 Participation in scientific community

SPARK's activities undertaken during 2012–2017 that illustrate high quality leadership interactions with their scientific peers.

B1.4.1 Participation in academic community	Number
Plenary or keynote talk at international conferences	35
Assignment as expert in research councils and foundations	26
Assignment as expert evaluator for position of professor, associate professor (docent) and lecturer	37

Assignment as opponent for PhD thesis	28
Assignment as member of examination board for PhD thesis	71
Assignment as editor or member of editorial board for journal	15
Assignment as reviewer for international journal	413
Member of national scientific councils	4
Member of international scientific councils	7
Chair of program committee (international conferences)	8
Member of program committee (international conferences)	28

1.4.5 Recruitments

Number of recruited research staff, men (M) and women (W) during 2013–2017.

B1.5.1 Recruitments (professors, associate professors and assistant professors)	Number	
	M	W
Recruitments with doctoral degree from another Swedish university	7	2
Recruitments with a doctoral degree from outside Sweden	7	5
Recruitment with doctoral degree from own university	3	
TOTAL	17	7

1.5 Research Output

1.5.1 Promotions and degrees

This section quantifies the development of scientific staff during 2012 to 2017 (within Industrial Product Realization at the School of Engineering), distinguishing men (M) and women (W).

B2.1.1. Doctoral degrees awarded and promotion of researchers within the area "industrial product realization during" at JU												
	2012		**2013**		**2014**		**2015**		**2016**		**2017**	
	M	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**
No.Dissertation defences		1			1				2		5	1
No. Docent promotions							1	1	3			
No. Professor installed	3				4	1			5			
TOTAL	3	1	0	0	5	1	1	1	10	0	5	1

1.5.2 Publications

Publications and other research output achieved during 2012–2017 to provide the publication profile of the SPARK.

Table B2.2.1: Total number of scientific publications produced by SPARK. Please specify citation index in each publication list.								
Publication types	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Period average**
Article in journal, peer reviewed	50	39	59	60	75	88	371	61,8
Article in journal, not peer reviewed	5	2	0	2	5	8	22	3,7
Article in journal, review (peer reviewed)	2	0	0	0	3	3	8	1,3
Book	1	1	1	0	1	1	5	0,8
Edited book	0	0	0	0	0	1	1	0,2
Chapter in book	7	6	4	5	7	9	38	6,3
Conference paper (peer reviewed)	56	51	81	97	88	81	454	75,7
Conference paper (not peer reviewed)	40	26	24	16	26	21	153	25,5
Thesis, doctoral	6	2	3	1	5	7	24	4
Thesis, licentiate[1]	1	5	1	10	3	9	29	4,8
Report	5	4	4	6	2	2	23	3,8
Article in journal, peer reviewed	50	39	59	60	75	88	371	61,8
Article in journal, not peer reviewed	5	2	0	2	5	8	22	3,7
Article in journal, review (peer reviewed)	2	0	0	0	3	3	8	1,3

[1] Licentiate is a Swedish and Finnish academic degree at graduate level corresponding to approx. half of a Swedish PhD.

Table B2.2.2. Aggregate publication information								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Period average**
Total number of publications in DiVA	176	134	187	202	214	234	1147	191,2
Number of publications in Web of Science	38	35	43	61	87	99	363	60,5
Number of publications in Web of Science, author fractionalized	19,4	19,0	22,9	30,6	51,0	53,6	196,5	32,8
Web of Science visibility (per cent of all publications included)	21,6	26,1	23,0	30,2	40,7	42,3		30,7
Web of Science visibility (per cent of all peer reviewed journal articles included)	61,5	61,5	61,0	66,7	75,6	84,6		68,5
Scopus visibility (per cent of all peer reviewed articles included)	75,4	87,5	91,7	80,6	86,7	82,8		84,0
Journals´ field normalized impact	0,90	0,92	1,00	1,12	1,03	1,14	1,04	1,02
Norwegian score fractionalized1	51,0	38,2	58,7	69,4	78,4	98,7	394,4	65,7
Publications in level 1 journal – Norwegian list	56	42	63	76	77	83	397	66,2
Publications in level 2 journal – Norwegian list	4	2	7	10	13	22	58	9,7
Publications in level 1 conference – Norwegian list	21	31	32	35	38	40	197	32,8
Publications in level 1 book publishers	2	3	1	3	8	7	24	4
Publications in level 2 book publishers	1	1	0	1	0	0	3	0,5

[1] It should be noted that the publication patterns of SPARK does not include many books and book chapters and, therefore, does not have much impact on the Norwegian list. The Norwegian scores above primarily reflect journal article and conference paper output.

Table B2.2.3. Citation indicators								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Period average**
Total number of citations	314	135	208	163	113	58	991	165,2
Number of citations, author fractionalized	127,3	62,3	108,2	60,7	51,3	27,3	437,1	72,9
Citations per publication	9,8	5,6	5,9	4,9	2,1	0,9		4,9
Share of publications not cited	21,1%	25,7 %	14,6 %	35,8 %	48,7 %	77,5 %		37%
Average field normalized citation rate (full counts)	1,15	0,67	1,11	1,17	0,80	N/A		1,0 (based on 5 years)
Share of publications among the 10 per cent most cited in the field (no. of articles within parantheses)	6,7% (2,0)	5,6% (1,2)	8,6% (3,0)	4,2% (1,4)	6,5% (3,5)	N/A (N/A)	N/A (11,1)	6,4% (2,2)
Share of publications among the 25 per cent most cited in the field (no. of articles within parantheses)	13,4% (4,0)	17,8 % (3,9)	18,0 % (6,3)	17,7 % (5,8)	22,3 % (11,8)	N/A (N/A)	N/A (31,9)	18,4% (6,4)

Table B2.2.4. Authorship								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Period average**
Average no. authors per publication	N/A	N/A	N/A	N/A	N/A	N/A		3,7
Average no. countries per publication	N/A	N/A	N/A	N/A	N/A	N/A		1,5

Table B2.2.5. Role of key scholars								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Period average**
Share of publications by three most active authors (full counts)	12,6%	15,1%	12,5%	20,1%	19,6%	15,8%		16 %

Table B2.2.6. Productivity								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Total/ annual average**
Total funding (MSEK) in relation to publications			308	355	373	343		345
Number of publications in relation to FTEs[1]	4,7	3,0	3,8	3,7	3,5	3,5		3,7
Number of citations in relation to FTEs[1]	8,4	3,0	4,3	3,0	1,8	0,9		3,6

[1] FTEs included are professors, associate professors and assistant professors

1.5.3 Innovation output

As well as engaging with society through contract research or education, researchers today sometimes patent their findings, commercializing these through multiple routes. Researchers also form companies based either on patents or other forms of intellectual property, e.g. materials, software or experience. These activities, often referred to as 'innovation activities', are listed in the tables below for the years 2007–2012.

B2.3.1. Patents[1]			
Patent number[2]	Short description	Person(s) involved	Date of registration
Patent 1: PCT Application No. PCT/EP2015/072424 Patent 2: Svenskt patent nr. 1551243-7	Sampling device and method for sampling liquid or viscous material Method of and device for analyzing a phase transformation of a material	Peter Svidro, Attila Dioszegi Attila Dioszegi, Peter Svidro	Date of filing – September 29, 2015 Date of filing – 2015-09-29

1 Data should match that held by DiVA.

2 Awarded patents only, not patent applications.

B2.3.2. Founded companies[1]				
Company name	Founder(s) from SPARK	Company type	Date of formation	Current status
N/A	N/A	N/A	N/A	N/A

[1] All eligible companies must be a direct result of the university's research activities and have, or have had, an annual income in access of 100k SEK.

1.6 Engagement and co-operation between research and society

This section presents activities related to co-operation between research and society and the impact of such activities. It includes the unit's general approach to enabling impact and engagement from its research, as well as specific examples of impact that have been generated by research within SPARK.

1.6.1 PhD degrees

The number of doctoral degrees (PhD, etc.) earned within the area "industrial product realization during" 2012–2017 when the awardee was employed externally. Number of men ('M') and number of women ('W') are recorded per year.

Table B3.1.1. Doctoral degrees employed internally awarded by other HEI

	2012		**2013**		**2014**		**2015**		**2016**		**2017**	
	M	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**
Number of doctoral degrees	2	3	1	1	0	2	1	0	3	0	1	

1.6.2 Major research related to co-operation with society

Activities regarding research related co-operation with society should be entered into one of three categories in the table below: Table 3.2.1 lists mobility between academia and non-academic society, such as exchanged lectures with external (non-academic) organizations, the engagement of adjunct professors, and externally financed PhD students in collaborative research projects with partners from industry or other organizations in society; Table 3.2.2 includes the number of publications co-authored with individuals outside of academic institutions, and popular publications aimed at the general public; Table 3.2.3 counts the number of external partners of SPARK divided between SME, large enterprises, and non-industrial partners; Table 3.2.4 summarizes the amount of *in kind* funding from industry and non-industrial organizations in society.

Table 3.2.1: Mobility between academia and society						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
No. of collaborative doctoral students1	3	3	4	6	7	7
No. of temporary research positions outside university2						1
No. of adjunct researchers			1	1	2	4

[1]Number of doctoral students in SPARK who are financed by non-academic external partners. Note that this does not mean doctoral students who are financed by any non-academic funding body, but students who are financed by external partners of SPARK (e.g. industry or public sector organizations).
[2]Permanent personnel who leave the university for non-academic society.

Table 3.2.2: Outreach activities						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
No. of scientific publications with representatives from society (industry/industry and institutes)	5 (13)	6 (10)	11 (20)	6 (14)	18 (26)	14 (40)
No. of popular science publications (popular science magazines, including those on the internet)	1	0	3	2	2	4

Table 3.2.3: Collaborative organizations (please provide description in A3.1.)						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
No. of partners from industry (SME)[1]					45	70
No. of partners from industry (non- SME)					10	11
No. of partners from society excl. industry and academia					N/A	N/A

[1]enterprise with no more than 250 employees and an annual turnover not exceeding 50M €.

Table 3.2.4: Indirect external funding (in MSEK)						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Indirect funding from non-industrial organizations in society (in kind[1])			N/A	N/A	N/A	N/A
Indirect external funding from industry (in kind)			32	47	52	52

[1]value of working hours done by external partners, value of equipment, databases, software, laboratories etc. that external partners provide in joint research projects.

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