Impact beyond academia

A GUIDE TO HELP PREPARING FOR IMPACT EVALUATIONS

Part of the project report on the monitoring of the Lund University SRAs

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Table of contents

INTRODUCTION 4
How to use this guide 4

BACKGROUND 5
What do we mean by collaboration, engagement and societal impact? 5
What do we mean by "the route to impact"? 5
Different evaluation models 6
Impact case studies 7

HOW TO PREPARE FOR COMING EVALUATIONS OF SOCIETAL IMPACT 7
Strategy and approach to impact 7
Writing impact case studies 7
Example of questions to be answered 7
Collect information routinely 8
Evidencing impact – REF 8
Evidencing impact – Sweden? 8

STRATEGIC RESEARCH AREAS AT LU – RECOMMENDATIONS 9

REFERENCES 10

APPENDICES 11
Appendix 1 – Glossary 11
Appendix 2 – Figure of a complex route 14
Appendix 3 – Examples of routes to impact 15
Appendix 4 – Examples of outputs, outcomes and impacts 16
Appendix 5 – Example of an impact case 18
Appendix 6 – SRA assessment and evaluation – questions 20

Monitoring the route to societal impact

Introduction

This document is meant as a guide to support researchers, research projects and -environments in preparing for future evaluations of collaboration and impact beyond academia. It should **not** be seen as a description of how preparations absolutely should be done.

At present, we do not know what the evaluations of collaboration and impact beyond academia will look like in the future (for example evaluations in connection with resource allocation). The Swedish government has appointed an investigation "Styr- och resursutredningen (STRUT)"[1] (lead by Pam Fredman) to look at, among other things, the resource allocation system and how the universities collaboration with the society may be economically rewarded. The deadline of this investigation is December 2018. The coming evaluations of research supported by ALF, Linné, Vinn-Ex and Berzelii are said to include collaboration and impact beyond academia.

Of course not all researcher has to do applied research or be involved in research that from the start have the goal to have a societal impact. But today researchers should at least consider if what they do may have an impact beyond academia and recognize that societal impact is so much more than commercial impact. Maybe your research is an important link in a larger research program aiming at impact?

HOW TO USE THIS GUIDE

This document is describing a likely development of the evaluation of collaboration and research impact beyond academia including the route to impact*. We believe that "samverkan" cannot be evaluated without looking at the whole route to impact – what we here call the collaborations, outputs, and outcomes (for definitions see attachment 1) – including the actual impact (genomslaget av samverkan).
Below you can read about:

- why the evaluation of research collaboration and impact beyond academia has become an issue today
- different ways of evaluating collaboration and impact
- what **we** mean by the concepts "collaboration", "societal impact" and "pathway to impact"
- why we recommend that LU researchers get prepared to write narratives about research and the route to impact
- how to prepare for coming evaluations of societal impact.

We end this guide with special recommendations for the Lund University Strategic Research Areas.

*) For definitions of impact and the route to impact, see below.

Background

In the research proposition 2016/17:50[2] and the budget proposition 2016/17:1[3] it is stated that one of the interim targets to the overall goal for research policy is that collaboration and societal impact will increase (in Swedish: *Samverkan och samhällspåverkan ska öka)* and that the government intends to let collaboration with the surrounding community to a larger extent affect the distribution of funds to higher education institutions (HEIs).

One reason to evaluate collaboration and societal impact is that the research sector/HEIs need to maintain and gain trust that money is well spent by the politicians, and hence the researchers/universities will be granted continued large fundings[4]. Other reasons, according to Vetenskapsrådet (VR)[4], are that it is important to demonstrate the value and impact that research and innovation have in society in order to facilitate better informed research policy decisions and to inform, gain and maintain trust from citizens.

In the UK there is already a system in place for assessing the quality of research in higher education institutions – the Research Excellence Framework (REF)[5]. The purpose of REF is to inform the selective allocation of funding for research but also to provide accountability for public investment in research and produce evidence of the benefits of this investment. To do this, REF – besides research excellence – also evaluate collaboration and the societal impact of research using narratives. The way REF evaluate societal impact has set an example to several other countries (see below *Different evaluation models*).

WHAT DO WE MEAN BY COLLABORATION, ENGAGEMENT AND SOCIETAL IMPACT?

Collaboration with the surrounding community includes collaboration with organizations, partners, end users, beyond academia ("samverkan med parter utanför akademin"). Collaboration in this context does not include research collaboration. The collaboration can be a co-operation or partnerships that is ongoing from the start of the project, or a collaboration that starts later in the process toward impact beyond the academy. In the UK the concept *engagement,* or sometimes *public engagement*, is often used when talking about "samverkan med parter utanför akademin".

There is not one single definition of "*research impact outside the academy*", agreed on by all parties. Here we will use the concept "*societal impact*" or "*impact in the society*" to cover all kinds of research impact beyond academia (samhällspåverkan eller genomslag i samhället).* Societal impact derived from academic activities can include, but is not restricted to, effects on, changes or benefits to the:

- economy,
- society,
- culture,
- public policy or services,
- health,
- the environment or quality of life

Societal impact also includes the reduction or prevention of harm, risk, cost or other negative effects[6].

The changes may occur among individuals, groups, organisations, in public opinion, or in society at large. The changes may be local, national or international. Changes in the society may occur after a relatively short time (years) or, more often, after a long time (decades).

WHAT DO WE MEAN BY "THE ROUTE TO IMPACT"?

Several research funding bodies like EU (Horizon 2020) and the different research councils in the UK as well as i.e. Formas in Sweden, ask of their applicants to describe how their research will make a difference outside academia. This description is often called "the pathway to impact" by research funding bodies. When describing this route to impact you start off by answering the questions:

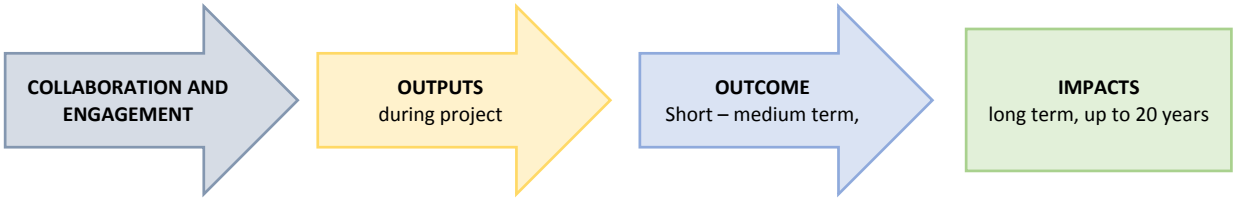
- Who might benefit from the research?
- How might they benefit from the research?

…and then you continue to describe what you can do to help make this happen, what you can do to ensure that your research makes a difference.

The process leading from research to societal impact is usually not a linear or causal process, but rather several changing, sometimes circular, processes, like a complex network[9] (see illustration in attachment 2). Because of the difficulties of illustrating all possible twists and turns of the societal impact rout we have here chosen to illustrate the latter part of this route

*) These examples are based on definitions of impact from: VR[4], Hefce[6], Hefce (blog)[7] and the Research Council of Norway[8]

– involving engagement beyond academia – in a simplified figure:



In attachment 3 we give examples of what this latter part of the impact route may consist of.

We also provide further examples of what may be seen as collaboration, engagement, output (outreach), outcome, and impact in attachment 4, and give definitions in a glossary in attachment 1.

When trying to understand what is meant by "impact" in the context of evaluating the societal impact of research, it can be helpful to note what impact **is not**. VR[4] recently explained the delimitations of impact like this:

- "Impact" is not the same as *co-operation and partnerships* with partners outside academia – although impact normally presupposes co-operation.
- "Impact" is not the same as *communication and outreach* – although impact normally presupposes outreach activities.
- "Impact" is not the same as *relevance*.

DIFFERENT EVALUATION MODELS

How then, can societal impact and the process leading from research results to societal impact be assessed and evaluated?

Traditionally uniform, linear models of knowledge production and impact assessment, focusing on easily quantifiable output and direct economic benefit, has been used. The linear model imply that universities provide for new, fundamental knowledge that can or should be directly applied and then brought to the market[9]. However, societal impact is today seen as so much more than easily measurable commercial impact, and is considered in a much broader context. Furthermore, as mentioned above, the processes leading to impact are seldom linear. The linear model is therefore now considered outdated[9].

Today the international discussion focus on how to evaluate the broad range of societal impacts and the route leading from research to impact. In its position paper from 2017[9] The League of European Research Universities (LERU) distinguish three main new evaluation models: (1) ones that aim at improving quantitative measurements; (2) ones that develop alternative and often qualitative measurements (case studies or narratives), as has been done in the UK REF 2014 (and also in the Netherlands[10], Norway[11] and Australia[12]); and (3) ones that focus on interaction and communication patterns between research and societal context.

The latter model (3), according to LERU, recognise that research is part of a broader innovation process, a network involving many parties that together form a flexible environment and share a common societal goal. Central to this model is the concept of *productive interactions**: the mechanisms through which research and other activities lead to socially robust knowledge and relevant applications. In the position paper LERU concludes that also in this model qualitative methods (such as the use of case studies and narratives) may be more informative than quantitative methods.

In Sweden the model *Fokus* was put forward by VR in 2015[13]. This model is similar to the British REF-model and includes evaluating impact using case studies. Another model recently suggested by Vinnova[14] only seems to evaluate interactions and deliverables beyond academia (collaboration, engagement, activities, outputs) and not a broad range of applications or impact. As mentioned above there is an ongoing investigations (STRUT) that is looking into how collaboration with the society may be assessed and awarded.

Taking into account i.a. the discussion in the LERU position paper[9], and the viewpoints of VR[4, 13] we believe that it is a good idea for LU researchers to consider the possibility that impact case studies will be asked for in evaluations of societal impact. Thus, in the following we will describe more about impact case studies and how to prepare for them.

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*) Productive interactions are defined as the mechanisms through which research (and other) activities lead to societal relevant applications. The interaction is productive when it leads to efforts by stakeholders to apply research results to societal goals, i.e. when it induces behavioural change. (LERU[9])

IMPACT CASE STUDIES

Impact case studies are narratives that describe how selected research come, or came, to have an impact beyond academia. According to the Fokus model[13] impact case studies should summarize a specific and delimited research effort (a research project, publication or other form). Like in REF 2014, the impact case study should also include:

- a list of research publications,
- a list of sources to corroborate the impact, and – most importantly –
- a detailed narrative of the impact (including the route to impact).

The important advantage of using detailed narratives (instead of indicators only) when describing impact, and the route to impact, is that

- case studies allow the reporting unit to select and describe different types of impact beyond academia.[13]
- the impact context is described: e.g. societal challenge, opportunity, market size, beneficiary and benefit.[15]
- the objectives are described. In the REF case study evaluation a significant impact on a single region or institution may score highly if the case defines the project aims as local and specific. A case which either fails to define the aims or sets broader objectives may receive a lower score because full reach has not been achieved[15].
- scope is provided for presenting how the research results were communicated to society at large, and what collaboration with society at large occurred in this connection. [13]
- various types of data can be used to present impact. [13]

After testing the use of case studies in 2015, Formas[16] in their analysis 2017 concluded:

"A general conclusion is that case studies can highlight the impact of research within Formas' areas of responsibility. It is a method that can capture societal benefits in a wide sense, including academic, cultural, economic, social and environmental effects, even when the route from research results to impact is complex and characterized by long lead times." (translated from Swedish).

How to prepare for coming evaluations of societal impact

STRATEGY AND APPROACH TO IMPACT

In an evaluation, the research environment will most likely be asked to describe its strategy and approach to impact. This statement may – as suggested in the VR Fokus-model[13] include a brief description of the reporting unit's (the SRA, research environment, department etc.) strategies:

- for communicating results beyond academia,
- for promoting the use of research results beyond academia,
- to exert an impact.

The statement may also include other concrete information about:

- existing support functions for researchers in respect of results communication and dialogues beyond academia,
- forums and contact points for researchers and societal and business interests etc.

WRITING IMPACT CASE STUDIES

When you write a detailed impact-narrative you should be able to write a coherent story explaining the process or means through which research led to, underpinned or made a contribution to impact (for example, how the result was communicated, how it came to influence the behaviour, agenda or way of thinking of users or beneficiaries, or how it came to be exploited, taken up or applied).

Example of questions to be answered

- What societal challenge, need or problem did you address?
- Who or what community or organisation has benefitted, been affected or impacted on? Which beneficiaries (pilot users, end users, stakeholders)

did you aim at, and at which level (local, national, international)?

- Was your research part of a wider body of research that contributed to the impact (for example, where there has been research collaboration with other institutions)? If so, the case study should specify the particular contribution of the submitted unit's research and acknowledge other key research contributions.[7]
- What outputs did you produce?
- Who outside the academia did you collaborate with?
- How did you go about to collaborate or disseminate, to influence or transfer? What activities did you carry out?
- What outcomes did this have and what effects on your collaborating partners and immediate stakeholders, that is, how did the stakeholders use your results and how were they affected.
- Details of the nature of the impact – how end users have benefitted, been affected or impacted, and in the long term, what impact did this have in the society (economic, social, environmental, cultural…)?

In attachment 5 we provide an example of an impact case study from REF 2014.

Collect information routinely

So, when writing the impact case study you need to have a lot of information at hand. Information on collaborations and engagement, outputs and activities can be gathered routinely. When it comes to showing outcomes (how your research has been used, taken up by stakeholders) or impact (the changes in economic, cultural, environmental etc. conditions aimed for) this may not always be straight forward. To gather information on outcomes may be relatively easy in some cases (start up companies, new (or improved) methods, processes or services being used etc.), and much more difficult in others (changes in policy, behaviour, public engagement and discourse).

Evidencing impact – REF

Within the REF evaluation in the UK it is mandatory to evidence and attribute your impact when writing an impact case study. The universities in the UK[17] therefore recommend that qualitative and quantitative evidence should be gathered routinely and that "alongside *gathering* evidence, research units should focus on *generating* evidence to support impact cases."

According to the REF evaluation[18] the most useful impact evidence included was:

- Context: brief description of the societal challenge or economic opportunity for the research e.g. market size.
- Beneficiary and benefit: evidence of a realised outcome for specific beneficiaries – this is particularly powerful when quantified or backed by data or testimony from research users.
- Pathway: how the funding, partnership and collaboration led to the impact, i.e. clarity of attribution.

Evidencing impact – Sweden?

What kind of evidence and attribution a coming evaluation will require, we do not know yet. Maybe you will be asked to show that your research is in the process of achieving impact in society or maybe you are asked to also show evidence of societal impact on end users, and how this impact is attributed to your research. It is clear that evidencing impact, and attributing the changes that has occurred to your own research, is a challenge, especially since it may take many years before the final impact is seen.

Strategic Research Areas at LU – recommendations

Two of the criteria used by the government when appointing the Strategic Research Areas (SRAs) in 2010 were that areas should conduct[19]:

- research that can contribute towards fulfilling major needs and solving important problems in society and
- research in areas that have a connection with the Swedish business sector.

Thus, besides evaluating research excellence and the SRA's international research impact within academia, SRAs are evaluated for how they collaborate and engage outside academia (see appendix 6). In the next evaluation they may also be evaluated for their impact beyond academia nationally and internationally.

Therefore we recommend the LU SRAs to set up a process or routine to keep an "impact diary". The reasons behind keeping an impact diary are twofold: you will need this information to be able to answer the type of questions that are included in your earlier assessments and evaluation (see appendix 6). You will also need the information to be able to write a narrative (an impact case study) including the long term societal impact. Another advantage with keeping an impact diary is that it gives a good overview of the project; you know what you have produced and you know what you need to follow up. The overview is also a great help should key people leave the project/program.

Recommendations for the impact diary:

- During the course of the project/program you need to keep track of (or, if asked for, generate evidence of) what your SRA do in terms of collaboration and other activities, what you produce (outputs), what effects (in terms of outcomes) it has on your collaborating partners and immediate stakeholders, and finally, if and how your research lead to any societal impact (see examples of activities, outputs and outcomes in appendix 4).
- To catch the long term impact you also need to keep track of what happens with your outputs/outcomes that are no longer within your control – do they advance to impact outside of academia? If you, for example, have patents or you have written guidelines, then it is your responsibility not only to do what you can to ensure that your results are being used, but also to follow up on how they are used, and what the effects are. For example:
  - Researchers from Lund University showed that the pesticides neonicotinoids damage beneficial insects that pollinate plants, especially wild bees and bumblebees.

    Outcome/short term impact: the EU Commission are now about to totally ban the pesticides.

    Long term impact: will someone follow up on the effects of a ban on wild bees and on crops?
  - Researchers from University of Bath, UK, came up with a straw bale construction as a novel sustainable low carbon building material, and developed a prototype.

    Impact: In their impact case study that was included in REF 2014, the researchers write: "Through the very close collaboration with industry partners, research outputs have often had an immediate impact. Over 300 building projects have benefited directly or indirectly from the research (equating to approximately 9 000 tonnes of carbon saved)." Read more about this the impact case study in appendices 3 and 5.

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Appendices

APPENDIX 1 – GLOSSARY

Concept	In Swedish	Explanation/Definition
Beneficiaries	Förmånstagare, mottagare	Those who in the end benefit from or use improved products, processes, etc., derived from academic activities
Collaboration (for knowledge exchange)	Samverkan (kunskapsutbyte med övriga samhället)	A dialogue and knowledge exchange between researchers and business, public and civil society, that helps research to influence policy and practice.([1])
Engagement	Samverkan	See Public engagement below
End users	Slutanvändare	The person(s) or organization(s) that will use or benefit from the product or service arising from the research. ([2])
Immaterial property rights (IPR)	Immateriella rättigheter	Intellectual property consists of products, work or processes that you have created and which give you a competitive advantage. There are 3 subcategories: • Industrial property: inventions (patents), trademarks, industrial designs, new varieties of plants and geographic indications of origin • Artistic work protected by copyright: original literary and artistic works, music, television broadcasting, software, databases, architectural designs, advertising creations and multimedia • Commercial strategies: trade secrets, know-how, confidentiality agreements, or rapid production. Intellectual property can be protected by means of the intellectual property rights (IPR) laid down by the World Intellectual Property Organisation (WIPO). The form of protection depends on the type of IP: • patents – allow you to stop third parties from making, using or selling your invention for a certain period depending on the type of invention • trademarks – protect the name of your product by preventing other business from selling a product under the same name • copyright – informs others that you (as the author) intend to control the production, distribution, display or performance of your work. Copyright is granted automatically, with no need for formal registration. You can start using the copyright symbol immediately. ([3]) Support from LU Innovation: https://www.innovation.lu.se/kontakt/vi-som-arbetar-har_1756718950#Patent
Impact, Academic within academia	Genomslag inom forsknings-samhället	*Academic impact* is defined by the research council in the UK ([4]) as "the demonstrable contribution that excellent research makes to academic advances, across and within disciplines, including significant advances in understanding, methods, theory and application".
Impact, Societal outside/beyond academia	Genomslag i samhället	The Swedish Research Council ([5]) definition of the concept of societal impact of research: "effects of research beyond academia which in some contexts and over time could amount to concrete influence on society by the application of research results to achieve social, economic, environmental or cultural effects." *Impact can be seen as the longer term effect of an outcome. See below "Outcome"*

Impact activities	Aktiviteter för att ge forskning genomslag i samhället	Activities such as public engagement that translate research and makes it accessible for users/beneficiaries to adopt. ([6]) This also includes policy activities such as lobbying, participation in debates, and other activities directed toward a special target group.
Impact case study	Fallstudie – en berättelse om genomslag	A story describing the journey from research to impact. Can also be called impact story or impact narrative.
Input	Insats/ investering	Input is the financial, human, material and knowledge resources used to deliver a research intervention.([7])
Innovation	Innovation	An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. This broad definition of an innovation encompasses a wide range of possible innovations. An innovation can be more narrowly categorized as the implementation of one or more types of innovations, for instance product and process innovations. ([8]) The minimum requirement for an innovation is that the product, process, marketing method or organizational method must be new (or significantly improved). This includes products, processes and methods that organizations are the first to develop and those that have been adopted from other firms or organizations. A common feature of an innovation is that it must have been implemented. A new or improved product is implemented when it is introduced on a market, spread, and come to use in other settings. New processes, marketing methods or organizational methods are implemented when they are brought into actual use.
Outcome	Resultat, effekt	The likely or achieved short-term and medium-term effects on stakeholders or manifestations of research and research outputs. ([2, 7])
Output (including impact activities, see above)	Produktion, prestation (utåtriktad aktivitet)	Products (including traditional and non-traditional research outputs), services or results (e.g. report) produced as a result of undertaking research. They often relate to the expected deliverables of the research. Outputs generally occur within the short to medium term. ([2, 9])
Pathway (or route) to impact	Vägen från forskning till genomslag i samhället	An Impact Pathway scheme is used as the base for monitoring and evaluation and describes in detail the output (i.e. the direct and tangible results) to outcome (e.g. changes in awareness, skills or understanding resulting from use of research results) and impact relations, with verifiable and preferably measurable indicators for output and outcome. ([10])
Public engagement	Samverkan med allmänheten	Public engagement describes the myriad of ways in which the activity and benefits of higher education and research can be shared with the public. Engagement is by definition a two-way process, involving interaction and listening, with the goal of generating mutual benefit. National Co-ordinating Centre for Public Engagement (NCCPE).([11])
Stakeholder	Intressenter, användare, mottagare	Stakeholders are people or organisations who have an interest in your research project, or affect or are affected by its outcomes. ([12])
Uptake	Anamma, lansera, tillämpa	The application of research outputs by users, resulting in outcomes. This may involve complex processes over time, whereby research outputs (e.g. knowledge, technologies, intellectual property) are adapted, built upon and operationally applied. Evidence of engagement, uptake and adoption, may include licenses, incorporation into policies or standards, use of tools, etc. ([2])

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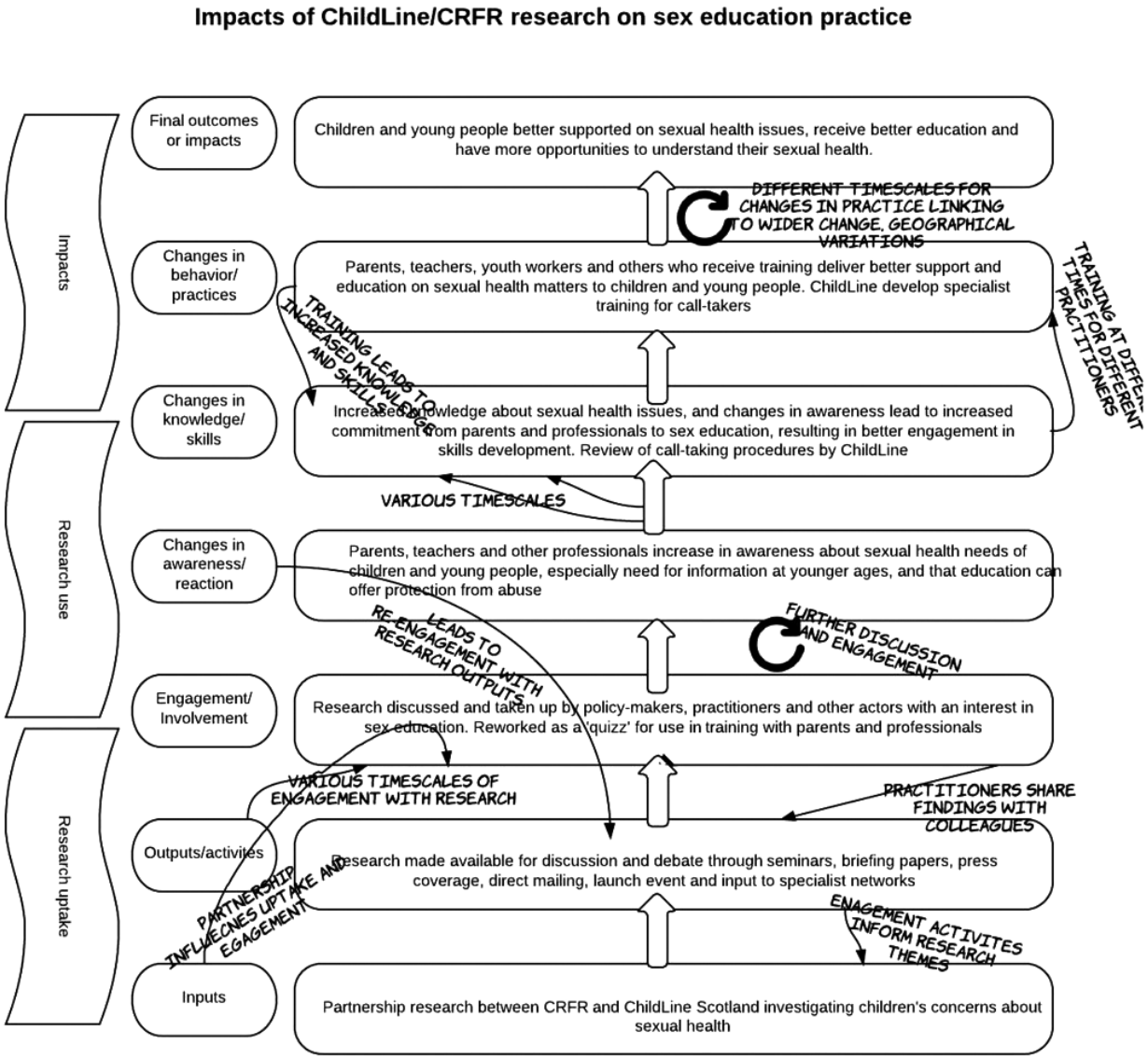
APPENDIX 2 – FIGURE OF A COMPLEX ROUTE

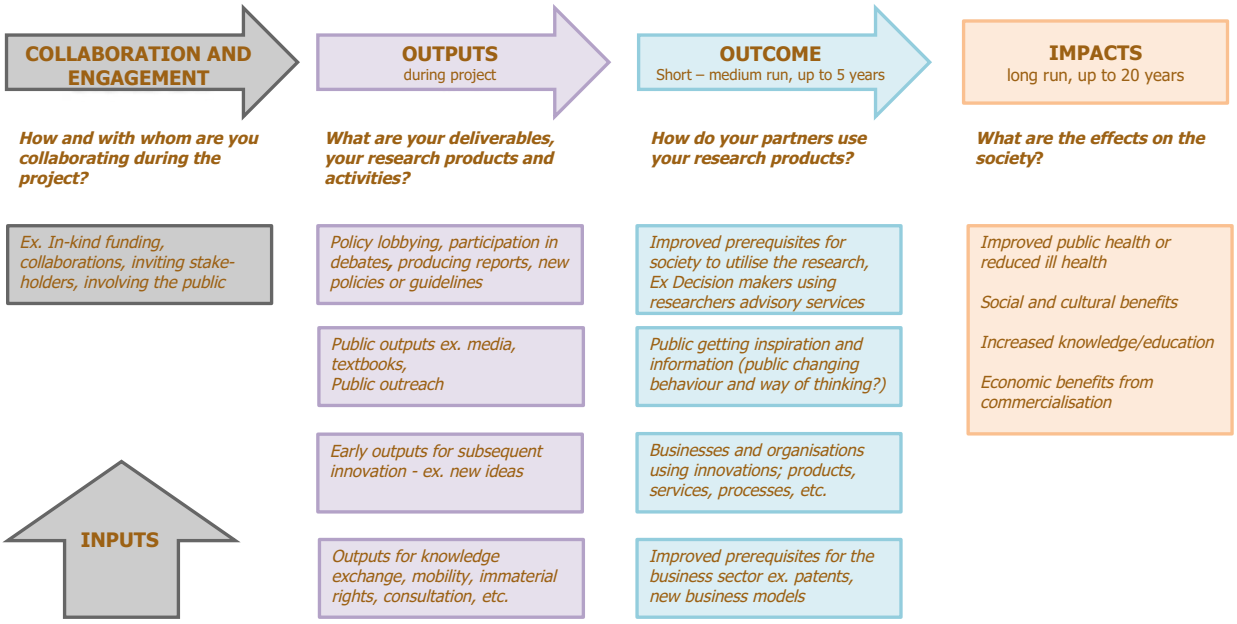
This figure illustrates the more complex picture behind the impact story, and shows how research might be used by different actors at different times and that the processes set out on the pathway are often cyclical.

From: Sarah Morton, Progressing research impact assessment: A 'contributions' approach, *Research Evaluation*, Volume 24, Issue 4, 1 October 2015, Pages 405–419.

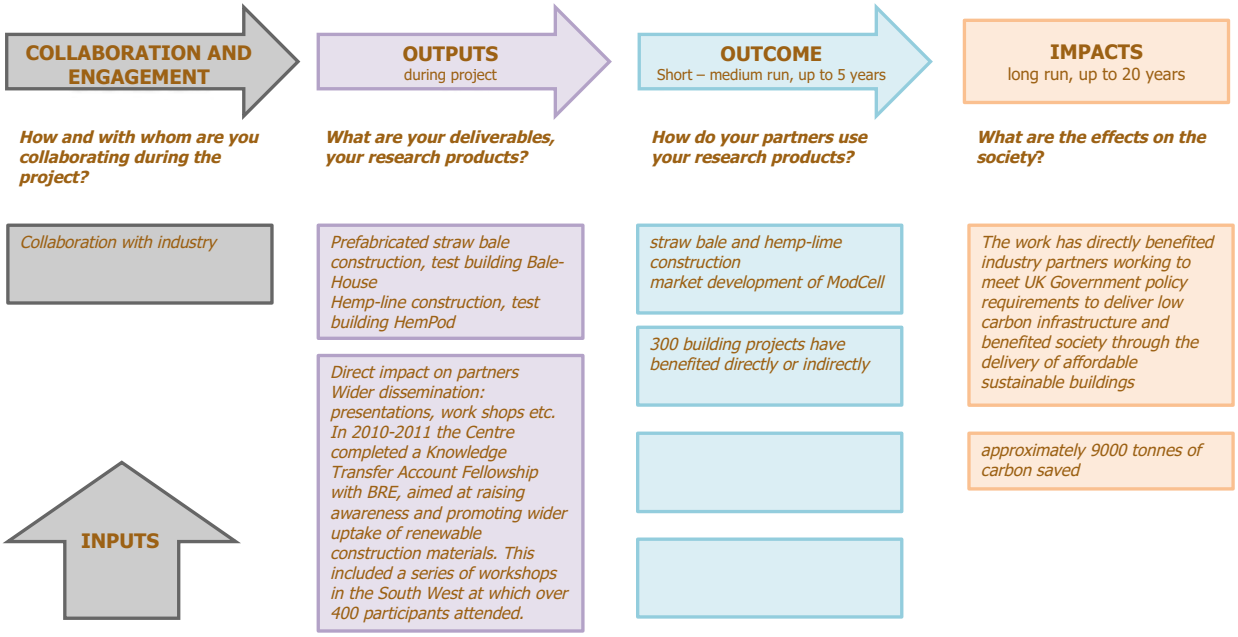


APPENDIX 3 – EXAMPLES OF ROUTES TO IMPACT

Illustrating some parts of the impact route



Example: Bio-based Materials in Construction: development and impact of prototype test buildings BaleHaus and HemPod, Univ. of Bath



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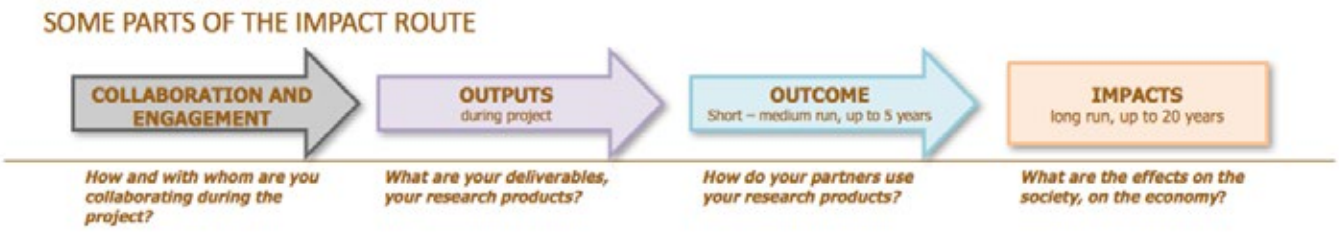
The study was downloaded from (http://impact.ref.ac.uk/CaseStudies/). For the full case study see also appendix 5.

APPENDIX 4 – EXAMPLES OF OUTPUTS, OUTCOMES AND IMPACTS

Examples of collaborations, engagement, outputs and outreach, outcomes, results and impact within the impact route



Collaborations and Engagement (from the start of the project)

- Collaboration, or consortia, with businesses and other non-academic organisations or actors, national or international. This also includes education or culture institutes, archives, etc.
- Funding from the business sector and others including in-kind
- Joint publications with the business sector and other actors
- Involving the public, citizen science
- Discussion on concrete problems in the realm of practice, participatory research

Outputs and outreach: deliverables in WP

- New ideas, products and processes leading to **potential**…
  - patents
  - prototypes
  - intellectual property rights
  - new policies and guidelines (in e.g. social services, health care, conservation etc.)
  - new services
  - new infrastructure and other outputs for societal target groups: instruments, datasets, software tools or designs
- Dialogue and results dissemination, outreach and knowledge exchange activities directed towards the public or different user-groups:
  - seminars, conferences,
  - external education
  - participation in debates, consultation
  - lectures for general audiences
  - exhibitions, workshops, press releases, publications, flyers, trainings, social media, web-sites, communication campaigns in radio, TV and on social media,
  - popular science publications, grey literature, books or articles, reports, contributions to media, products or information material.
- Informal collaborations, to build and convene networks

Outcome: use of results by stakeholders

- **The use of** research products by societal groups. New products and processes are used by businesses and other actors.
  - products, services or processes used by organisations or businesses (commercialisation, developing praxis, business models)
  - policies or guidelines lead to changed procedures and working methods in businesses and organisations (e.g. social services, health care, conservation etc.), e.g.: decision makers using researcher's advisory services
  - patents/licences
  - use of research facilities by societal parties
  - projects in cooperation with societal parties
  - contract research
- **Results of** dissemination and knowledge exchange activities directed towards the public or different user-groups.
  - public getting inspiration and information adapted to target group

Societal impact (effects on society, benefits to society)

- **Societal impact** derived from academic activities includes social, environmental, cultural and economic benefits. Societal impact also includes the reduction or prevention of harm, risk, cost or other negative effects.
- **Impact includes** the effect on, change or benefit to e.g.:
  - an audience, beneficiary, community, constituency, organisation or individuals, public bodies, private sector entities…
  - in any geographic location whether locally, regionally, nationally or internationally.
- **Impact includes** an effect on, change or benefit to e.g.:
  - the activity, attitude, awareness, behaviour, capacity, opportunity, performance, policy (basis for decision-making), practice, process, understanding, public engagement, teaching, culture...
- **Examples** of societal benefits:
  - economic benefits from commercialization
  - improved public health or reduced ill health
  - policy changes or changes in legislation
  - increased knowledge/education

Indicative range of impacts

Civil society	Informing and influencing the form and content of associations between people or groups to illuminate and challenge cultural values and social assumptions.
Cultural life	Creating and interpreting cultural capital in all of its forms to enrich and expand the lives, imaginations and sensibilities of individuals and groups.
Economic prosperity	Applying and transferring the insights and knowledge gained from research to create wealth in the manufacturing, service, creative and cultural sectors.
Education	Informing and influencing the form or the content of the education of any age group in any part of the world where they extend significantly beyond the submitting HEI.
Policy making	Informing and influencing policy debate and practice through interventions relating to any aspect of human or animal well-being or the environment.
Public discourse	Extending the range and improving the quality of evidence, argument and expression to enhance public understanding of the major issues and challenges faced by individuals and society.
Public services	Contributing to the development and delivery of public services or legislation to support the welfare, education, understanding or empowerment of diverse individuals and groups in society, including the disadvantaged or marginalised.

Hill, Steven (Head of Research Policy University of Oxford, 20 May 2015). Understanding research impact: analysis of the REF impact case studies. Available as: shill-oxford-20may2015.pdf

APPENDIX 5 – EXAMPLE OF AN IMPACT CASE

An example of an impact case study from REF2014

An impact case study used within the British REF consists of:

1. Summary of the impact
2. Underpinning research
3. References to the research
4. Details of the impact (shown below)
5. Sources to corroborate the impact (shown below)

Text **in bold print** (and that is not in cursive) is highlighted for this occasion!

Bio-based Materials in Construction: development and impact of prototype test buildings BaleHaus and HemPod, Univ. of Bath

4. Details of the impact (indicative maximum 750 words)

Overall Contribution: Our straw bale **research has directly contributed to the market development of ModCell,** the award of UK and EU patents and certification of the system [1 below]. The research has shown that the excellent thermal insulation levels provided by straw bale and hemp-lime construction can **reduce operational carbon emissions** by 70–90% compared to 1990 best practice housing requirements. Using crop materials in place of conventional cavity masonry wall construction can also save around 30 tonnes of carbon per house (equivalent to 10–30+ years operational impact depending on the heating system). These figures are based on the Life Cycle Assessment of the BaleHaus project. The research has **supported UK industry in the development and adoption** of novel sustainable low carbon building materials and products. Research contributions to new building projects have included BRE Information Notes design guidance, expert advice on material specifications, bespoke performance tests on materials and evidential data from research output to support the building control approval process. **Through the very close collaboration with industry partners, research outputs have often had an immediate impact**. Over 300 building projects have benefited directly or indirectly from the research (equating to approximately 9000 tonnes of carbon saved) [2, 3 below], and these have won prestigious awards [4 below].

Benefits and Beneficiaries: **The benefits of the research stem both from** improved performance and lower carbon impact of new technologies compared to existing solutions. The embodied and operational carbon reductions of both straw bale and hemp-lime are significant. **Direct beneficiaries of the research include** industry partners (both ModCell Ltd and Lime Technology Ltd) through increased sales and clients who have procured lower carbon buildings. Clients include: The Science Museum; Marks & Spencer; Tesco; Hayesfield Girls School (Bath), May Park Primary School (Bristol); Hengistbury Head Visitor Centre; University of the West of England; 20 BaleHaus homes for LILAC Co-Housing (Leeds); Inspire Bradford Business Park; Waterfoot Primary School; Think Low Carbon Sustainable Centre; Barnsley College; Holm Lacey College Straw Bale Café; Weydon Secondary School; and HAB (Kevin McCloud's development company).

Dissemination: **The research activities have been undertaken in close collaboration with industry** (ModCell Ltd, and Lime Technology Ltd). This has ensured direct and almost immediate uptake of research findings. **Wider dissemination routes** have been through conventional publications (journal), presentations (conferences, seminars) as well as CPD activities to promote benefits of renewable materials (workshops; exhibitions). In 2009-10 BaleHaus received substantial media coverage, including on local TV (BBC, ITV), international, national and local radio (BBC), national and international print media and internet exposure [5 below]. McCloud officially opened BaleHaus in November 2009, attracting significant media interest (see quote above). The Lilac Housing scheme, using BaleHaus design, has more recently featured on BBC national TV (The Culture Show; 10.10.12). The CICM's reputation as a leading centre for innovative construction materials research has increased, attracting new staff, students, researchers and visiting academics. In 2010–2011 the Centre completed a Knowledge Transfer Account Fellowship with BRE, aimed at raising awareness and promoting wider uptake of renewable construction materials. This included a series of workshops in the South West at which over 400 participants attended.

Note that they use citations to corroborate

Commercial impact: "The research carried out at the University of Bath has been instrumental in the growth of ModCell" – Director (ModCell Ltd). Since 2008 the commercial value of ModCell projects has grown from £11k in 2008 to over £1.8 million in

2012; over the same time ModCell staff grew from 1 FTE in 2008 to 10 FTE in 2012. The hemp-lime construction market in the UK has grown from a few niche projects to over 250 completed projects, including Kevin McCloud's Triangle Project in Swindon. Lime Technology's turnover has grown from £1 million in 2005 to £6 million in 2012; over the same period Lime Technology's staffing expanded from 12 FTE in 2005 to 57 FTE in 2012. ***"We could not have developed as successfully as we have without our collaboration with the University of Bath over the past 10 years"*** – Technical Director (Lime Technology). These commercial developments have been directly supported by the research outputs from Bath. Wider benefits of this impact derive from employee spending into the local economy. Both main industrial partners have also been developing export markets for their products. Lime Technology has exported materials and technical expertise delivering projects in USA and Australia; and ModCell, supported by the EuroCell project, in Netherlands and Spain.

Societal impact: The research has directly **supported the delivery of new housing projects** (Lilac community housing in Leeds) **and public buildings, including four new school buildings** (see www.modcell.co.uk). CICM has played a leading role in the Nucleus building, a new science block for Hayesfield Girls School in Bath, the first commercial loadbearing application of the ModCell straw bale panels. Walker supported the school's development committee during the procurement process, advising on technical details and using research data directly to provide reassurance and clarification on performance where necessary.

"We won't get to an ultra-low-carbon built environment simply by improving on the performance of the same old construction techniques. The BaleHaus certainly hits that button, and could play an important part in enabling house builders to meet their carbon targets." – Director (Forum for the Future).

5. Sources to corroborate the impact

1. ModCell Patents: UK Patent GB 2457891B**;** European Patent application EP1162321A2.

2. Modcell® building projects: UWE Faculty of Environment and Technology (2010); Merrow Park & Ride (2010); Weydon Secondary School (2011); Castle Park Primary School (2011), Straw Bale Café (2011); Inspire Bradford Business Park (2011); 20 homes, LILAC affordable co-housing (2011-12). See: www.modcell.com/projects. **Hemcrete® building projects**: Jennings Business Park (2008); The Wine Society (2008); Orwell Housing (2008); The Renewable House (2009); Welsh Institute of Sustainable Education at CAT (2010); M&S (2011); 29 homes, Diss (2009-11); 42 homes, Swindon (2010-11); 16 homes, Blackditch, Oxfordshire (2010-11); 15 homes, Dormary Court, York (2011); 60 homes, Letchworth (2010-11); 16 homes, Watford (2010-11). See: www.limetechnology.co.uk and www.homesandcommunities.co.uk/ourwork/renewable-construction

3. References to CICM impact in built work: Thomas, C. The Genesis Project: demonstrating sustainable construction, *The Structural Engineer* 6 May 2008, pp. 39–46.

4. Awards for building incorporating CICM research:

- BaleHaus: SWBE Award for Innovation (2010); British Construction Industry Awards, Shortlisted (2010).
- WISE Building (Centre for Alternative Technology): Building of Year, *Daily Telegraph* (2011); Favourite building of 2010, *Architects Journal*.
- Knowle West Media Centre: The South West C+ Carbon Positive Award for Carbon Positive Communities, Bristol Civic Society Environmental Award (2008); Green Apple Award Silver Award winner South Region (2008); RICS Regional winner for the South West Community Benefit category (2008); Shortlisted for the David Alsop Sustainability Award – IStructE Awards 2009.
- ModCell panels: The Offsite Construction Awards: for Best Product of the Year & Best New Product (2008)**.**
- Long Stanton Park & Ride: Green Apple Award (2012).
- Clayfields Sustainable Housing: RIBA Award (2009).
- The Triangle: RIBA Regional Sustainability Award (2012).

5. TV programmes featuring CICM work: Local BBC West TV news (BaleHaus launch), Nov. 2009; Discovery TV – How do they do it, Nov. 2010; Kevin's Grand Design (Channel 4), Dec. 2011; Al Jazeera – Earthrise, Aug. 2012; The Culture Show, BBC TV (Lilac housing scheme), Oct. 2012; BBC 2 – Working Lunch Oct. 2012.

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The study was downloaded from (http://impact.ref.ac.uk/CaseStudies/)

APPENDIX 6 – SRA ASSESSMENT AND EVALUATION – QUESTIONS

SRA assessment and evaluation – questions asked

Recommended: impact monitoring by each SRA (Type-II questions) *)

Examples of impact types	Information needed to describe different impact routes
Within academia	
Research impact[1]	**Describe scientific quality in international comparison** (including collaboration and mobility within academia)
	Describe the most important results, including development of methods. (B2)
	List of Conferences, visiting researchers and research visits. i. Major conferences and seminars arranged [year of follow-up]. ii Visiting researchers (not included in C2a*). List of personnel) and duration (more than 2 weeks). (Name, position, home university, university grade, gender, percentage (of full time) participation in the research environment). iii Research visits by personnel in the strategic research environment (included in C2 a. List of personnel) and duration (more than 2 weeks). (Name, position, host university and department, gender, university grade, duration in weeks). (B4)
Beyond academia[2]	**Routes to societal impact**[3, 4]
All of the impact-categories below	**Lists of collaborations**[5] **and mobility**
	List of most important collaborations or strategic alliances with companies, institutes or other organizations in relation to the strategic research environment. State type of collaboration, name of organization and the objective. Define the extent of the collaboration according to a scale (1–3). (C1)
	Mobility: i. List of persons from industry who have been employed or engaged within the framework of the strategic research environment during the last 12 months (name, gender, home organization, business registration number, employed in strategic research environment (percent of full time), engaged). ii. List of persons from organizations outside of academia other than industry, who have been employed or engaged within the framework of the strategic research environment during the last 12 months (name, gender, home organization, business registration number, employed in strategic research environment (percent of full time), engaged). iii. List of researchers from the strategic research environment who have been employed or engaged by industry or industrial research institutes during the last 12 months (name, gender, home organization, business registration number, employed in strategic research environment (percent of full time), engaged). (C3)
	Education
	List of clients on whose behalf the strategic research environment has carried out contract education (name of external client, subject area of contract education, number of participants of the contract education and extent of contract education (days)). (E4)

Commercial and economic impact	**Strategic value[6] for business and/or society**
	List of names and business register numbers (organisationsnummer) of the primary organizations utilizing results and competence from the SRA in the development of improved methods, goods, services or processes, etc. Comment on e.g. type of "innovation"[7]. (D4–5)
Health and wellbeing	List of new private or public companies (names and business register numbers) established during the last 12 months as a consequence of research and activities related to the strategic research environment. (D6)
Environmental impact	Describe how new or improved products/groups of products such as services or goods etc. have been utilized by public organizations or have been introduced in the market since last follow. (D7)
Social and Cultural Impact	List of applications for immaterial property rights (IPR) since last follow-up (patents, design patents, trade mark protection; still under review and granted). (D8)
Policy impact government policy, public policy and services	**Strategic value for society; policy impact**
	List of policy activities and outputs (presentations and consultancy, expert advice and memberships, briefings, reports etc). Specifying the number of organizations where these "impacts" have taken place. (D9)
Public impact on engagement and understanding	**Strategic value for society; public impact**
	List of public activity and outputs (media, textbooks, conferences, popular science presentations and policy lobbying). Comment (type of activity, purpose of activity, name of activity and reference). (D10)

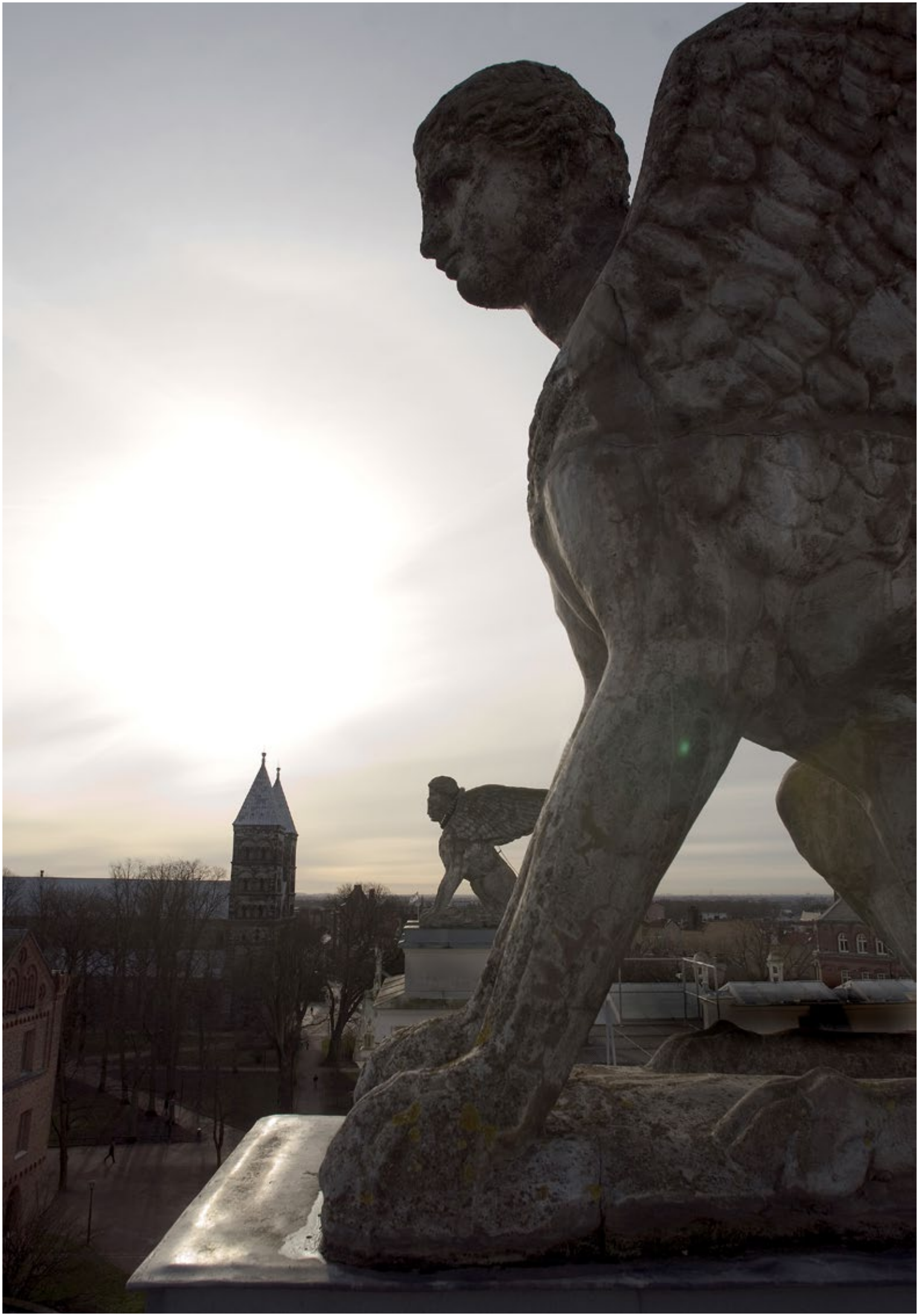
*) For a full description of all indicators, see list supplied by Research Services.

COMMENTS TO THE TABLE ABOVE:

Impact within academia
Research impact
Comment:
This includes impact both within and outside the assessed academic field(s)

Impact beyond academia
Comments:

1. Note that one project may lead to more than one type of impact.
2. Different questions may be appropriate for different SRAs.
3. Please note that in the earlier SRA assessments, and the SRA evaluation, the concept "impact" was used in several questions without it being properly defined. As we understand, what was asked for in most questions was rather for the SRAs to list outputs, activities and engagements with different stakeholders. No question in the earlier evaluation asked for what we define as impact. Showing real impact, of different types, requires evidence of effects on (benefits for) target groups.
   Further questions on the route to impact for
   - **business and/or society** could be**:** *What were the wider economic, social and cultural effects?*
   - **for society; policy** could be: *What were the outcomes, that is, how were the results used by politicians? What were the policy impacts e.g. what were the effects on politics/policy, what were the wider effects of the changes in policy?*
   - **for society; public** could be: *What were the outcomes, that is, how were the results used, taken up? What were the public impacts, e.g. what were the effect on people's engagement and understanding?*
4. **List of collaborations:** See collaboration in a wide sense, could be with companies and all kinds of institutes and organizations, thus also e.g. with education or culture institutes.
5. **Strategic value:** These questions cover different steps on the route to societal impact.
6. **…comment on type of "innovation":** The OECD definition of innovation includes the implementation of new, or significantly improved, products and processes, new markets, or new organisational methods. However, in a wider sense, innovation includes new services and other methods as well as new policies or strategies. It is important to note that an innovation is both new and implemented, i.e. a new idea is not an innovation until it has been spread and adopted.



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