D2.5

National reports with a review and synthesis of the collated information

Sweden

Document information

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D2.5: National reports with a review and synthesis of the collated information – Sweden

1. Introduction

1.1 About INSPIRATION

The aim of INSPIRATION is to establish and promote the adoption of a strategic research agenda for land use, land-use changes and soil management in the light of current and future societal challenges. Main objectives are:

- **Formulate, consult on and revise an end-user oriented strategic research agenda (SRA);**
- **Scope out models for implementing the SRA;**
- **Prepare a network of public and private funding institutions willing to commonly fund the SRA.**

The proposed methodology is based on a multi-stakeholder, multi-national and interdisciplinary approach that covers the variety of stakeholders (public bodies, business, scientific community citizens and society) and the variety of relevant funders. The vehicle to engage with relevant stakeholders across the Member States is a National Focal Point (NFP) in 17 countries[1]. Between March 2015 and March 2016 The NFP's interviewed National Key Stakeholders (NKS), performed a desk study and organized workshops with national stakeholders of funders, end-users and researchers across the various soil and land management disciplines. The goal of these exercises was to gather information and support the main objectives as stated above.

The collated results will be structured along four integrative themes: 1) resources demand and efficiency; 2) natural capital stewardship; 3) land management; 4) net impact on global, EU and local scale (see section 1.3) and merging into thematic knowledge needs to satisfy the as yet unmet societal challenges and to ensure that knowledge contributes primarily to enable meeting these challenges. Based on these results, a cross-border and cross-discipline dialogue will subsequently be organized among the relevant user communities, funding bodies and scientific communities in Europe in order to reach a trans-national, prioritized SRA as well as a model for execution of this SRA. Thus a SRA will be produced which will give national funders confidence that for each Euro they spend, they will get multiple Euros worth of knowledge in return in order to address their national societal challenges.

Learn more about the INSPIRATION coordination and support action on the project's website: **www.inspiration-h2020.eu** and follow us on twitter: **@inspiration4eu**.

[1] The Swedish Geotechnical Institute (SGI) with support of Formas is currently mirroring the INSPIRATION approach in Sweden. SGI has proposed to act as Swedish National Focal Point and to become a full member of the INSPIRATION consortium. This has been welcomed by the consortium. Currently formal negotiations are in place between SGI, the consortium and the EC to effectively implement this collaboration. This report furthermore contains some information for Denmark and Luxemburg – representatives of both countries joined the Belgium workshop – and for the Republic of Ireland – representatives joined the UK workshop – see below.)

1.2 This report

This country report is an excerpt from the INSPIRATION Deliverable 2.5 “National reports with a review and synthesis of the collated information”, which integrates 17 national reports. These 17 countries, in alphabetical order, and respective report authors are:

1. **Austria**,
   Pia Minixhofer, *Sophie Zechmeister-Boltenstern*, Rosemarie Stangl, Andreas Baumgarten, Martin Weigl, Peter Tramberend,
2. **Belgium** (including some information for **Denmark** and **Luxemburg**),
   Nele Bal, Bavo Peeters,
3. **Czech Republic**,
   Petr Klusáček, Stanislav Martinát, Bohumil Frantál,
4. **Finland**,
   Antti Rehunen, Teija Haavisto, Ritva Britschgi, Outi Pyy, Jari Rintala, Petri Shemeikka,
5. **France**,
   Marie-Christine Dictor, Samuel Coussy, Valérie Guerin, Corinne Merly,
6. **Germany**,
   Uwe Ferber, Stephan Bartke, Detlef Grimski,
7. **Italy**,
   Matteo Tabasso, Sarah Chiodi, Giulia Melis,
8. **Poland**,
   Anna Starzewska-Sikorska,
9. **Portugal**,
   Thomas Panagopoulos, Vera Ferreira, Dulce Antunes
10. **Romania**,
    Mihail Dumitru, Sorin Liviu Stefanescu, Andrei Vrinceanu, Valentina Voicu, Nicoleta Vrinceanu,
11. **Slovakia**,
    Maros Finka, Maria Kozova, Zita Izakovicova, Lubomir Jamecny, Vladimir Ondrejicka,
12. **Slovenia**,
    Boštjan Cotič, Barbara Mušič, Ina Šuklje Erjavec, Matej Nikšič,
13. **Spain**,
    Pierre Menger, *Gemma Garcia-Blanco*, Efren Feliu,
14. **Sweden**,
    Yvonne Ohlsson, Lisa van Well, Kerstin Konitzer,
15. **Switzerland**,
    Regula Brassel, *Marco Pütz*,
16. **The Netherlands**,
    Linda Maring, Jos Brils
17. **The United Kingdom** (including some information on **the Republic of Ireland**),
    Paul Nathanail, Matt Ashmore.

Deliverable D2.5 concludes the activities of INSPIRATION Work Package (WP) 2 "**Demands of research from industry, end-users and funders (State-of-the-art at national levels)**", task 2.5 "**Review and synthesis of the collated information**".

The WP2 activities were executed in the 1st year of the INSPIRATION project (month 1 – 12), i.e. in the period from March 2015 to February 2016. In the WP2 project description, the final task executed in this period is described in the following way:

> "*The NFPs will organize at national level a 2-day workshop, where the collated information (task 2.4) will be reviewed and synthesized and prioritized under guidance of the NFP by the NKSs. The WP-leader will prepare – in consultation with the INSPIRATION core group – a generic outline for the agenda of the 2-day national workshops. That outline will then be tailored to specific national situations by the NFPs. The results of the workshop – i.e. reviewed and synthesised information regarding topic a-d as mentioned under the WP2 objectives[2] – will be described in a national report (in English) by the NFPs. Before finalizing these reports, the NKSs as well as the International Advisory Board (IAB) will be given the opportunity to review the draft report. In these cases where English is not the native language, the national reports will also contain an executive summary (policy brief) of the report in the native language."* (INSPIRATION Grant Agreement - Description of Action - DoA).

Deliverable D2.5 describes the results of NKS interviews and of the desk-exercise as performed in participating countries aimed at collecting national research demands, science-policy-interface experiences and funding options. This report builds up on the interim results presented in Deliverable 2.4.[3] The methodologies followed for the information collation and synthesis are presented in more detail for each country below. In general, the following approach was applied (see also Figure 1):

1. In each country, national key stakeholders (NKS) have been identified (in a way to ensure broad representation of soil and land-use/management topics and affiliations in research funding / end-use / science or policy making);
2. Interviews (structured according to a common template: see Annex I and II) with circa 20 NKS per country have been conducted in order to collect national research needs as well as information on science-policy-interface and financing options (with interim result presented as D2.4);
3. In each country, a national workshop with NKS was conducted. Basis for the workshops was the input provided in the NKS interviews before the workshop. It was presented in order to synthesize the collated info, discuss and review the key national research topics. The workshop thus aimed to check, verify and enrich, and in some cases also already prioritize the suggestions provided by the NKS;[4]

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2 See section 1.5 for a description of topic a-d.

3 Brils, J. et al. (2015): National report on collated information following the template. Final version as of 01.12.2015 of deliverable 2.4 of the HORIZON 2020 project INSPIRATION. EC Grant agreement no: 642372, UBA: Dessau-Roßlau, Germany.

4 In several countries besides the NKS interviewed also more stakeholders were invited (i.e. it were open events), and participated and contributed to the workshops.

4. The results of the interviewing plus workshop process were documented in a report to become the respective final national reports. A draft version was to be send nationally to the NKS for review;
5. The national reports were aggregated in a combined document, on which the International Advisory Board (IAB) of INSPIRATION was asked to give feedback, too;
6. The D2.5 report has been finalised taking into account the IAB recommendations.

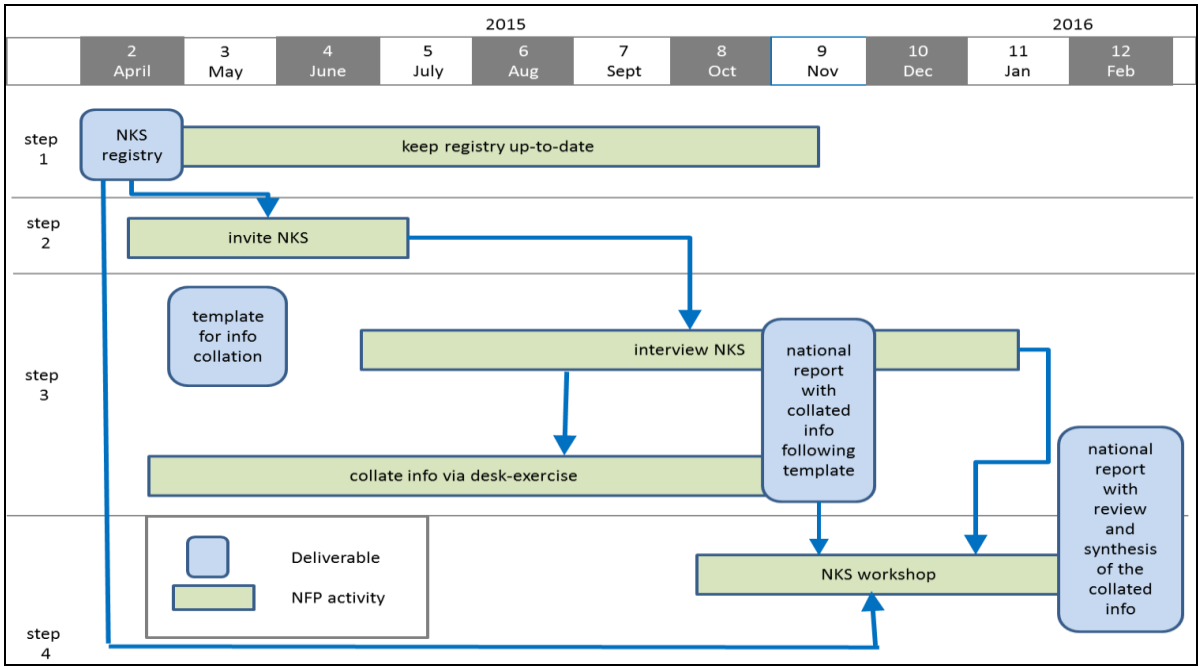

Figure 1: *INSPIRATION's WP2 workflow.*

The information collated in this report feeds into WP3 "Transnational commons aggregated under integrated themes". According to the INSPIRATION DoA, the main objectives of WP3 will be to:

1. Achieve an overview of the transnational shared demands and experiences grouped under common themes based on the national state-of-the-art reports as produced by WP2,
2. Prioritise and elaborate the topics that could be included in the SRA (to be developed by WP4) under specific themes,
3. Elucidate the opportunity to match (to be done under WP4) individual stakeholders (as funders) to specific SRA topics that could be shared transnationally." (INSPIRATION Grant Agreement - Description of Action - DoA).

Visit the INSPIRATION website for the up-coming deliverables of the network!

1.3 The INSPIRATION conceptual model and its themes

In order to identify cross-country and cross-sectorial knowledge gaps and research questions, the national Research and Innovation (R&I) needs will be analysed along four overarching themes identified in the INSPIRATION conceptual model. This model is presented in figure 2. It has been used to structure the information presented in this report on R&I needs following these guiding key-questions for each theme:

- **Demand**:
  What does society demand from natural capital and ecosystem services including the SSW-system?
- **Natural capital**:
  What has nature, including the Soil-Sediment-Water (SSW)-system, to offer and which determinants sustain the system?
- **Land management**:
  What are options for an integrated, cross-sectorial land management to balance societal demands and natural capital?
- **Net-impacts**:
  What are the impacts of different options of managing natural capital, including the SSW-system on global, regional and local as well as temporal scales?

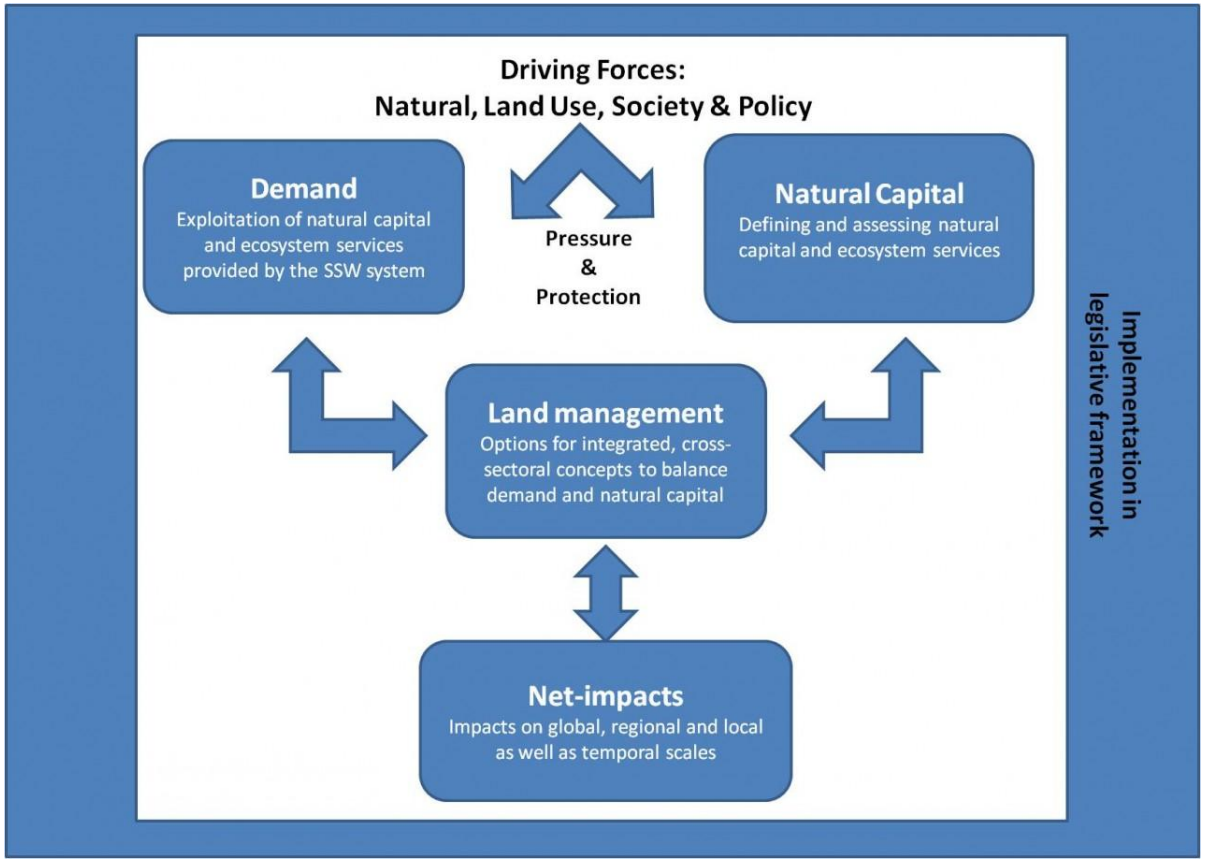

Figure 2: *INSPIRATION's conceptual model.*

1.4 Guide to the reader: outline of the country chapters

Each county chapter in Deliverable D2.5 follows a comparable outline:

Section X.1- Executive summary

This section provides an executive summary in English (X.1.1) as well as in the national language (X.1.2).

Section X.2 - Methodology followed

This section describes the methodology followed in the respective country including information on the stakeholder engagement (see also section 1.4).

The subsequent sections give a review and synthesis of the main results of the topics as mentioned under the WP2 objectives (see section 1.2).

Section X.3 Research and Innovation (R&I) needs

- ***Topic a:*** ***Demand-driven***** suggestions for the Strategic Research Agenda (SRA), i.e. suggestions from the perspective of industry, end-users and funders.*
  Related key question to be answered: ***What (new) knowledge do these parties need to tackle societal challenges including the increase of job opportunities)?***

* ***Demand-driven*** *in INSPIRATION means focusing on the demands of those who are responsible or feel committed to tackle the societal challenges related to the INSPIRATION scope and themes, i.e. industry, end-users and funders. These parties could improve their business opportunities and/or take better informed decisions on what measures to take and execute in order to tackle other societal challenges if they would (be enabled to) use the knowledge as resulting from execution of the INSPIRATION SRA.*

This section is divided in the sub-sections:

- Societal challenges and needs (X.3.1);
- Topics / research needs to include in the SRA (X.3.2).

The research questions under the topics in the X.3.2 sub-sections are divided by themes of the INSPIRATION conceptual model as described in section 1.3 of this chapter.

Section X.4 - Experiences regarding connecting science to policy/practice

- ***Topic b:*** *Experiences regarding the exploitation of scientific knowledge to improve business opportunities and/or tackle other societal challenges.*
  Related key question to be answered: ***Where to improve the science-policy interface so that (new) knowledge can and will be more effectively exploited by the demand side?***

This section is divided in the sub-sections:

- Use of knowledge (X.4.1);
- Possibilities to set the agenda (X.4.2);
- Science – policy – practice (X.4.3).

Section X.5 National and transnational funding schemes

- ***Topic c:*** *Predominant, current as well as promising alternative funding schemes / mechanisms / programs for knowledge production and dissemination.*
  Related key question to be answered: ***How to get with one Euro of national/regional funding a multitude of Euro's (from all sources) worth of knowledge in return contributing to EU and national demands? Or even how to get with one euro of EU funding a multitude of euro's (from national, regional, local, and private sector) worth of knowledge in return contributing to the R&I demands on Land and the Soil-Sediment-Water systems.***
- ***Topic d:*** *Experiences regarding the use of any trans-national, common budget for scientific knowledge production related to the scope of INSPIRATION.*
  Related key question to be answered: How to set up/govern the appropriate funding option(s) resulting from INSPIRATION – based on previous learning experiences – so that: (1)the above demands will be fulfilled, (2) knowledge resulting from implementation of the SRA will be taken up and used and (3) funders experience that their invested, national Euros are indeed multiplied?"

This section is divided in the sub-sections:

- Funding schemes and possibilities for research funding (X.5.1);
- Gaps in financial resources for research (X.5.2).

Section X.6 - Other remarks made by interviewees

This section is optional and is not taken up in all national reports. It contains remarks, points of attention and recommendations for INSPIRATION as given by the NKS.

1.5 Annexes

Annex I: NKS questionnaire template

This is the updated version of the questionnaire - reflecting inputs from the IAB and discussions at the NFP training in Vienna on 22nd – 23rd June 2015.

Note: this questionnaire template is meant to help National Focal Points (NFPs) to facilitate the interview/conversation with the National Key Stakeholders (NKS). Some questions are relevant to one NKS, other questions to another NKS. Hence, not all questions are relevant to each single NKS. The NFPs are required to adapt the template accordingly – keeping in it as many as possible of the issues to be addressed. If needed, the NFPs also translate the questionnaire into their national language.

The questionnaire (see next pages) has the following outline:

A. **Interview information:**
   To be filled out by the interviewer

B. **Introduction:**
   That the interviewer can use to start the NKS interview

C. **Background information of the NKS interviewed:**
   Mostly 'tick-boxes'

D. **Strategic Research Agenda (SRA):**
   NKS preferred topics, overarching themes and scope for the SRA and national state-of-the-art on research agendas that the NKS is aware of

E. **Science-Policy-Interface:**
   NKS experiences regarding the exploitation of scientific knowledge to: improve business opportunities; tackle other societal challenges; assist policy-implementation and/or policy revision

F. **Funding:**
   Predominantly used as well as promising alternative funding schemes / mechanisms / programs for knowledge production and dissemination that the NKS is aware of

G. **Other:**
   At the end there is some time advised to let the NKS give us their advice, some nice quotes (that we can use anonymously in our communications), examples etc.

H. **Ending the interview:**
   Explain follow up and if/how NKSs will be involved in the next steps of INSPIRATION

Questionnaire template

A. Interview information
Country: Name of INSPIRATION researcher: Date of Interview: How does the NKS wish to be referred to: *[Anonymous, personal opinions, company's opinion. Choose when it is a good time to discuss this. In the beginning or later on.* *SHOW the interviewed NKS the ENGAGEMENT CONSENT FORM and ask him/her to fill it out. Please introduce the engagement consent form (available in 'D2.1 MoU' and editable by yourself) and hand a copy to the interviewee to read and fill in – make sure that you take this away with you and keep for your own records]*
B. Introductions
[Please introduce your selves, the project and the purpose of the interview. You can use the handout as provided at the end of this template. This can also be sent beforehand to the NKS. Agree on a time span: approximately one and a half hour.]
C. Background information on the interviewee
1. Name of NKS interviewed: 2. Institution: 3. Role:
4. Are you a (multiple answers possible): ○ National-regional-local authority ○ University/research institute ○ Small or Medium sized Enterprise (SME, i.e. < 500 employees) / consultant ○ Business and industry ○ Non-Governmental Organisation (NGO) ○ Network representative / leader ○ Other, specify: …
5. Fields of expertise (multiple answers possible): *[Ask to specify background regarding the selected item(s) in order to understand expertise background of interviewee]* ○ Soil ○ Water ○ Sediment ○ Urban / spatial planning ○ Landscape design ○ Land management ○ Other, specify: …..

6. Does your organisation provide external research funding?
   - ○ Yes. Please specify: ...
     [e.g. as programme holder, public, private, …]
   - ○ No

D. SRA

7. Which societal challenges do you regard as important?

   [*If needed, you can use the European Commissions (EC) list of societal challenges here. These EC themes are*:]

   - Contribute to food security and food safety;
   - Ensure secure supplies of safe drinking water;
   - Secure energy supply and distribution;
   - Reduce raw material and resource consumption, Ensure efficient use of natural resources;
   - Contribute to climate change mitigation and societal adaptation;
   - Contribute to a healthy living environment;
   - Ensure secure infrastructure

   [Explain that these challenges may be used as bases for defining of the overarching themes for aggregating the research topics of our SRA.]

   a. If applicable, what additional, other or alternative challenges would you suggest/prefer?

   [When needed, you can mention challenges as nature conservation, sustainable use of ecosystem services, halting the loss of biodiversity]

8. Starting with your own experience: which <u>specific topics</u> (research needs) should be included in the SRA?

   [For each single topic mentioned by the NKS, use the following follow-up questions. The a, b and c sub-questions are mandatory. The other sub-questions are optional]:

   a. Explain – elaborate the topic
      - *Who will be affected?*
      - *Who is responsible?*
      - *Is it a topic of concern of your organisation / department*
      - *Is it only a national topic, or a shared topic by multiple countries?*
      - *Where are we now, where do we want to be in x years (point on the horizon)?*
      - *How can the newly gained knowledge be effectively used?*

   b. Priority:
      1. *High priority*
      2. *Some priority*
      3. *Neutral priority*
      4. *Low priority*
      5. *No priority*

      - What is the urgency, i.e. what goes wrong if we do nothing?

c. Who wants to/should fund this kind of research?

[Optionally: check the following WP3 key-words for relevance, i.e. if they raise any additional topics by the NKS. The key-words can be used as support / check list

Be sensible as interviewer if this is needed.]

- *Assessment of land resources*
- *Potential productivity of land and soils*
- *Demand for soil/land resources, imports and exports*
- *Competition between land uses (land-use conflicts)*
- *Concepts to identify and quantify relevant impacts*
- *Instruments to avoid / minimize impacts (feedback to decision-making process)*
- *Opportunities of innovative land-use technologies*
- *Resource-oriented land management systems]*
- *Soil regeneration*
- *Soil and groundwater remediation*

9. Linked to topics mentioned by the NKS:

   a. What are the important / relevant documents, research agendas, research programmes underpinning these topics? (state-of-the-art)

   b. Related to these agendas and programmes: what are timelines of programming and windows-of-opportunities to influence agendas / programmes?

   [Note: question 9b is input for work package 5]

E. Science-Policy-Interfacing (SPI)

10. How would you define 'scientific knowledge'?

11. For what do you use scientific knowledge in your job?

12. Which sources of (scientific) knowledge do you use for doing your job?

[Open question and you can mention some of the sources underneath as examples]

- *scientific paper*
- *consultants*
- *reports*
- *colleagues*
- *experiences /examples within my own country*
- *experiences /examples abroad*
- *newspapers*
- *television*
- *conferences Involvement in research projects*
- *data (bases)*
- *websites, such as: …..*
- *other, specify: …..*

13. To what extent do you use most recent/new scientific knowledge (i.e. state-of-the-art scientific insights/findings) for doing your job?

14. To what extent are you able to influence (and how) the setting of scientific research policies/agendas in our country?

15. To which extent do our national policies/agendas reflect your specific needs and priorities?

16. To what extent has been made use of the state-of-the art in scientific research for the formulation of existing policies in our country?

[Questions only for NKS from the non-science sector (business and policy):]

17. Have you ever been involved in:

    a. the formulation of scientific research questions?
    b. doing scientific research (i.e. knowledge co-creation)?
    c. synthesizing/wrapping-up of scientific knowledge, e.g. to feed into policy making or to increase business opportunities?

[When yes: Follow-up questions]

- How successful/satisfying was this, on a scale of 1-5?
    1. *Very successful/satisfying*
    2. *Successful /satisfying*
    3. *Neutral*
    4. *Unsuccessful/unsatisfying*
    5. *Very unsuccessful/unsatisfying*
- What went well
- What could be improved?
- What to avoid/not to do?
- Additional remarks?

[Question only to NKS who are likely to have insights here (e.g. research funders)]

18. (How) is the societal impact of scientific research related to the scope of INSPIRATION being assessed in our country?

[If they know: Follow-up questions:]

- How successful/satisfying is this, on a scale of 1-5?
    1. *Very successful/satisfying*
    2. *Successful/satisfying*
    3. *Neutral*
    4. *Unsuccessful/unsatisfying*
    5. *Very unsuccessful/unsatisfying*
- What indictors are used?
- What goes well?
- What can be improved?
- What to avoid/not to do?
- Additional remarks?

19. Which national Science-Policy-Interface documents do you know of / can you recommend?

F. Funding

20. Which experiences and expectations in funding schemes (public / private) do you have in your own field that could offer opportunities for future research on land-use and -management and related impacts to Soil-/Sediment-/Water-systems:

    - Sub-nationally/regionally?
    - Nationally?
    - European? [*e.g. H2020, Interreg, multi-lateral such as the Joint Programming Initiatives*]
    - International? [*e.g. Belmont Forum, Foundations.*]

    [For all R&I questions aiming at achieving policy targets in the Land & SSW related system (like e.g. Sustainable Development Goals on soils, existing EU directives such as the Environmental Liability Directive, etc.) consider all Public and Private funding sources. Please ask to provide details and give most important references (documents, website) that could be relevant for explaining the answer]

21. How to increase the added value of different financial resources (i.e. achieve a multiplier) for doing research that contributes to EU and national demands, in particular to the R&I demands on Land and the SSW-system?
    [*CONSTRUCTIONS that (could) work. PP, PPI, etc. Just ask for, as open as possible for suggestions, ideas, experiences, good examples*]

22. Are there areas of research and innovation (R&I) that you are aware of that are not (yet) covered by current funding mechanisms and which would need new/different funding schemes / infrastructures?

23. Integrated approaches (necessary for addressing particular societal challenges related to the use and management of land and related impacts to SSW systems) are usually difficult to fund / get recognized by the research funding communities. What would be necessary to improve this?

24. Based on previous learning experiences that you are aware of: how to best set up / govern funding option(s), so that societal demands will be fulfilled, knowledge resulting from execution of the SRA will be taken up and used; and funders experience that their invested, national Euros are indeed multiplied? *[if they know: follow-up questions]*

- How successful/satisfying was this, on a scale of 1-5?
    1. *Very successful/satisfying*
    2. *Successful/satisfying*
    3. *Neutral*
    4. *Unsuccessful/unsatisfying*
    5. *Very unsuccessful/unsatisfying*
- What went well?
- What could be improved?
- What to avoid/not to do?
- Additional remarks?

G. Other (remarks, suggestions, examples):

H. Ending the interview

Thank you for taking the time to participate in this interview:

- Would you like us to keep you updated about INSPIRATION progress?
- Would you suggest anyone else who we should be interviewed by us?
- Do you have further questions arising from this interview, or would you like to add anything else?
- What information are you interested in, and willing to give feedback on?

  [Discuss the feedback mechanism and if they have expressed their opinions as a person or as a representative of their organisation/network. Checklist:]

  a. Information to exchange / willingness to give feedback on:

     - (complete interview, not recommended)
     - summary of main conclusions
     - national report, national contribution to D2.4
     - complete D2.4, all countries

  b. Preferred level of feedback:

     - no feedback
     - informal feedback
     - formal feedback (e.g. on behalf of represented organisation)

[Check: have you discussed consent form / how to refer to interviewee]

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Annex II: NKS hand-out: INSPIRATION interview at a glance

INSPIRATION interview at a glance

Aim of INSPIRATION:

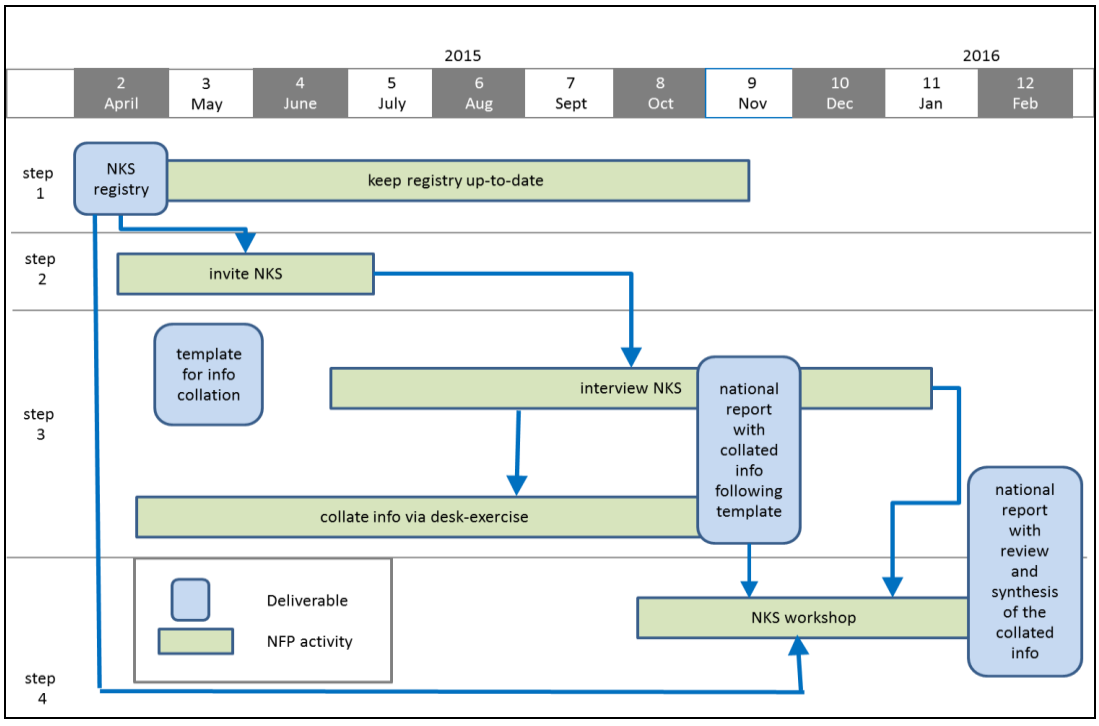
The main purpose of the EC-funded INSPIRATION project is to formulate an end-user driven strategic research agenda (SRA) for land-use, land-use changes and the related, impacted compartments of the Soil-Sediment-Water (SSW) system in order to meet current and future societal challenges and needs. Next to that, the project aims to scope out models of implementing the SRA and to prepare a network of public and private funding institutions willing to commonly fund the execution of the SRA.

National Key Stakeholders (NKS):

In a series of NKS interviews across EU nations the "National Focal Points (NFP) gather for nations individually information related to the INSPIRATION scope (land and SSW-system use and management) on:

- Research and Innovation (R&I) needs
- Experiences regarding connecting science to policy/practice
- National and transnational funding schemes

In the interviews we focus at NKS – like you – positioned at a strategic level, i.e. leading persons in their field of profession; with a good overview on opportunities; a clear vision on, and insight in knowledge demands (short, middle and long-term). Furthermore, these NKS are well positioned and participate in relevant professional network(s) and may also have potential to become an ambassador for INSPIRATION. We selected NKS to represent different disciplines and institutional backgrounds including: land-use planners; managers; soil, sediment and water experts; researchers, funders and regulators/policy makers.



Workflow in the first year of INSPIRATION

This interview:

Collecting input from you – an expert in your field – is crucial for the project in order to help us describing the state-of-the-art in our country as input into the European research agenda. In the interview we will go through a series of topics and questions: The interviews of NKS (ca. 20 per nation), together with a desk study on research needs and funding possibilities will be synthesized to a 'national report'. This synthesis will be reviewed in a national workshop, to prioritize the topics for the suggested Strategic Research Agenda (SRA) from our country's point of view. The national reports will finally be used as input for elaborating the European SRA and cross-nation matchmaking (matching research needs to possible funding).

Example questions:

Research and Innovation (R&I) needs

- Which societal challenges do you regard as important?
- Starting with your own experience: which specific topics (research needs) should be included in the SRA?

Experiences regarding connecting science to policy/practice

- How would you define 'scientific knowledge'?
- To what extent has been made use of the state-of-the art in scientific research for the formulation of existing policies in our country?

National and transnational funding schemes

- Does your organisation provide external research funding?
- Which experiences and expectations in funding schemes (public / private) do you have in your own field that could offer opportunities for future research on land-use and -management and related impacts to Soil-/Sediment-/Water-systems

Your benefits from participating:

- A chance to influence the European SRA on land and SSW management in the light of societal challenges and needs;
- Being able to make use of the results of the project: overview of research need and of existing and promising funding schemes on different levels (sub-national, national, European, international) and opportunities for a better connection between science and policy/practice;
- Use the matchmaking opportunity to get in contact with other networks in- and outside our country, and countries learn which shared challenges can be taken up jointly.

Contact and further information:

For general information on the INSPIRATION project visit our website: www.inspiration-h2020.eu

Contact the National Focal Point:	Contact the general project coordination:
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2. Sweden

Report by Yvonne Ohlsson, Lisa van Well, Kerstin Konitzer

2.1 Executive summary

2.1.1 English version

Land, land use, and land use changes, and their relationship to soil, water and sediment systems are linked to a number of societal challenges. Research and innovation are needed in order to tackle these challenges. Research issues should originate in societal needs, which is why it is important that society's various stakeholders participate in the formulation research questions. In addition, the research results need to be implemented in society in order to have an impact. A close collaboration between researchers and stakeholders is therefore necessary.

A total of 18 Swedish stakeholders, identified as the "National Key Stakeholders", NKS, (researchers, research funders and current or potential users) have helped to identify and prioritize important societal challenges and research issues for Sweden. They have also provided comments on the financing arrangements that are appropriate and effective, and how the science-policy interface and research-implementation are best secured. The present report is based on interviews with NKS, discussions at a workshop (14 January 2016 in Stockholm) and supporting documentation recommended by the NKS. A number of people (in addition to the 18 NKS) have also contributed with literature suggestions and comments.

A list of those who have contributed is provided in Appendix Ia.

The major societal challenges that are highlighted in this report are largely related to attaining a sustainable, healthy and secure living environment. A chemically and microbiologically safe environment relates strongly to food production and drinking water. The sustainability aspect is also highly related to sustainable production and consumption of food and other products, as well as to the challenges of sustainable construction in the face of rapid urbanisation. Climate change and adaptation to a changing climate is an important challenge in itself, but also integrated into most of the other challenges.

In addition, a number of research themes, including important research topics, have been compiled and linked to these societal challenges. Current themes include "Climate change effects on surface and ground water and ground conditions (mitigation and adaptation)", "Safe and sustainable (drinking) water supply from water source to tap", "Ensuring efficient use of natural resources", "How to reach sustainable urbanisation", "Sustainable agriculture and food production", "Sustainable forestry", "Management of Contaminated land, groundwater and sediments", "Biodiversity and ecosystem services" and "Communication and implementation : Societal reach and impact ".

In order to tackle these social challenges research agendas should emphasise targeted, and preferably multistage, calls based on societal reach and communication as appropriate and important tools to ensure societal relevance. Moreover, the calls or programmes should promote collaboration between universities, colleges and institutions, but also between researchers and various societal stakeholders (government, industry, small and medium-sized enterprises (SMEs), industry associations, etc.). Collaboration should occur at an early

stage in the project life so that all parties feel an ownership in the research question and to ensure that it addresses societal needs. This helps to provide more focused applications with a higher outcome for those who invest time, commitment and resources in writing applications and building consortia. Further important components are longer project duration (> 3 years) and longer term programmes (e.g. 10 years). Effective communication and implementation were also seen as essential. The latter should be given great weight in evaluations of research applications.

Measuring the social impacts of research is difficult and it may take some time before effects are seen in society. There few actors who have systematically worked on this, but the interest is present and there is a need for more support, method development and guidance. Providing “measurements” and indicators of societal relevance in various research projects, assessments and programmes is increasingly in demand by many stakeholders. In the report, various types of indicators to assess social impact are compiled. Examples are the number of/average number of relevant stakeholders involved in R&I projects and how they are involved, number or percentage of F&I project (in a portfolio), the results of which can be directly implemented in consulting/policy/other implementation processes and how the implementation occurs, number or percentage of R&I projects where relevant institutions and professional resources for communication and implementation are linked. Different indicators may be relevant for different various stakeholders.

In Sweden there are many ongoing efforts for addressing societal challenges in various and research areas and research and innovation agendas. These efforts involve actors from several sectors and administrative levels. Swedish financiers are working diligently to find ways to substantially increase the impacts and benefits of research to society. Targeted calls for proposals are becoming more frequent. Even within PhD studies there is often a focus on the importance of collaboration with societal actors. Input into the government’s research and innovation bill for the coming 10 years (2017-2027) underscores the challenges of society and the societal relevance aspects that research funding bodies, industrial representatives, national authorities and research institutions need to deal with.

2.1.2 Swedish version

Mark, markplanering och markanvändning och deras relation till jord-, vatten- och sedimentsystemet är kopplat till ett flertal samhällsutmaningar. För att ta oss an utmaningarna behövs forskning och innovation. Forskningsfrågorna behöver ha ett ursprung i samhällets behov, varför samhällets olika intressenter behöver medverka i att formulera forskningsfrågorna. Vidare behöver resultaten implementeras i samhället för att ge effekt. En nära samverkan mellan forskare och intressenter är nödvändig.

Totalt 18 svenska forskningsintressenter, s.k. ”National Key Stakeholders”, NKS, (forskare, forskningsfinansiärer och förväntade användare, eller behovsägare) har bidragit till att identifiera och prioritera för Sverige viktiga samhällutmaningar och forskningsfrågor. De har också gett synpunkter på vilka finansieringssätt som är lämpliga och effektiva, samt hur övergången forskning–policy respektive forskning-implementering bäst säkerställs. Föreliggande rapport baseras på intervjuer av NKS, diskussioner vid en workshop och underlag som rekommenderats av NKS. Ytterligare ett antal personer (utöver de 18 NKS)

har också bidragit med underlag och synpunkter. I rapporten finns en lista (Appendix Ia) med de som bidragit.

Viktiga samhällsutmaningar som lyfts fram är i hög grad relaterade till en hållbar, hälsosam och säker livsmiljö. Den kemiskt och mikrobiologiskt säkra miljön relaterar starkt till *livsmedel* och *dricksvatten*. Hållbarhetsaspekten knyter i hög grad an till *hållbar produktion och konsumtion* av såväl livsmedel som andra varor, men också till en *hållbar byggsektor* och en *snabb urbanisering*. *Klimatförändringar* och anpassning till ett förändrat klimat är en given utmaning dels i sig själv, men också som en del i andra utmaningar.

Vidare har ett antal forskningsteman, inklusive viktiga forskningsfrågor, sammanställts vilka också är kopplade till samhällsutmaningarna. Aktuella teman är “Climate change effects on surface and ground water and ground conditions (mitigation and adaptation)”, ”Safe and sustainable (drinking) water supply from water source to tap”, “Ensuring efficient use of natural resources”, “How to reach sustainable urbanization”, “Sustainable agriculture and food production”, “Sustainable forestry”, “Management of Contaminated land, groundwater and sediments”, “Biodiversity and ecosystem services” and “Communication and implementation: Societal reach and impact”.

För ta sig an samhällsutmaningarna framhålls riktade, gärna flerstegs-, utlysningar med utgångspunkt i samhällsutmaningar som lämpliga och viktiga instrument. Vidare bör utlysningarna eller programmen gynna samverkan mellan universitet, högskola och institut men också mellan forskare och samhällsaktörer (myndigheter, industri, små och medelstora företag, branschorganisationer etc.). Samverkan behöver komma in tidigt så att alla parter känner ett ägarskap i forskningsfrågan och ett samhällsbehov. Det ger mer genomarbetade, fokuserade ansökningar och ett högre utfall för de som investerar tid, engagemang och medel i att skriva ansökningar och att bygga konsortier. Ytterligare viktiga komponenter är långa projekttider (>3 år) och långsiktiga program (10 år). Det är också avgörande för en effektiv kommunikation och implementering. Det senare bör ges stor tyngd i utvärderingar av forskningsansökningar.

Att mäta samhällsnytta av forskning är svårt och det kan ta tid innan effekter syns i samhället. Det är få aktörer som systematiskt har arbetat med detta, men intresset finns och det finns ett behov av stöd, metoder och vägledning. Redovisning av samhällsnytta efterfrågas alltmer från olika aktörers verksamheter. Det finns exempel på indikatorer på samhällsnytta som kan användas. I rapporten har olika typer av indikatorer sammanställts. Exempel är antal/medelantalrelevanta stakeholders involverade i FoI-projekt samt hur de är involverade, antal eller andel FoI-projekt (i en portfölj) vars resultat direkt kan implementeras i konsultverksamhet/policy/annan implementeringsväg och hur det implementeras, antal eller andel FoI-projekt där institut för in relevanta och professionella resurser för kommunikation och implementering. Olika indikatorer kan vara relevanta för olika aktörer.

I Sverige pågår stora satsningar kring samhällsutmaningar inom många områden och ett stort antal agendor har utarbetats. Många branschaktörer deltar idag i såväl forskningsprojekt som i utarbetande av agendor. Finansiärerna arbetar medvetet för att hitta former där samhällsnyttan får genomslag. Riktade utlysningar genomförs i allt högre grad. Även i doktorandutbildningar finns idag ofta ett fokus på vikten av samverkan med samhällsaktörer. I inspel till Regeringens forskningsproposition och innovationsproposition för den kommande 10-årsperioden (2017-2027) framhålls samhällsutmaningarna och

samhällsnyttoaspekterna av såväl forskningsfinansiärer som bransch- och myndighetsrepresentanter och forskarföreträdare.

2.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Sweden. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. In Sweden, 18 national key stakeholders, NKS, have been interviewed. Details on these NKS are provided in Annex Ia and the interview questions are provided in Annex Ib. A stakeholder workshop was held in Stockholm Jan 14, 2016, in which the results from interviews and a desk top study was presented and further discussed and reviewed. The workshop agenda and participant list is provided in Annex VI. This national report constitutes a synthesis of stakeholder interviews, the desk top study and the result from the workshop. The desk study was based on documents as suggested by NKS and by a literature survey performed. These are listed in Annex II.

At the workshop, there were in-depth thematic discussions in groups and plenum in order to reach consensus, prioritise when relevant and make a synthesis regarding the questions discussed. At a first stage all workshop participants were given an opportunity to discuss and provide input to each of the three topics (Strategic R&I-agenda, Science-policy interface and funding opportunities). Thereafter the participants were split into three groups that worked specifically on one topic each towards final recommendations to the Swedish report from each group. The group results and recommendations were also presented and discussed in plenum at the end of the workshop.

After the workshop the results were included in the present report and all NKS, also those not attending the workshop, were invited to review the results after the workshop. Also other contributors, some present at the workshop and some not, were given the opportunity to review the report. Overall, 12 stakeholders (funders, researchers and end-users) gave feedback on the report. Some stakeholders chose to give specific review comments to some parts of the reports while others gave specific and/or more general comments on the whole final report. (See also Annex Ia.)

Furthermore, it could be argued that the final Swedish report to some extent represents more stakeholders than the ones involved. This is due to that several national activities have taken place the last years that have included a large number of stakeholders and that have resulted in agendas and other documents related to the scope of INSPIRATION. Several of the Swedish NKS have also been involved in these activities and have brought in valuable insights and results from these activities. E.g., The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) was commissioned by the Swedish Government in 2014 to analyze Swedish research. In order to fulfil this commission Formas has produced several background reports. The process applied, with high stakeholder interaction and a focus on research based on societal challenges, is to some extent similar to that of INSPIRATION and the reports therefore represent a synthesis of several expert opinions. Also, Sweden´s Innovation Agency (VINNOVA) together with Formas and the Swedish Energy Agency has financed a large number (more than 80) of strategic research and innovation agendas. These are in short presented in an agenda catalogue (Strategiska innovationsagendor (2015)), and several of the agendas are related to the scope of INSPIRATION and are referred to in this delivery. They were developed by

actors that want to develop an area and that have, based on common visions and goals formed, worked out strategies for the development of the area.

2.3 Research and Innovation (R&I) needs

2.3.1 Societal challenges and needs

Several NKS mention that the EU challenges, although important, appear biased towards the human perspective. Headline challenges should also reflect the value and protection of nature as such. Aspects mentioned as important and potentially relevant “headings” are conservation and restoration of nature and biodiversity and sustainable use of ecosystem services. Biodiversity is particularly important and related to many of the other challenges.

Contribute to a healthy living environment, Contribute to food security and food safety and Ensure secure supplies of safe drinking water are all mentioned as highly important, but closely related to each other. Drinking water could be considered as “food”, and food security and food safety could be subjects under Contribute to a healthy living environment. The three EU challenges are all highly rated. These are also related to the challenges of rapid (and sustainable) urbanization under which an existing and ageing built environment should also be considered. Contribute to a safe chemical and microbial environment is an important challenge within the broader challenge of Contribute to a healthy living environment for the INSPIRATION context (land/land management and the SSW-system).

Another view is that one of the major global threats to society and the environment is overconsumption. From this angle, Sustainable and reduced resource consumption would be a priority challenge (similar to the challenge Reduce raw material and resource consumption).

The one challenge that almost all respondents mention being of high importance is Climate change mitigation and social adaption. The discussions in the Stakeholder Workshop lead to the conclusion that this challenge ought to be considered an important “stand alone”-challenge, but also a component under most other challenges. It was stressed that also the understanding of climate change effects is important and not just mitigation and adaption.

Also mentioned as highly important are migration and other demographic challenges (ageing population, migration to cities, and ensuring developments in peripheral areas). The migration challenge is rapidly becoming urgent, and other challenges follow, increased need for housing food and water challenges being the most evident.

Urbanisation/urban areas can have significant impacts on soil/land resources due to soil sealing and as centres of consumption, generation of waste, flow of matter/chemicals and energy.

During the NKS workshop these challenges were discussed and assessed. While they are highly related to one another, there is also the problem of conflicts of interests and goal conflicts between the different challenges and measures to address these. It was suggested that the goal conflicts in themselves are an important societal challenge, for which there is a need of research on how to deal with them.

A list of the societal challenges and needs as specified in the interviews and in the workshops can be found in Annex III.

2.3.2 Topics / research needs to include in the SRA

SW-1 Climate change effects on surface and ground water and ground conditions (mitigation and adaptation)

The European research and innovation Roadmap for Climate Services (DG Research and Innovation 2015) has stated that there is a strong need for research and innovation in order to make climate services more relevant, credible and assessable to its users. In Sweden, the effects of a changing climate on social, economic and ecological systems, as well as accessibility to sustainably produced renewable energy are issues that are fairly high on the research agenda. According to the expert panel associated with the Formas report "Scope and effects of Swedish climate research" (Formas 2015d), the most important societal challenge within the climate area is the conversion to a more sustainable and climate-safe society with reduced greenhouse gas emissions. The panel further asserted that much of the basic research on climate issues in Sweden has been done within the natural sciences and that there is a need to broaden the research field to include social sciences and humanities, as well as trans- disciplinary and applied research. An example of this would be improved use of climate services for cost-efficient and sustainable community development.

The subject is also elaborated in The Swedish Background report: Checkpoint 2015 on climate change adaptation (Andersson et al 2015). The report concluded that there is not necessarily a lack of climate adaptation research, but rather a gap in how the research is being packaged and communicated to the research community and to stakeholders.

Following the conceptual model of INSPIRATION, specific topics marked "SH" originate in stakeholder interviews and the workshop and those marked "CN" originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demand

- How to adapt energy efficient buildings and construction to climate change? (CN)
- How to adapt water- and agriculturally based production businesses to climate change? (CN)

Why? Societal decision makers that deal with climate change mitigation and adaptation measures (local, regional and national authorities and private businesses) need a robust evidence base in order to make informed decisions and enact cost-effective adaptation and mitigation measures. More research on the role of climate services and ecosystem services is important for addressing this.

Natural capital

- How to increase carbon storage while increasing wood and biomass production in forestry? (CN)
- How to maintain or increase agricultural productivity in a changing climate (crop selection, plant breeding, cultivation, soil preparation and water management)? (SH)
- How to prevent or minimise risks for infectious diseases in agriculture due to climate change? (CN)
- How to assess expected soil erosion and compaction in agro systems due to climate change? (CN)

- How geotechnical characteristics of ground conditions and soil stability are affected by more frequent extreme weather events such as torrential rains and flooding due to climate change to minimise risks for landslides and erosion together with their impacts? (CN)
- How sea level rise due to climate change and affects coastal erosion?

Why? There is a still growing need to assess how climate change impacts on various elements in the natural environment and particularly how these impacts in turn affect one another. This includes the needs for understanding of ecosystem dynamics, the ecology and regulatory mechanisms in the natural systems affected by climate change and development of ways to access the effects of climate change on ecosystems (adaptive traits, change in biodiversity, extinction rates, and migrating species)

Land management

- How can tools be developed for climate change adapted planning of the urban environment (storm water treatment and management, waste water systems, ground water levels, green and blue areas, cool areas etc.)?
- How does a changing climate affect ground stability, increased risk for landslides and a safe infrastructure for transportation and building? Models need to be developed.
- How can agricultural methods be adapted to a changing climate and how to manage potential risks? (CN)
- How to integrate climate change adaptation into forest planning and management? (CN)

Why? Climate change effects, mitigation and adaptation are issues that cross a number of disciplinary, sectorial, jurisdictional and administrative boundaries. There is still a need to develop methods to concretely address climate change in an intersectoral manner. Thus it is important that research take a broad, process-oriented focus on addressing problem-based governance and land management issues.

Net impacts

- What is needed for long term monitoring and evaluation of climate change adaptation actions in order to prioritize measures?
- How to achieve integration of approaches, solutions and policies in the nexus between the use of water, energy and food to support an efficient and sustainable utilization of natural resources? (CN)
- How can we develop standards and protocols for data in support of vulnerability and risk assessments, and decision-support systems?

Why? These issues deal with specific impacts of climate change within various types of territories (rural, urban, geological specificities etc.) and thus can lead to a better implementation of land use management and/or spatial planning.

SW-2 Safe and sustainable (drinking) water supply from water source to tap

Prerequisites for the supply of safe drinking water are raw water sources that are of as "clean" and high quality as possible. Groundwater is threatened by pollution and over-extraction, and the threats are increasing as a result of climate change and increasingly intensive human impacts. Increasing concentrations of organic matter in raw water affects treatment processes at water treatment plants as well as the biological processes in the distribution network. We need to *increase the protection of raw water sources* and the long-term *value of water* resources need to be addressed in order to raise the awareness in society in general and among planners and politicians specifically. Treatment processes at the plants need to be adapted to changes in raw water quality. There is also a need for long term *monitoring of* water sources (ground and surface water) with respect to contamination as well as plans for *protection* and *remediation* when necessary.

In **"A vision for water - Research and innovation agenda for the water sector in Sweden"** The Swedish Water & Wastewater Association (2014) addresses challenges and research needs within the water sector. Apart from the elaborated "Swedish challenges", vision and research and innovation needs the agenda also addresses the need for *better coordination and collaboration at various levels within EU, the Nordic countries and Sweden*. R & D requirements were identified within the areas of 1) risk analysis and economic assessments 2) effective and safe production of drinking water 3) effective and secure supply of drinking water and 4) safe water in private wells.

Following the conceptual model of INSPIRATION, Specific research topics marked "SH" originate in stakeholder interviews and the workshop and those marked "VW" originate in "A vision for water" (Swedish Water & Wastewater Association, 2014). *The research topics raised in the current report do not cover all issues raised in the "A vision for water". For a full picture we refer to the report, which is in English.*).

Demand

- How can models be developed to raise the awareness among planners and politicians of the long-term value of water resources?

Natural Capital

- How does natural organic material affect drinking water treatment and how to ensure the efficiency of water treatment plant processes with increased levels of such compounds in raw water? (VW)
- How can methods be developed for the *characterization of organic carbon in raw and drinking water*? This is expected to lead to new types of online sensors for process-control in the water treatment plant.

Why? One fifth of the 450,000 wells for private water provision are currently regarded as unsuitable for drinking water abstraction. Therefore there is a need for systematic mapping of water quality as a natural resource. Common problems include natural contaminants from bedrock and the penetration of microbiologically contaminated surface waters through well liners and easily permeated soil layers. Additionally, water of poor quality can be more corrosive and therefore cause leaching of harmful substances from material that is in contact with the water. (VW)

- How can we develop robust and reliable measurement methods for the detection of pathogens and/or antibiotic-resistant microorganisms, natural toxins and chemicals in raw water?

Why? These methods would strengthen work to protect raw water sources and should be linked to decision-support systems for water treatment plant operators. Monitoring with the help of model-based methods, software sensors and “sensor data fusion” are also of interest. (VW)

Land Management

- How to provide improved methods for land use planning and management in agricultural and forestry areas, and more effective runoff water management in urban (“soil sealed”) areas? (SH)
- How can different stakeholders’ and other countries’ claims on water resources be balanced using legal, economic and decision-making tools?(VW)
- How to develop of more efficient techniques for remediation of raw water sources affected by chemical accidents, contaminants (such as pharmaceuticals) and organic pollutants?

Why? Increased concentrations of organic matter are known to reduce the effectiveness of chlorine disinfection. They also increase corrosion in the distribution network and furthermore cause clogging of carbon filters so that these do not work as a chemical barrier.

Net Impacts

- How do human activities and behaviour (food production, farming near and “on” water resources, consumption habits) affect the quality/contamination levels in ground and surface water as drinking water resources? (SH)
- How have legislative measures taken (or not) prevented ”new” substances from affecting drinking water or sources for drinking water? (SH)
- How to develop tools and methods to measure the health effects associated with consumption of water and to enable the evaluation of the effects of various actions? (VW)
- How does climate change affect provision of drinking water? (SH)
- How do contaminants (such as PFAS, fertilizers, and pharmaceuticals) affect raw water quality, treatment processes and mixture toxicity and human health?
- How do diffuse sources/sum of contribution from many ”small” contaminant sources affect the quality/contamination levels in ground and surface water (SH)
- Which are the health effects from exposures of several contaminants (mixture/mixture toxicity) (SH)
- How are PFAS-substances, fertilizers, pharmaceuticals, unknowns in surface water and groundwater) affecting the cleaning process (SH)
- What materials in contact with water affect water quality and to what extent (SH)

Why? Different types of tools are required as ill-health can be of an acute nature caused by pathogens or of a chronic nature caused by prolonged exposure to chemical substances such as e.g. perflourated hydrocarbons and pesticide residues. (VW)

SW-3 Ensure efficient use of natural resources

The Swedish vision is to be the leading nation on resource smart use of materials by 2030. Swedish households and industries are in the front in an international perspective, with respect to reuse of material in waste.

Natural resources may be materials or substances extracted for use in products or used "as such". They can also be land and water resources which can be exploited for our need of space to build on, for recreational purposes, for food production and much more. As people buy and dispose of more and more products and as services becomes more expensive than even more advanced new products, little is repaired and reused by people. Re-use relies much upon industrial recycling. Land and water is exploited as populations and economies grow. The challenges related to efficient use of natural resources need, probably more than most challenges, integrated approaches and are to a great extent related to human behaviour and social sciences as well as to industry. Sweden has good opportunities to find innovative solutions for sustainable and "resource smart" use of materials.

Following the conceptual model of INSPIRATION, specific research topics marked "SH" originate in stakeholder interviews and workshop. Those marked "IA" originate in the general research goals identified in the Swedish Research and Innovation Agenda – "Resource-Efficient Material Utilization: Renewing Swedish Excellence". There are also some common research needs identified marked with "CN".

Demand

- How to provide innovative and resource efficient production and business models and methods for sustainable resource recovery? (IA)
- What Bedrock types could crushed replace natural gravel in different applications and where in Sweden you can find these bedrocks (SH)
- How to assess the intrinsic value of the environment, e.g. the value of nature in areas sparsely populated (today) in comparison to densely populated areas or the value of nature for today's population versus future generations? (SH)

Why? More research and development on these demands are still needed to facilitate resources and material conservation in production processes over a product's life cycle. It is important to create value based on function rather than selling new products. Balancing multifunctional use of many natural resources, for example combining recreation and forestry, is fundamental for both people's well-being and sound business models.

Natural Capital

- How to increase efficiency and sustainability in the use of forestry and agricultural resources? (CN)
- How bedrock types when crushed could be used in end products (ballast, industrial material) and replace natural gravel in different applications and where in Sweden you can find these bedrocks? (SH)
- How to develop combined novel pre-treatment and metallurgical operations, to make full use of ore concentrates, scrap and residues in order to maximize the economic outcome and minimize the environmental impact of the entire process chain? (SH)

Why? Increased knowledge from research on how to apply economic theories and methods (including cost-benefit analysis) to questions related to different goods and services from our natural resources is necessary for a sustainable development and for a cost efficient adaptation to climate change.

Land Management

- How to achieve sustainable soil management for efficient food production? (SH)
- What are the effects of recreation on human health and economic aspects of multiple uses of forests under the influence of climate change? (CN)
- How the inclusion of reuse as an opportunistic component can be used in industrial maintenance strategies (IA)

Why? There is still a great need of increased knowledge on how to balance the demand from society to the natural capital. Development of new methods and how to implement measures for a secure and sustainable development using the natural capital in a resource efficient way, is highly needed due to urbanisation, present life-styles and climate change.

Net Impact

- What are the socioeconomic impacts of strong environmental requirements in public procurement? (IA)
- What policy instruments can be used for stimulating the introduction of products on the market that are easily reused, repaired and recycled? (IA)
- How can development of recycling technology and efficient processes be used for sustainable resource recovery? (IA)
- How to develop methods for optimizing the sorting of data from the recycling process to produce and sell statistical overviews? (IA)
- How to do evaluations of the pros and cons of further developing the Ecodesign Directive? (IA)
- How to achieve changes in human behaviour, e.g. consumption patterns (driving forces, motivation, social and psychological effects)? (SH) (IA)

Why? Today's use of the natural resources still needs to be accompanied by an increased knowledge of how to generate strategies and measures for increased resource efficiency, decreased environmental pressure and improved businesses. Steering and governance processes are important for an efficient use of natural resources and to manage potential conflicts. By further research on how to apply a systems perspective on production activities and consumption patterns, improvements of resource efficiency and avoidance of negative effects of exploiting land and other resources, can be achieved. Environmental ethics and taking long term responsibility for "new" solutions and products is also important.

SW-4 How to reach sustainable urbanization?

This research area deals with several of the societal challenges which contribute to the built environment. The impacts of climate change as well as a number of societal trends, including rapid urbanization, ensuring development in peripheral areas, increased migration and an aging population, have led to the need for a more efficient, sustainable and productive built environment. These trends increase the pressures on resource use and existing urban infrastructures. This research area is also related to the functional built environment, regional development and increased competitiveness at the European and global scale. It is important in this area that authorities have the funding and mandate from the government to prioritize these measures and find ways to include all relevant actors (including civil society and the private sector) in addressing these challenges.

The Formas Evaluation of Swedish Building and Planning Research (Formas, 2013) mentions that research from the larger (technical) universities is quite practically-oriented towards Swedish building and planning practices and that the international dimension to such research plays a smaller role. The evaluation also mentions that more fundamental research is needed to ensure a research environment that is capable of meeting new societal challenges.

Following the conceptual model of INSPIRATION, specific topics marked “SH” originate in stakeholder interviews and the workshop and those marked “CN” originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demands

- How can both densification and greening of cities be achieved? (CN)
- To what extent is increased underground building a viable option for sustainable urbanization? (CN)
- What role do noise and vibration-free environments play in sustainable urbanization? (CN)
- How can accessibility to sustainable and modern energy be assured? (CN)

Why? Innovation and quality in the built environment is seen as important in order to deal with the challenges of climate change, densification of cities and migration, coupled with the need to build in a sustainable manner and transition to sustainable consumption and production patterns.

Natural capital

- How can the design and multifunctional use of green and blue-green infrastructures be adapted to climate change? (SH)
- How can pressure on, and loss of, urban biodiversity be reduced? (CN)
- How can natural resources be used for efficient supply of alternative and energy efficient building materials (CN)
- What are the effects of a changing climate on ground stability and landslide risks for safe infrastructures? (SH)

Why? This is seen as important to deal with environmental and climate change adaptation issues, e.g. flood prevention and the linkage of urban-rural areas, while at the same time improving nature and people’s well-being, is imperative.

Land management

- How to design technologies and planning tools for climate change adaptation of resource efficient wastewater systems for a sustainable built environment? (CN)
- Which tools can be used for planning for effects of sea level rise and flooding i.e. adapted building in areas near coastal areas and waterways? (SH)
- Innovative technologies and processes for handling polluted materials and polluted land need to be developed as well as planning processes when building on old deposits and polluted land (SH)
- How can heritage governance of the built environment be ensured in a changing climate? (SH)
- How can we increase planning and preparedness for health threats due to heat waves and other severe climate change impacts? (SH)

Why? Again, the effects of a changing climate on the built environment and processes to manage infrastructure systems are still in demand. Both buildings and infrastructure need to be energy-efficient and resilient to climate change impacts as well as being socially sustainable (Formas “Meeting Societal Challenges”, 2015). New developments should also be sustainable, and urbanization processes need to be developed further.

Net impacts

- How can collaboration be improved and conflicts of interests avoided in urbanization processes? (CN)
- What are the barriers to sustainable development in the built environment (identified by all types of stakeholders, e.g. insurance, industry, authorities)?

Why? There is general agreement that all types of relevant stakeholders should be involved in decisions regarding the built environment and quality of life. Involving stakeholders in helping to elaborate applied-research questions can aid in the net impacts that such research (and ensuring policy decisions) might have. At the same time, examples from international research projects can be instrumental in providing Swedish research with “best practices”, new methods and processes.

SW-5 Sustainable agriculture and food production

In the strategic research program for *Future Agriculture*[5] *– Livestock, Crops and Land Use* (Bengtsson *et al.,* 2010) six major challenges were identified:

- Reduction of the environmental impact of agriculture and mitigation of climate change
- Adaptation of agriculture to a changing climate
- Management of present and potential risks
- Responses to societal values and contribution to policies
- Agriculture and rural development
- Resolution of conflicting goals of agriculture and land use

Another relevant publication is "Scenario Development as a Basis for Formulating a Research Program on Future Agriculture. A Methodological Approach (Öborn et al (2013)).

Based on above mentioned challenges, knowledge gaps were identified and used to identify key research questions. Some of the questions, listed below, are relevant from the perspective of physical planning and land use, and need to be addressed to prepare for an unknown future.

Following the conceptual model of INSPIRATION, specific research topics marked "SH" originate in stakeholder interviews and the workshop. Those marked "FA" originate in research goals identified by the Future Agriculture platform. There are also some common research needs identified marked with "CN".):

Demand:

- How can we achieve a sustainable food production in terms of quantity, quality, and minor environmental impact? (SH)

Why? Swedish agriculture faces the challenge of maintaining a balance between increasing its efficiency per unit (i.e. per hectare or per animal) and at the same time meeting society's demand for improvements in product quality, and invention of new products such as bioenergy. This is also in line with the increasing consumer demand for food produced in an ethical and environmental way. All of this requires further research and development.

Natural Capital *(FA)*

- What are the functions of different kinds of organisms and populations in real production systems?

[5] Future Agriculture is a strategic cross-disciplinary research platform at the Swedish Agricultural University, SLU, in which researchers, together with the agricultural sector, authorities and nongovernmental organizations, develop research to address the sustainable use of natural resources with emphasis on agricultural production, including farm animals, and land use. The aim is to function as a hub for knowledge synthesis and dialogue transfer between academia, industry and society, foster a new generation of agricultural researchers, and provide Swedish and international actors with science based knowledge to facilitate strategic decisions. More information regarding Future Agriculture is available at http://www.slu.se/en/collaborative-centres-and-projects/future-agriculture/.

- How can crop species and varieties, and livestock species and breeds, be adapted to new climatic conditions, such as higher temperatures, longer drought periods and extreme weather events, and what is the potential for domesticating 'new' species, e.g. to utilize marginal areas or organic waste?
- How can resource use efficiency and production be increased on agricultural land while maintaining ecosystem services, biodiversity and animal welfare?
- How can integrated systems, at different scales, for crop, livestock and energy production be designed and evaluated?
- Which options for new land uses are available and what are the potential advantages and disadvantages of using more land for different types of agricultural production?

Why? Adaptation of agriculture to a changing climate is necessary and the above mentioned issues are crucial for land management based on understanding the systems, processes and functions and in a changing climate.

Land Management *(FA)*

- What is the normative status of different forms of agricultural production of food, feed, energy etc., i.e., are they perceived as right or wrong in society?
- How do political processes related to climate, the environment, biodiversity, trade, rural development, animal health and welfare etc. lead to international, regional and national agreements, policy instruments and laws supporting or restricting agricultural land use and production?
- What are the effects and consequences of various international agreements, policies and laws on agricultural production and land use?
- How can threats to food security caused by climate change and other ecosystem changes or collapses be managed and avoided?
- How do agricultural production systems constitute threats for ecosystem resilience, and affect risks of ecosystem and environmental collapse, and climate-induced catastrophes?

Net Impacts

- What are the effects of increased competition for land based resources on producer prices and the economy in the agricultural sector, e.g. more large-scale and specialized production, or integration of production in new kinds of ownership and collaboration? (FA)
- What is the importance of different forms of land tenure, ownership, and collective action for agriculture and rural development? (FA)
- How do urban and rural areas interact through flows of natural resources, goods, energy, ideas, capital, people, and through means of transportation? (FA)
- How can economic and social sustainable development in rural areas and food security in cities be combined? (FA)
- What are the conflicts and trade-offs between different agricultural land uses, including conflicts between goals, different techniques and land management systems? (FA)
- What are the possibilities for resolving conflicts between urbanisation and agriculture, e.g. urban planning, urban farming and small-scale production in urban or peri-urban areas? (FA)

- How can trade-offs and synergies between ecosystem services, production, climate impact, biodiversity, animal and human welfare and health be identified and managed? (FA)
- What are the possibilities for multiple-use and multifunctional systems to resolve conflicts in agriculture and land use? (FA)
- How can agriculture mitigate land degradation and environmental pollution? (FA)
- How can nutrients, water and wastes at different scales be recycled more efficiently? (FA)
- What are the environmental and climate impacts of structural changes in agriculture– specialization versus integration, small scale versus large scale, and geographic localisation? (FA)
- How do human activities and behaviour affect food and water quality and production – We farm near and “on” the water, but little research today is done on the effects of exploiting land. (SH)

SW-6 Sustainable forestry[6]

Developing management strategies to ensure a sustainable forest landscape in the face of increasing societal and environmental pressures is a major challenge. To ensure the sustainability of Swedish forests and forestry, decision-making must be based on a solid scientific understanding of the relationships between climate change, ecosystem functioning, and the biophysical and social consequences of human intervention. There is increasing pressure on forestry to maintain, or even increase, biomass production in the boreal region. This does not necessarily mean other ecosystem services such as biodiversity or recreation will be unduly impacted, or that we will jeopardize long-term sustainability of soils and cause unacceptable deterioration in water quality. But it does mean that we need to use state-of-the-art knowledge to develop improved management-support tools. There is therefore an increasing pressure on the research community to integrate the wealth of biophysical and social science findings to create new knowledge that can strengthen forest governance and policy.

In the Future Forests program[7] five overarching questions have been identified to evaluate the sustainability of forestry in a contemporary and future perspective. These are marked (FF) below. Also, other research topics are covered, marked (SH), which were proposed by stakeholders.

Following the conceptual model of INSPIRATION, specific topics marked “SH” originate in stakeholder interviews and the workshop and those marked “FF” originate in the Future Forests Programme. Those marked “CN” originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demand

- How can we combine a sustainable and multifunctional forestry and ensure accessibility to eco-system services (CN)

Why? Managing forests sustainably means increasing their benefits, including timber and bioenergy, to meet society’s needs in a way that conserves and maintains forest ecosystems for multipurpose use. How to meet society’s demands require further research.

Natural Capital

- Is the long-term sustainability of base cations threatened by biomass removal and how does this affect soil and surface water acidification? (FF)

[6] The introduction text was provided by Hjalmar Laudon, professor in Forest Landscape Biogeochemistry, Swedish University of Agricultural Sciences.

[7] The Future Forests programme leads the interdisciplinary scientific development of forest governance and management science in Sweden. The programme started in 2009 in recognition that sustainable management of forest is a major societal challenge, where decision-makers must be able to merge scientific knowledge with differing perspectives on sustainable forest management. http://www.slu.se/en/collaborative-centres-and-projects/future-forests/about-future-forests/

- How is biomass grown and utilized as efficiently as possible from an economical as well as environmental viewpoint and how can forest residues, for example stumps, be used in bioenergy production (in a lifecycle perspective)? (CN)

Why? Forests cover about sixty percent of Sweden. Ample opportunities therefore exist to use its biomass for different purposes. Forests play an important role in tackling climate change. The trees can be processed and used to replace other materials in buildings or replace fossil carbon in fuels. Continuous research is needed to increase knowledge of both positive and negative aspects of different forestry practises and how to increase efficiency of uses of forest resources.

Land Management

- How can landscape approaches be used to improve the sustainability of forests and forestry (FF) and how can forest planning and management be adapted to climate change? (CN) What are the economic aspects of multiple use of forests under the influence of climate change? (CN)

Why? Due to the high pressure on land use today it is important to find solutions for how to utilize land in several different ways, including recreational use and values. It is also necessary to adapt plant choices and management to changed climate conditions. Increased knowledge of how biomass is grown and utilized as efficiently as possible from an economical as well as environmental viewpoint is fundamental.

Net Impact

- How is carbon sequestration in forests soils affected by different forest management strategies? (FF)
- How does forest management affect nutrient dynamics in soils, leakage to surface waters, and eventual export to the Baltic Sea? (FF)
- What is the contribution of forest cover to water quantity and quality, and how do different types of silvicultural systems affect the overall health of surface waters? (FF)

Why? The broad utility of forests for production, recreation, rural development and environment require continuous new knowledge to meet the changing sector and society needs. Forest operations regain an increased focus, i.e. wood flows, logistics and road construction and maintenance. Research on net impacts of e.g. new infrastructures for sustainable forest management and wood fibre for energy purposes is required. New methodologies and technologies in forest management are needed due to climate change adaptation and have to be reflected with the use of software and GIS applications. System analysis for sustainable bioenergy production from forestry resources are also needed (CN)

SW-7 Management of contaminated land, groundwater and sediments

Contaminated land, groundwater and sediments relate to several of the EU-challenges. Contaminated soil and sediment pose a particular problem since most pollutants (metals and organic contaminants) do adsorb to organic and mineral particles, contaminants accumulate and reach concentrations often several orders of magnitude higher than in water. The contaminants are often also less biodegradable when they are adsorbed to particles and the polluted sediments and soils will constitute a new chronic source of contaminants, years and decades after the emissions have stopped. Traditional remediation generally consists in excavation or dredging and landfill disposal, which is both highly disruptive to the environment (e.g. destroys habitats and cause re-suspension of contaminated particles) often expensive and it is questioned whether it is a sustainable solution. There is often also a long time-lag between when the emissions took place and when the sites are remediated. Climate and geological changes can accelerate these problems. E.g. the northern coastline of the Baltic Sea is subject to a post-glacial land uplift, which is revealing large amounts of deposited and highly contaminated fibre residues from the paper- and pulp industry and "sediment slides" cause a release *en masse* of sediment-bound contaminants. The fibre masses contain extreme concentrations of e.g. PCBs, dioxins and mercury and contaminant concentrations in eagle eggs are rising again. Ecosystem and ecosystem services are threatened at several levels, resulting in human health and ecological effects as well as economic and social effects.

New solutions are needed in order to on one hand reduce new emissions, i.e. prevent them from accumulating in the environment and on the other hand to remediate already polluted soils and sediments.

Several international and national research agendas deal with contaminated land[8]. It is stressed that "solutions oriented" research on environmental pollution is needed in general and specifically for risk assessment and remediation of contaminated land and sediments.

Specific research topics:

Demand:

- Research related to the "risk concept": Probability and consequences; what are acceptable levels of risk? How can we "live" with risks? Individual or societal level views in risk assessment. What is the intrinsic value of the environment?
- What environmental ethics aspects are relevant in contaminated land management and how can we take long term responsibility for "new" solutions – in the light of history and related to the use of ecosystem services
- How can we re-use excavated soil and minimize excavation of "clean" soil. How can we make use of contaminated sites as such (fit-for-purpose).

[8] e.g. the BONUS strategic research agenda 2011–2017, the SGI surveys on contaminated areas, VR1550 (2015), Background analysis and recommendations to the governmental bill on research and innovation.

Why? Risk based decisions usually include various kinds of valuations, although the grounds for these are not always clear. How can and do we value nature in sparsely populated areas (today) in comparison to densely populated areas, or value nature for today's population versus future generations?

Natural Capital

- How can we better understand, address and describe contaminant behaviour in the land-water-sediment system including; effects from secondary sources; sediment processes in situ (such as natural attenuation, compound transformation, and natural capping/burial) and "new"/emerging contaminants and their interaction with the soil-water-sediment system (research on toxicity, bioavailability, physicochemical properties, fate and transport, analytical methods (low detection limits))?
- Innovative strategies, methods and tools to sample/characterise and assess contaminants in bedrock, soil and sediment need to be developed. This includes assessment and modelling of contaminant "source to sea" and *in situ* transfer (flux) between and within (including bioavailability) compartments (sediment, biota, water). Also, biomimetic methods (for bioavailability and effect assessments) that can be used at early Tiers (Tier 1 or 2) methods (i.e. quick and inexpensive) need to be developed.
- We need to find or define indicators and descriptors of effects of contaminants on organisms (e.g. biomarkers) and on ecosystem services (e.g. mineralization of organic matter, plant production, healthy fish populations, and safe fish for consumption).

Why? We tend to focus on one medium at a time in research and fail to provide knowledge on the S-S-W-system needed in order to efficiently manage contamination in practice. We need a holistic view on the distribution, bioavailability and effects of environmental contaminants and an understanding of the interaction between compartments (soil-water-sediment-biota). Also, as primary sources, i.e. new emissions are dealt with, secondary sources become more important. Further, current risk assessment procedures for contaminated sites rely on guidelines that were developed for land sites and there is an urgent need to develop guidance, tools and methods suitable for contaminated sediment sites. With REACH and national restrictions we have become better at reducing our contaminant emissions. Still, however, "new" contaminants such as PFAS-substances are encountered in soil, groundwater and sediment and have to be dealt with.

Land Management:

Development of tools and methods for sustainable management and planning:

- How can we best prioritize between *contaminated sediment areas* with respect to protection of the water recipient (lake, sea) at a regional and national scale or prioritize between remediation options at a site?
- How can we assess climate related risks and "geotechnical risks", e.g. contaminated sites at locations vulnerable to flooding or land slides?
- Innovative and cost effective methods need to be developed (*in situ* or on-site remediation, more efficient "dig-and-dump" measures, remediation methods for

contaminants in the bedrock in general.) Also, long term monitoring is needed to provide feedback, and improve remediation techniques.

- Statistical and modelling approaches need to be developed, or adapted to the purpose, for determining so called “representative concentrations” (with respect to heterogeneity, variability) to minimize risk of over- och underestimate need for remediation. We also need to evaluate how information technology could be more efficiently used in contaminated land and sediment applications (e.g. new monitoring techniques, GIS techniques for mapping etc.).

Why? More sustainable remediation methods are needed than traditional excavation and landfilling. Also, in order to take on societal challenges new solutions and techniques should benefit from the advances in information technology. In general, environmental practices are still traditional and e.g. costs/measurements are high, resulting in few data. Continuous or long term measurement could provide e.g. a basis for research and for evaluating measures taken. Better/faster sensors as well as interfaces for data collection (apps) and presentations are needed.

Net Impacts

- What are the effects from diffuse contaminant sources or sum of contribution from many ”small” sources, from contaminant mixtures and what is the impact of contaminant sinks (such as sediments, fibre banks etc.) on ecosystem services in the light of land uprising and climate change?
- What are the risks from “new”/emerging contaminants? We need research on toxicity, bioavailability, physicochemical properties, fate and transport, analytical methods (low detection limits), especially PFAS-substances, fertilizers, pharmaceuticals, “unknowns”).
- How do approaches aiming at integrating social, economic and ecological dimensions in decision making succeed in meeting the original goals in real applications?
- Assessments of the net effect of remediation measures - what risks are actually reduced and to what extent are risks elevated by the remediation measures, e.g. spread of contaminated sediment due to excavation? In what time perspective?
- Research on long term efficiency, effectiveness and sustainability of remediation alternatives. This should include long-term monitoring to verify assessments and sustainability in solutions (e.g. long term performance of mitigation measures for vapour intrusion in buildings from volatile contaminants, of stabilized and solidified contaminated soil or sediments, of capping of sediments).

Why? Contaminated land management, strategies, tools etc. are to a great extent focused on the most hazardous point sources/single contaminants and questions arise whether we underestimate the threat from the many sites that have not individually been ranked as the worst contaminated ones, or from secondary sources. Decision support tools and approaches are generally intended to support informed decisions that are aiming at sustainable solutions. Transparency is a key component. Tools need to be easily accessible and user-friendly, in order to be used in practice. However, tools tend to be based on underlying (often complex) theories, equations as well as assumptions and simplifications or even judgment of values that may, or may not, be agreed but are “built in” in the methodology. In order to manage contaminated sites more sustainably we also need to learn from measures already taken.

SW-8 Biodiversity and ecosystem services

This interdisciplinary research area is relatively new and one of the major challenges is how knowledge can be better used in the management of ecosystem services and biodiversity by for example central government agencies, county administrative boards, municipalities and industry. Land and soil are sources for important services for human well-being and as such they provide a near-term stimulus to economic growth (Vincent, 2012). Land use and land use changes are closely related to biodiversity and ecosystem services. The complexity of the area can be illustrated by the not obvious trade-offs between climate change and biodiversity and how to determine what degree of climate change that corresponds to what change in biodiversity (e.g. Andersson et al (2012) and Olsson et al (2012)). Formas (2015a) analysed on-going research, knowledge gaps and needs and identified several concerns. The research topics below origin in this analysis.

Following the conceptual model of INSPIRATION, specific topics marked “SH” originate in stakeholder interviews and the workshop and those marked “CN” originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demand

- What are the differences in valuations of stakeholder, individual and collective values, what is the temporal and context dependence of valuation, what methods can be used to in practice to manage values expressed in different terms (monetary, qualitative, quantitative) and how is precision in the valuation of different types of ecosystem services best achieved?

Natural Capital

- Which are the functional links and causal relationships between biodiversity, ecosystem functioning, ecosystem services and benefits?
- How can ecosystem functions in practice be measured and compared and how can awareness be raised of what can be measured at present?
- Which are the thresholds related to ecological and social resilience, with focus on how the concept resilience can become operational and used as a communication tool?
- How can/is/should less evident/visible ecosystem functions and services be included/accounted for, such as soil processes and certain cultural ecosystem services?

Land Management

- Trans-sectorial instruments for steering and governance are needed, and need to be assessed. How do different instruments affect each other and which are the effects of different levels and ambitions in the instruments?
- What are the institutional change requirements linked to, among other things, property rights, governance and solidified norms and values?
- How and with what instruments for steering and governance can we handle changes in society, in values and preferences?

- How do different trans-sectorial instruments for steering and governance affect each other and which are the effects of different levels and ambitions in the instruments?

Why and what?

Innovative instruments for steering and governance and scenarios and predictive and experimental approaches (e.g. ecological compensation) and models are needed. This includes a need of development of instruments as such and a need for processes for adaption and follow-up of instruments developed and used.

Net Impact

- What is the effect on biodiversity and ecosystem services when introducing them in planning processes such as environmental impact assessments and spatial planning?
- What is the connection between life style and consumption of ecosystem services and the consumers' dependence of and effect on ecosystem services including issues related to consumer awareness and responsibility?
- What are the effects of introducing economical risk assessment in e.g. environmental impact assessments?

SW-9 Communication and implementation: Societal reach and impact

Research *on* societal reach and impact should be of interest to funders as well as researchers as societal relevance and impact are becoming more and more important in motivating official and private funding and in evaluations, as mentioned by several NKS. The Formas Report (2015c) “Meeting societal challenges” concludes that there is a need to move away from traditional communication of results and data to a focus on reliability, trust and other soft values. Much of the societal relevance and practical impact of research is driven by how research is communicated and used as the basis of implementation in policy decisions and/or planning practices. It would be a good investment to allocate some funding on this research from research budgets within the scope of INSPIRATION (land/land use, soil-water-sediment). Examples identified are listed below:

Land management:

- How can tools and processes, novel possibilities related to Information Technology be developed?
- How can research questions be formulated from and adapted to specific stakeholder needs?
- How can the governance challenges and regulatory issues in integrating climate change intersectorally be addressed?

Why? There is still a need for finding novel ways to include relevant stakeholders in the research agendas, as well as in individual projects. The governance preconditions for research (e.g. jurisdictional and normative backgrounds) are also essential to understand how research can influence policy implementation. The Formas report “Meeting Societal Challenges” (Formas 2015c) asserts the importance of communication strategies between decision makers, scientists, practitioners and the public and involving them not only as the beneficiaries of the research results, but also in the “co-production” of knowledge.

Net impacts:

- What communication approaches/techniques/strategies/activities are efficient in practice (Cost/benefit)
- How can behavioural studies of how emotions and other “soft” factors affect decision making for land use questions?
- How can concepts of ecological and social resilience (i.e. thresholds and breaking points) be operationalised and used as communication tools?
- How do stakeholders value ecosystem services and how can these result in social, economic and environmental development?
- How can adaptive processes for the development, adaptation and assessment of ecosystem instruments be developed and how can they deal with change?*
- How do learning processes and implementation in various types of organisations help to implement ecosystem services?*

Why? Communication and involvement strategies demand time and resources, both for the researchers and for the users of knowledge. It is important to evaluate the costs and benefits of such strategies in order to make them as efficient and fair as possible. Understanding the human and behavioural elements (humanistic studies) of how knowledge of natural/technical science and land use planning are implemented and communicated is an area of that would better help to close the science-policy gap. Understanding learning processes, adaptive governance and instruments for implementation and valuation methods which include stakeholders are gaps identified in the Formas report “Analysis of research on biological diversity and ecosystem services” (Formas 2015a).

*from Formas 2015a “Analys av forskning om biologisk mångfald och ekosystemtjänster”

2.4 Experiences regarding connecting science to policy/practice

2.4.1 Use of knowledge

Defining scientific knowledge

Interviewees found it hard to judge how scientific knowledge differs from other types of knowledge, such as that possessed by stakeholders, consultants and other actors. These other types of knowledge are also very useful in addressing societal problems. Scientific research is not just delivered by universities and research institutes, but also by consultants or national and regional authorities, who can have a deep knowledge of an area.

In the NKS workshop the topic of what defines “scientific knowledge” and how it differs from other types of knowledge was discussed and made more precise. Scientific knowledge should be: 1) evidence-based, 2) generalizable, 3) verifiable, and 4) replicable. Scientific knowledge must also be evaluated, peer-reviewed, published and searchable. There was some discussion on the extent to which data (databases) could be classified as “scientific knowledge”, but the consensus was that data must be analysed before it becomes knowledge and can then be used by relevant stakeholders. However, this definition of scientific knowledge and its publication in peer-reviewed journals often means that it is not “user-friendly” and does not always reach the intended end-user groups.

Use of scientific knowledge

Most of the national and regional authorities interviewed regularly used scientific knowledge (almost daily) in their work, either as users and/or producers of such knowledge. It is important for authorities to also have sufficient knowledge capacity to pose the right follow-up questions to researchers and to themselves look for further possibilities to employ knowledge. They stressed the importance of policy-relevant and applied research, even though scientific peer-reviewed research is seen as a very important quality assurance. Most of the non-knowledge provider interviewees saw their role in “translating” and distributing scientific research further, for instance to branch organization members, or to municipalities, and other users.

The term “knowledge broker” is being used more and more in Sweden. These brokers aid in the process of translating societal needs to research questions and in transforming research results to new forms of information to increase its usefulness and societal relevance. This may be a role that national authorities can play. “Packaging” research from basic research to applied research and then in a form that can be used by decision-makers was seen as an important task. Thus, the key is to make research seen and heard by user groups. However, sometimes this packaging can be misleading if stakeholders only hear from the “rock stars” of research because they are best at promoting their research. But what about others that may do more robust research but don’t have the channels in to the users? A lack of understanding on quality requirements in provided data (e.g. in risk assessment of chemicals) makes it hard for authorities to make use of existing data from research, even though the use by authorities is referred to in motivation of societal impact in research applications.

Sources of scientific knowledge

Swedish interviewees from all areas were largely in agreement about the main sources of scientific knowledge they used. The types were mainly scientific papers, reports and web-sites (such as the Swedish portal for climate change adaptation portal: www.klimatanpassning.se), but most also stated that exchange of best-practices, both nationally and abroad were great sources of practical scientific knowledge. Interviewees also noted that one of the best forums for exchange of information between knowledge providers, knowledge funders and knowledge users was conferences where scientific information was presented in a policy-relevant way to both users and funders.

There was general agreement that Open- Access scientific publications helped to facilitate the access to and use of scientific publications by end-users and other researchers.

Use of state-of-the-art research findings

One regional authority interviewee stated that sometimes there is a grey zone between “basic research” and research that has been surveyed or collated. It is hard to be sure that the “research” used or “ordered” from research institutes is really state-of-the-art - that is, if it represents a thorough survey of all research or if it is just a cursory or partial survey. Often the methods used to do this type of research are not presented, and it is hard to use it as a basis for making policy decisions.

Good examples of state-of-the-art knowledge are the “Governmental investigation on climate change and provision of drinking water” (SOU 2015:51) where the investigators were careful to include all existing knowledge and the governmental report “Sweden facing climate change – threats and opportunities” (SOU 2007:60), which is still seen as an important synthesis today and has influenced policy.

It is more difficult to judge to what extent state-of-the-art research has been used in the formulation of policies. While state-of-the art research was considered to be quite good in Sweden, there are ways that this type of research can have a greater utility for society. One way that state-of-the-art research can have a better impact is if individuals rotate in positions between several areas of the “triple helix model”. An important comment is that research institutes coupled to relevant authorities is more common abroad than in Sweden, and that targeted and long term research based on policy needs are easier to accomplish when this is the case.

2.4.2 Possibilities to set the agenda

Respondents felt that they today have rather good possibilities to help set the national research agenda in Sweden. Regional authorities feel they have possibilities to influence the research agenda in a number of ways. One way is by responding to questionnaires sent by universities and national authorities that do research. In this manner it is possible to lift pertinent questions up to the research agenda. Other ways to influence the research agenda are to be representatives on various reference groups or to be policy advisors for investigations or research projects. Respondents also had possibilities to provide input into the upcoming Research and Innovation governmental bill. For some specific issues of high societal interest or attention (e.g. PFAS), groups are initiated comprising researchers, consultants, authorities etc. This attention also results in more focus these issues on the research agendas and in funding opportunities.

National policies/agendas sometimes reflect specific needs of stakeholders, but not always. For instance, stakeholders feel there is no national climate adaptation strategy in Sweden that would help their work. The government has power via financing to universities and authorities that do research, but most of the financing to national authorities is not long term. Thus, more long-term permanent research solutions are needed in e.g. climate adaptation for knowledge dissemination and for funding of adaptation measures. In another case, some of the Swedish environmental goals are not well thought out and hard to implement. There is also a need for research financing authorities to *better link national goals with allocating of funding*. Governance processes at all policy levels in e.g. the remediation of contaminated soils area are often dependent on specific persons and more work should be done to make these processes more transparent and institutionalised.

2.4.3 Science – policy – practice

Involvement in research

Many national authorities in Sweden also do their own research in the areas covered by INSPIRATION – soil management, land use, water, spatial planning and climate change adaptation and thus they are often involved directly in research applications in Sweden. Regional authorities are also occasionally involved directly in research applications, i.e. as a stakeholder partner responsible for communication and contribute with work-in-kind. Some private organizations and NGOs work with facilitating the science-policy interface in communication of research results, promoting the “triple helix model “and in syntheses of research and organising match-making events.

In general, interviewees thought that the earlier stakeholders (like regional authorities) can be involved in research projects, the better, and for some it is a pre-requisite to be able to take part in the formulation of research questions to take part in the project. Through collaborative and knowledge co-creation processes, stakeholders can influence research throughout the life of the project. A good example mentioned is the requirement that Ph.D.-students actually spend time and perform research at the involved authority or institute. Another way for users be involved in research is to suggest case study sites and be involved

in matchmaking meetings like those that preceded the Tuffo-Formas call ”Efficient Remediation of Contaminated Sites”[9].

A further suggestion that emerged during the workshop for involving relevant stakeholders to a greater degree in research is to involve them formally in projects as “implementers” or give them a role as a work package leader for implementation. This would help to ensure that the results of the research are actually being used, as far as possible, and strengthen their involvement in the project.

One of the challenges is that research should not be considered as finalized after a scientific publication. Some of the branch organizations and authorities see this as just the beginning of the process. While peer-reviewed publications are important in order to ensure scientific excellence, most users of the knowledge rarely read scientific journals and publications as they often end up in expensive and non-accessible publications. Thus the research appreciated, but difficult used in implementation of dealing with the societal challenges. One of the challenges for scientific research is to disseminate results to both the scientific community and to users. An example of this in Sweden is the strategic research program for MistraPharma which is a tool to develop important tools for the users and the policy process.

How is societal impact being assessed?

Sweden is currently in the process of exploring how the societal impact of scientific knowledge can be assessed and evaluated. The Formas report “Meeting societal challenges” (Formas 2015c) is a good example of this effort. In Sweden, assessment criteria for research applications generally include both scientific quality and societal relevance. However, some interviewees found the instructions for what is assessed as high societal value (especially communication with stakeholders/end users) somewhat unclear given that communication and implementation opportunities vary between different types of projects.

In 2015, (Swedish Research Council, 2015) following a national decision to fund 10 Strategic Research Areas, four research councils evaluated[10] the impact of the research strategy addressing the questions:1) How has the research been planned and steered (‘strategic management’)? 2) What is the quality, results and effects of the research? 3) What has been the strategic significance of the initiative for society and for the business sector? 4) What is the state of collaboration between universities and with other stakeholders? 5) What is the state of the link between the strategic research and education? The main strength of the strategic research investment has been its long-term focus. Shortcomings were mentioned in linking the strategic areas to the needs of society and the development of undergraduate programs and courses. Around 20 percent of the strategic research environments were facing challenges, both in respect of their research quality and their strategies.

[9] http://www.swedgeo.se/sv/vagledning--verktyg/fororenade-omraden/forskning-och-teknikutveckling/tuffo1

[10] https://publikationer.vr.se/produkt/evaluation-of-the-strategic-research-area-initiative-2010-2014/

Examples of assessing societal impact in Sweden:

- Formas has been commissioned to analyse how Swedish research funding has made an impact in meeting societal challenges in the areas of Environmental Sciences, Climate Sciences, Agricultural Sciences, and Building and Planning Sciences. The Formas analysis performed by a Nordic expert group was based on *case studies* provided by universities (Formas 2015c "Meeting societal challenges).
- Mistra (www.mistra.org) does stakeholder investigations in parallel with research projects and the MistraPharma is often mentioned as a good example. In the water sector there are a number of reports/evaluations on how scientific knowledge is used.
- In a survey and analysis of Swedish research institutes (Kontigo, 2015), the institutes and their effect on impact and reach of research was evaluated.

In terms of "measuring" or assessing the societal relevance of projects (and the SRA), workshop participants stressed the importance of following up on projects and the results, effects and impacts they may have made, after the life of the project. This, however, requires resources, either on the part of the research funders, or as integrated into longer-term projects that allow for the follow-up (and follow-through) phases.

Several indicators of societal impact were identified in the interviews and discussed in detail during the workshop. The focus was on developing **qualitative** indicators, rather than only **quantitative** indicators. A distinction was made between **long-term indicators** that could measure effects and impacts of research further in the future, and **short-term indicators**. The problem with long-term indicators is that there is often a long time-lapse between the end of a project and when the impact may be felt. There is also the problem of establishing causality, as it may be impossible to attribute the result of a project to an actual outcome (which may be the result of other factors). Thus it is difficult to quickly and easily assess societal impact.

Societal "reach" may be a possible proxy for impact and give an indication of the potential impact of research by the extent to which it involves relevant stakeholders in research and communicates its results to end-users, the academic community and branch organizations.

During the workshop the three most important indicators chosen for societal impact and reach of both the SRA and individual projects (in order of relevance and practicality) were:

1. How relevant stakeholders involved in R&I-projects
2. How project results can directly be implemented in consulting/policy/or other relevant implementation route
3. How R&I-projects or R&I-applications bring in relevant and professional resources for communication and implementation

The full list of indicators and their further elaboration is provided in Annex IV.

References and recommended documents that deal specifically with the Science-policy interface are found in Annex II and marked **(SPI)**.

2.5 National and transnational funding schemes

2.5.1 Funding schemes and possibilities for research funding

Experiences and expectations

A positive trend experienced is that several national funders have opened up for research and innovation on solutions to societal challenges and also included a focus on the national environmental goals. The VINNOVA calls "**Challenge driven innovation**" and Formas Sustainable development of the built environment are mentioned as good examples. Also **BIG** ("Branschsamverkan i grunden" or "**Industry collaboration in the foundation** www.big-geo.se/) is mentioned as a good example, especially with its intention to last as a Programme for 10 years. BIG focuses on the efficient and secure foundation of transport infrastructure.

Swedish Water Development (SVU) is the local authorities' own R&D program on municipal Water & Wastewater technology. The business is predominantly focused on applied research and development in the interest of Swedish Water members. The SVU has continuous calls relates to the Soil-/Sediment-/Water-system. The demand for stakeholder involvement and dissemination is high, and this funder offers good opportunities for future research within the scope of INSPIRATION.

Internationally the **SNOWMAN Network (www.snowmannetwork.com)** concept is mentioned as a good example of transnational calls. The added value compared to other calls is the focus on interaction and dissemination, not only with respect to stakeholders but also between funded projects. In joint meetings possibilities for interaction and added values are addressed. There has been continuous follow up on dissemination activities by a Knowledge Dissemination Group which has also actively supported dissemination activities and as a result even more dissemination than anticipated and initially planned for is the case. Another added value of the meetings has been that they also served as matchmaking meetings between researcher and new constellations were formed for future transnational calls.

Swedish researchers also have high expectations in the **BONUS** program (Currently the Blue Baltic call, due March 10, 2016) and the **Water JPI**.

In a Nordic perspective, Nordic Innovation (www.nordicinnovation.org) and **Nordforsk** (www.nordforsk.org/en?set_language=en) offer possibilities. Nordic Innovation is a Nordic institution working to promote cross-border trade and innovation. Nordforsk is an organisation that facilitates and provides funding for Nordic research cooperation and research infrastructure.

Swedish researchers have also been very successful, and have expectations for the future, in the **ESPON (European Territorial Observatory Network)** (www.espon.eu) where transnational consortium provide applied research on subjects such as land-use, climate change adaptation, demographic issues and territorial governance

The above mentioned funding instruments constitute a few examples. In appendix V a list large number of National funding options is provided and some European funding options (main emphasis was on listing Swedish options).

Best ways to govern funding options so that societal demands will be fulfilled

Several actors have provided recommendations to the governmental bill on research and innovation, e.g. IQS (2015), VR1550 (2015)*, Svenskt Vatten (2015), SGI (2015b). The recommendations in documents, the interviews and the discussions in the Swedish Stakeholder workshop form the basis for the suggestions below.*

The Swedish NKS agree that there is not one best way of funding research directed towards fulfilling societal demands. A general need expressed by several stakeholders is, however, that the academic status of applied research is raised in order to increase the overall success rate in applied science applications in "open" calls. "Targeted" calls are generally considered better instruments today for applied research dealing with societal challenges. Also, targeted calls are often more "flexible" tools than open calls, and giving funders the possibility to try out different forms that can be adjusted over the years. Furthermore, keywords for taking on the challenges are transdisciplinarity, holistic approaches, transnational collaboration, needs-based and solutions-oriented research and stakeholder interaction and involvement from start to end. Along with securing these aspects in funding comes the added value of better reach and impact.

Some important key issues or aspects were mentioned as well as funding options that meet these key issues. The key issues were:

- Increased academic status of applied research.
- Project time – 3 year research projects is considered too short to include the implementation step properly in most cases
- "Real" stakeholder involvement from idea to implementation
- Efficient and relevant communication – communications plans important tools
- Solutions to societal demands may be "step wise", and opportunities to get funding to continue on successful projects can be important

In order to take on these aspects some funding options, or components in calls, considered successful (or that has potential to be successful) were mentioned:

- 2-step applications where the first step constitutes a sketch including the idea and the imagined/proposed consortia (including stakeholders). First step evaluation is based on the *potential* of the idea. A number of ideas pass on to step two. *This gives a high success rate and less involvement of stakeholders in ideas that do not get funding.*
- Opportunity for projects to build on project results in a second project, i.e. to take results a step further. Call 2 is open for call 1- projects, resulting in a possibility to take results a step further – and more likely towards implementation.
- Increased weight in evaluations of applications on societal relevance, users' needs and how results will be communicated and implemented efficiently in the applications.
- Separate communication and implementation projects that *continue one year after the research has ended*. A professional project communicator and a reference group works/interacts with the project during the project time and an extra year. (Ref Swedish EPA, the call "Storslagen Fjällmiljö").

- Specific requirements for each project granted to work on a communication and implementation plan with support from a professional communicator. (Ref the Swedish Centre for Innovation and Quality in the Built Environment)
- Including competence that can assess “impact and reach” in evaluation boards – and make sure that they have influence in the process.
- Formalising stakeholder interaction – An option can be to form “contracts” or agreements between researchers and stakeholders in order to make expectations and premises for engagement clear. This may include expected engagement in implementation as well as how stakeholders interact during the project.
- Funder interaction in matchmaking – active support towards good applications
- Clustering and synthesis: A funder may after a program or call, identify projects that have dealt with similar issues and fund a synthesis. This could support communication and implementation as well and constituting a platform for new research collaborations.
- Reservation of a portion of the funding budgets for longer-term strategic research programmes which can be sought by universities and research institutes, while the rest of the funding is earmarked for shorter-term applied research that is open to all categories of applicants. This is a way for national funders to deal with the science-policy gap.
- Follow-up or assessments by the funders after the projects are finalized (longer term perspective) as well as during the project. There should also be a plan to change the governing accordingly.
- New “forms” of co-funding - e.g. SMEs, local municipalities or different carriers of knowledge are given opportunities to participate. By allowing for greater financial contributions from economically stronger actors to finance participation of economically weaker actors in a “common pot” or that part of the project budget can be used for project related cooperation with SMEs (Formas (2015a)).
- Ensuring sufficient time between the call announcement and submission deadline for the call in order to form the relevant consortia, write a good application etc.
- Information to stakeholders when launching calls, in order to ensure early involvement.
- Calls for funding of long term (e.g.10 year) strategic innovation programs directed at identified challenges.
- Targeted calls directed towards challenges which lack strong research environments
- Demonstration and test beds. Challenge-driven research and innovation requires large investments, have long cycles, and is project-based and fragmented. New technologies, processes and methods need to be verified on a smaller scale before implementation on a large scale. There is also a need for resources for demonstration projects.
- Program for mobility between academia, industry and the public sector.

Several good examples were mentioned by the NKS:

- The Swedish Water Project Program. The program links together different problem-based topics and research constellations. This has also lead to better conditions for co-financing and a sufficiently cross-sectorial approach.
- MISTRAPHARMA – Success factors mentioned are long project time (8 years) and great focus on stakeholder involvement as well as the funder's (MISTRA) contact with the project throughout the project time.
- The SNOWMAN network calls, with specific attention to communication throughout the projects (SNOWMAN started as an ERA-net and ERA-Nets are in general mentioned as good examples by several NKS).
- The call "Storslagen Fjällmiljö" (Grand Mountain Environment), with its extra year focused on communication and implementation.
- "Concepts" as Test-beds, Living labs
- Biodiversa, BONUS & JPI Water

Possibilities to build on existing and new constellations of public and private actors in sectors such as water, contaminated areas or climate give better conditions for co-financing. These constellations tend to be successful as such. A mix is, however, often needed to ensure that certain problem-based questions do not fall between the cracks of different funders, or calls. But not all research funders or calls in Sweden set the same conditions or demands for such constellations. Some make co-financing a prerequisite while in some calls such co-financing or even coordination of use of different funds, can be difficult.

A suggestion raised in order to increase the financial means of calls is to nationally (or internationally) identify "small" funding sources and gather them in large national calls or if possible in "common pots". This could allow for larger budgets for each project funded, and an added value for the funders and that more projects are funded. The risk with this approach is that there may be research questions that do not fit in, are not covered or cannot compete (although important). Therefore, several NKS express the need to maintain a mix of funding mechanisms and that the advantages of a national mix (sometimes referred to as a "scattered" funding landscape) outweigh the advantageous of a few mechanisms with large financial means. Furthermore, the trend in research funding is to secure and ensure the societal impact of research, and the various funders try out different ways to achieve this. This provides a national portfolio of good examples and stepwise improvements in funding research that effectively contributes to solutions to societal challenges.

Several NKS mention the positive effects of "seed-money" or step-wise calls in which money is invested in the process of developing a project idea and concept and in building competitive consortia. These projects tend to be developed and performed in closer collaboration between stakeholders and researchers. It is also advantageous for international collaborations where the building of research consortia and the involvement of stakeholders are even more difficult and time consuming as well as costly.

2.5.2 Gaps in financial resources for research

Areas of R&I that are not yet covered by financing schemes

Only a few specific examples were given:

- One area falling behind is pipeline construction and maintenance. Several topics in this area deal with questions that do not fit in to Vinnova's funding scheme, even though they deal with competitiveness and export. Innovation procurement was also moved from Vinnova's responsibility and thus efforts there were ended. These could be pursued with EU-funding.
- The interface between land use and beck limnology also seems to have fallen between the cracks in funding opportunities.
- More research on the processes and the connection between knowledge and its use in planning and policy. Steering and governance of these issues are important, as well as how processes can be made more efficient and stakeholders can be better mobilized in planning processes.
- Polluted areas have been seen as topics in Nordic and EU calls (e.g. SNOWMAN). Formas supports environmental research nationally in open and targeted calls, but the success rate has been limited. Some NKS suggest that this may be due to the applied nature of the subject, and that targeted calls are needed. Targeted calls are, however, usually short-term and there is a need for a longer term program and a part that has specific responsibility for the funding of the soil-water-sediment field in relation to contamination and specifically solutions oriented research[11].

Integrated approaches

In order to perform research in a more trans-disciplinary way it is important to start working like this early, already in the stage of PhD writing. Trans-disciplinary courses are available now, but it takes time to get used to. It is also important that persons within preparatory panels recognize the added value of this approach. Targeted calls often succeed better with this, according to the NKS and even international funding opportunities, such as ERA-NET e.g. SNOWMAN and JPI provide good examples. Yet, additional platforms are needed and it is important that the different disciples can understand one another already at the beginning of the project application stage. A trans-disciplinary approach is also difficult to implement in smaller projects. Both writing the funding applications and implementing the projects demand more time and thus more funding than a single disciplinary project.

A good mix of different disciplines and stakeholders in research projects will continue to be important. Flooding/storm water programmes are examples of research topics that force actors to work together but there is still a lack of competence in certain areas. Other trans-disciplinary topics are the bio-economy, especially linked to innovation and resource recycling where systems analysis and environmental economists are needed. But these types of applications take time to write. Both natural scientists and social scientists need to "own" the questions.

[11] Since the interviews were performed, The Swedish Geotechnical Institute has, however, been given the opportunity to provide yearly funding within this area, by launching a first call in 2016 and providing funding for the first projects in 2017.

2.6 Annexes

Annex Ia: NKS interviews in Sweden

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
15-10-20	The Swedish Research Council, FORMAS	Elisabet Göransson, Lisa Granelli	1			1							1	1	1	1
15-10-21	Swedish Geotechnical Institute	Charlotte Cederbom		1	1	1	1						1			1
15-10-22	Repr of all Sw County Adm boards on behalf of EPA	Klas Köhler		1		1							1	1	1	
15-10-23	Umeå University	Mats Tysklind			1		1				1		1	1	1	1
15-10-27	Nordregio	Kjell Nilsson	1		1		1								1	1
15-10-28	The Swedish Water & Wastewater Association	Daniel Hellström	1	1	1				1	1	1		1	1	1	1
15-11-05	The Swedish Centre for Innovation and Quality in the Built Environment (IQ samhällsbyggnad)	Eva Schelin	1	1	1					1	1		1	1	1	1
15-11-05	Swedish Forest Agency	Hillevi Eriksson		1		1							1			1
15-11-09	Stockholm county adm board	Karin Willis		1												1
15-11-11	Stockholm University	Jonas Gunnarsson			1		1						1	1	1	

15-11-27	National Agency, Sweden	[12]		1	1	1								1	
15-12-03	Sweco	Anna Yman	1	1				1					1	1	1	1
15-12-04	Geological Survey of Sweden	Göran Risberg	1	1	1	1							1	1	1	1
15-12-04	Department of Environmental Science and Analytical Chemistry (ACES)	Marlene Ågerstrand			1		1						1	1	1	
15-12-04	SBUF (the construction industry's organisation for research and development)	Ruben Aronsson	1						1				1		1	1
15-12-08	NCC	Jan Byfors		1					1							1
15-12-15	Swedish Environmental Protection Agency	Marianne Lilliesköld	1	1		1							1	1	1	1
15-12-18	VINNOVA- Sweden's innovation agency	Sebastian Axelsson	1			1							1	1	1	1

Several more stakeholders have contributed, although not formally involved as NKS, e.g. by participating in the Stakeholder Workshop or by contributing with information and documents, or by providing feedback on texts. These are: David Bendz, Research Director at SGI, Dan Berggren Kleja, Professor in soil sciences, Swedish Agricultural University, Hjalmar Laudon, Responsible for land and water issues in the Future Forest Program, Swedish Agricultural University , Hjördis Löfroth, Research coordinator Natural disasters and climate change adaptation SGI, Johan Skarendahl, The Swedish Centre for Innovation and Quality in the Built Environment (IQ samhällsbyggnad), Lars Andersson, Professor and Head of the Future Agriculture Program, Swedish University of Agricultural Sciences, Lisa Granelli, Senior Research Officer, Formas, Tomas Johansson, Swedish Board of Agriculture, Peter Bruce, Stockholm University.

In the review of the report some stakeholders focused specifically on certain parts. Elisabet Göransson, Lisa Granelli, Marlene Ågerstrand, Daniel Hellström and Johan Skarendahl took specific interest in the part related to funding opportunities with constructive feedback, comments and remarks. Marlene Ågerstrand, Daniel Hellström, Lisa Granelli, Elisabet Göransson and David Bendz contributed specifically to the Science-policy/Science-implementation interface part. For the R&I-agenda and research questions part Daniel Hellström, Dan Berggren Kleja, David Bendz, Jonas Gunnarsson, Peter Bruce, Tomas Johansson, Charlotte Cederbom contributed with specific review comments and contributions.

[12] The respondent wish to stay anonymous

Annex Ib: NKS questionnaire template

See Chapter 1, Annex I

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

Annex II: Documents used for the Swedish desk study

Andersson L., Bohman A., van Well L., Jonsson A., Persson G. och Farelius J. (2015). Underlag till kontrollstation 2015 för anpassning till ett förändrat klimat. SMHI Klimatologi Nr 12, SMHI, SE-601 76 Norrköping, Sverige.

Andersson P., Palme U. (2012) Markanvändningens effekter på växthusgaser, biologisk mångfald och vatten. IBSN 978-91-620-6509-6 (Rapporten bygger på Naturvårdsverkets rapport 6505)

Bengtsson J, Magnusson U, Rydhmer L, Jensen ES, Vrede K, Öborn I. 2010. Future Agriculture – livestock, crops and land use. A strategic programme for research. Swedish University of Agricultural Sciences (SLU). ISBN: 978- 91-576-9008-1. [On line]. Available from: http://www. slu.se/en/collaborative-centres-and-projects/future- agriculture/publications-and-printed-matter.

Olsson, M., Andersson, P., Lennartsson, T., Lenoir, L., Mattson, L, Palme U., Land management meeting several environmental objectives Minimizing impacts on greenhouse gas emissions, biodiversity and water Knowledge compilation and systems perspectives, Naturvårdsverket Report 6505, 2012

Ares (2009) 326974 - 17/11/2009 Guidance for assessing Social Impacts within the Commission Impact Assessment system. **(SPI)**

BONUS strategic research agenda 2011–2017, update 2014 - http://www.bonusportal.org/files/2974/BONUS_Briefing_22_SRA2014_update.pdf

EU Baltic Sea Strategy - http://www.balticsea-region-strategy.eu/

Effektiv energianvändning (2014). - Forsknings- och innovationsagenda för effektiv energianvändning. **(SRIA)**

Formas (2011). Analys av miljöforskningen och förslag till forskningsstrategi 2011−2016 Rapport: R4:2011 ISBN 978-91-540-6058-0, ISSN 1653-3003

Formas (2012). Forsknings- och innovationsstrategi för en biobaserad samhällsekonomi. Rapport utarbetad på uppdrag av regeringen av Formas i samråd med VINNOVA och Energimyndigheten Rapport: R2:2012 ISBN 978-91-540-6067-2.

Formas (2013). Evaluation of swedish building and planning research.

Formas (2015a). Analys av forskning om biologisk mångfald och ekosystemtjänster.

Formas. (2015b). Forskning till stöd för att uppnå miljökvalitetsmålet Giftfri miljö – Analys och strategi.

Formas (2015c). Meeting societal challenges.

Formas (2015d). Omfattning och effekter av svensk klimatforskning.

Future Forests - Sustainable Strategies under Uncertainty and Risk Program Plan 2009 (in English). http://www.mistra.org/download/18.28e913871380e4c8e623dc/Future%2BForest%2Bprogramplan%2B2009.pdf **(SRIA)**

Future Forests - Program Plan 2013 – 2016 (November 2012). http://www.slu.se/Global/externwebben/centrumbildningar-projekt/futureforests/Future%20Forests%202013-2016.pdf **(SRIA)**

Hållbar Sanering (2009a). Sammanfattning av kunskapsluckor identifierade inom Hållbar Sanering Beredningsgruppen för Hållbar Sanering

Hållbar sanering (2009b). Forsknings och utvecklingsbehov inom efterbehandling av förorenade områden.

IQS (2015). IQ Samhällsbyggnads inspel till den forskningspolitiska propositionen 2016

The Swedish metals-producing Industry's associations (2013). National action for metallic materials – A strategic research and innovation agenda **(SRIA)**

Kontigo (2015). Svenska forskningsinstitut inom formas ansvarsområden. Kartläggning och analys. På uppdrag av Formas **(SPI)**

Langfeldt, L; Scordato L. (2015). Assessing the broader impacts of research. A review of methods and practices. Nordic Institute for Studies in Innovation, Research and Education (NIFU). Working Paper 8/2015 Ett uppdrag åt Formas - Forskningsrådet för miljö, areella näringar och samhällsbyggande. **(SPI)**

MINBAS Innovation agenda (2013). En forsknings och -innovationsagenda för Mineral, Ballast och Sten **(SRIA)**

Moermond et al. (2015). Cred: criteria for reporting and evaluating ecotoxic data. Environmental Toxicology and Chemistry. DOI 10.1002/etc.3259 **(SPI)**

Naturvårdsverket (2002). Kunskapsförsörjning inom efterbehandling av förorenade områden. Rapport 5252.

Sandgren M, Thor M. (2015) Hållbar skörd av råvara – Kombination av två starka svenska kunskapsområden: Skogsnäring och arbetsmaskiner. Strategisk agenda för forskning och innovation. Sustainable harvesting of forest raw material**.** http://www.nra-sweden.se/sites/nra-sweden.se/files/hallbar_skord_final.pdf **(SRIA)**

Sandström, U. (2015). Ecosystem services: Mapping of publication Activities and Trends for Sweden and other Countries 2004-2014.

SGI Publikation 12 (2014). Förorenade områden –Inventering av effektivitetshinder och kunskapsbehov 2013

SGI Publikation 17 (2015a). Förorenade områden – Inventering av effektivitetshinder och kunskapsbehov 2014 Förorenade områden i den fysiska planeringen

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effektivitetshinder och kunskapsbehov, 2010

SGI VARIA 629 (2012). Förorenade områden – Inventering av effektivitetshinder och kunskapsbehov 2011

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Swedish Research Council (2015). Evaluation of the strategic reasearch areas initiative 2010-2014. ISBN 978-91-7307-282-3

Svenskt vatten (2013). A vision for water research and innovation agenda for the water sector in sweden (published in English in September 2014) **(SRIA)**

Svenskt vatten (2015). Svenskt Vattens inspel till regeringens förestående forskningspolitiska proposition

Strategiska innovationsagendor (2015). Agendakatalog Juni 2015. Vinnova, energimyndigheten, Formas. **(catalogue covering more than 80 SRIA:s)**

Strategic research and innovation agenda for the Swedish metal and mining industry (STRIM) (2013) **(SRIA)**

The Research and Innovation Agenda – "Resource-Efficient Material Utilization: Renewing Swedish Excellence" (2014). RESURSSMART MATERIALANVÄNDNING– så förnyar vi svenska styrkeområden. **(SRIA)**

The joint Baltic Sea research and development programme, Strategic research agenda, 2011-2017 – update. Publication 14.
http://www.bonusportal.org/files/2981/Publication_No._14_update.pdf **(SRIA)**

The European Technology Platform for Water (2010). WssTP Strategic Research Agenda, A common vision for water innovation. **(SRIA)**

Vesterberg B, Lind B. (2016) "Effektivare markbyggande och FoU för ett hållbart samhälle." Bygg &Teknik 1/16

Vincent, Jeffrey R. (2012). Ecosystem Services and Green Growth. Policy Research Working Paper; No. 6233. World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/12084 License: CC BY 3.0 Unported

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Öborn I., Bengtsson J., Hedenus F., Rydhmer L., Stenström M., Vrede K., Westin C. and Magnusson U. 2013. Scenario Development as a Basis for Formulating a Research Program on Future Agriculture: A Methodological Approach. Ambio 42:7, 823-839.

Annex III: List of challenges and needs

A list of challenges and mentioned by stakeholders in interviews and further elaborated in the NKS workshop. When similar, they are grouped together. The first six groups are the ones reflected by section 2.1 i.e. the most pronounced challenges in the view of all stakeholder interviews performed and from the discussions in the stakeholder workshop.

Group	Challenges[13]	Comments
1a	Pressure on natural environments, resources and ecosystems and loss of biodiversity	Ecosystem services are a tool that can be used to deal with this challenge
1b	Conservation and restoration of nature and biodiversity and sustainable use of ecosystem services	Related to challenges 3a,b,c,
1c	Nature preservation & biological diversity, halting the loss of biodiversity	
1d	Green and blue-green infrastructure	Related to 5a Rapid and sustainable urbanization
2a	A healthy living environment	
2b	A safe chemical and microbial environment	Relate to a Rapid and sustainable urbanization
2c	Food security and food safety	could be included under 2a or 2b and related to 3b (Transition to sustainable consumption and production patterns')
2d	Safe drinking water	could be included under 2a or 2b 2b and related to 3b (Transition to sustainable consumption and production patterns')
3a	Sustainable and reduced resource consumption	
3b	Transition to sustainable consumption and production patterns	
3c	Securing sustainable agricultural production chains	
3d	Sustainable forestry	
4a	Climate change mitigation and social adaption	Important that climate change mitigation and adaptation are integrated as a challenge in all other challenges, as well as remaining a challenge of its own.

[13] *Since several stakeholders mention challenges of similar nature, but not with the exact same words the authors have suggested a synthesis of the challenges.*

4b	Climate change	Climate change measures and services are highly integrated into challenges of the built environment (5a)
4c	Climate research - governance across different levels and sectors	Related to 7c Managing conflicts of interest
4d	Effects on climate change to ecosystems	
4e	Emissions of greenhouse gases	
5a	Rapid and sustainable urbanization	
5b	Aging built environment	Including challenges of waste management
5c	A sustainable Building Sector	
5d	Migration and other demographic challenges	Ageing population, migration to cities, ensuring developments in peripheral areas
6a	Accessibility to affordable, reliable, sustainable and modern energy	
6b	A biobased economy	
6c	Developing a circular economy	
7a	Decision making under uncertainty	
7b	Societal policy change barriers	
7c	Managing goal conflicts	(between various administrative levels and between different sectorial interests) Related to many of the other challenges above
7d	Need for research both “on” (basic research) and “for” (applied research)	

Annex IV: Indicators of societal reach and impact

Examples of indicators
Top three indicators (as ranked during the NKS workshop), applicable for the SRA and for individual projects
Relevant stakeholders involved in R&I-projects Notes: This is an indicator of the potential for projects to have a relevance for society and/or end users. Although the number or percentage of relevant stakeholders involved in R&I projects was ranked as the #1 indicator during the workshop with NKS, was what was deemed important, was more important were qualitative sub-indicators such as *which* stakeholder where involved, *how* they are involved and in *which stages* of the project they are involved. It was thought important that stakeholders are involved already from the beginning of projects and throughout the life of projects. A way to make this indicator more precise is for research financers to specify: • **The percentage of a project budget in which stakeholders are involved** (co-financing or work in-kind) • **Which stages of the project stakeholders are involved (e.g. problem formulation, implementation, dissemination)** • **Percentage of and how *inter-sectoral* researchers or stakeholders involved**
How project results can directly be implemented in consulting/policy/or other relevant implementation route Notes: This indicator shows a measure of policy awareness among researchers and an understanding of the policy process and how research fits into the greater societal context. This indicator was ranked as the #2 most important indicator during the NKS workshop. However, this indicator was also seen as more of a long-term result or impact indicator, which may not be immediately or easily measurable. It must be complemented by stepwise indicators such as how the results may be implemented and even indicators such as: • **Number (and nature) of contacts with relevant policymakers (authorities, members of Parliament, EU Commission, local, regional or national authorities etc.)**. • **Description of which policy processes are targeted by the research** These contacts are the first step in ensuring that the results of research can actually be used in policy or implementation.
How R&I-projects or R&I-applications bring in relevant and professional resources for communication and implementation Notes: This indicator was ranked #3 in importance during the NKS workshop. It was thought that projects that involve communicators (and creative communication methods) throughout the project life stand a better chance of being relevant for the various users/stakeholders. The project leader may not always be the appropriate person to manage communication in a project. Communicators' involvement at the end of projects is beneficial, but they could also be useful as integrated members throughout the project life. Communicators thus should have a very good understanding of the methods and results of the project. They must have sufficient understanding of the scientific aspects of the project or be able to "translate" the results into more easily understood language.

Other relevant indicators for the Strategic Research Agenda
Number and nature of research performed in cooperation with SMEs or NGOs (process indicator) Note: A very relevant process indicator that can help to assess how collaboration will occur
Number and nature of research institutes' support the application by joining on their own expense for own research, and sharing networks of stakeholders as well as creating bigger research platforms Note: Having relevant users/stakeholders as co-financers within projects is a good indicator that societal relevance may be achieved. • Degree of mobility between research-policy-business is also an important sub-indicator
Use of library services and other communication infrastructure (Open databases, webpages, platforms, interactive tools, etc.) by researchers outside the institute/university possessing the service Note: Hosting, administering and maintaining such research infrastructure takes resources and should be a part of the financing possibilities
Number and nature of new standards produced as the result of research Note: As an alternative to the more traditional indicator of "number of patents produced"; the way that research results in new or altered standards across Europe is an important indicator, particularly standards that open up for new markets
Fraction of/number of research projects that result in/are implemented in courses to students/industry/authorities etc. Note: Assess the potential for capacity building, communication and the dissemination of knowledge produced within the projects
Number and nature of tools, guidance papers, checklists produced
New businesses started as a result of research Note: An impact indicator which may be difficult to measure in the short-term

Annex V: List of funders and funding options

No	Name	Funder	Description	web-site
National				
1	Common	Agency for Marine and Water Management	The Swedish Agency for Marine and Water Management is responsible for marine and water planning, supervision and regulation. The Agency has taken over the bulk of the responsibility for marine and freshwater issues from the Swedish Environmental Protection Agency.	https://www.havochvatten.se/hav/vagledning--lagar/anslag-och-bidrag/aktuella-forskningsutlysningar.html
2	No name	Carl Trygger's Foundation for Scientific Research	The Carl Trygger´s Foundation's mission is to provide support for research in the subject areas of forestry and agricultural sciences, biology, chemistry and physics including these Sciences in engineering applications and with an orientation that is likely to contribute to business development in Sweden. There is an annual call submission deadline, normally in May each year.	www.carltryggersstiftelse.se
3	No name	CF Lundström's Foundation	The CF Lundstrom's Foundation (administrated by the Royal Swedish Academy of Agriculture and Forestry, KSLA) is to encourage-scientific research for the benefit of the country's industry and agriculture/forestry. Application in January 2016. The KSLA is also administrating other foundations that support scientific work in the agricultural and forestry sector.	http://www.ksla.se/anslag-stipendier/cf-lundstrom/
4	No name	Crafoord Foundation	The Crafoord Foundation's main objective is to support scientific research and education. Contribution is provided mainly to applicants at a selection of universities and colleges located in the southern part of Sweden. This year applications must have arrived at the Foundation by 4th February 2016.	www.crafoord.se
5	2016:1 Resource and climate efficient forestry	Energiforsk	Energiforsk is a research and knowledge-based company that operates and coordinates energy research. There is a brand new research program on Resource and Climate Efficient Pulpmill Industry that welcomes proposals. Research should be on concrete project on the problems experienced at pulp and paper mills. The projects will primarily look at how low-grade energy can be made useful, how organic residues can be used, how to increase the amount of domestically produced high-quality biofuels at the mills and process ventilation. Last day for applications is 1st February 2016.	www.energiforsk.se

6	Common	Energimyndigheten	The Swedish Energy Agency works for a sustainable energy system, combining ecological sustainability, competitiveness and security of supply. The Energy Agency is one of Sweden's largest research funding bodies. The Agency finances research for new and renewable energy technologies, smart grids, and vehicles and transport fuels of the future. The Agency supports commercialization and growth of energy related cleantech. A major part of the R&D activities funded by the Agency are conducted in different thematic programs. All calls are available at the website.	www.energimyndigheten.se
7	Common	Formas	The mission of Formas is to promote and support basic research and need-driven research in the areas Environment, Agricultural Sciences and Spatial Planning. One part of Formas mission is also to promote societal value of research, with an international perspective. To be eligible to apply to Formas for funding, the main applicant must have a Doctoral degree. Applications for information projects or for organising conferences, symposia and workshops are exceptions to this rule. All calls, open, future and closed, are available at the website.	www.formas.se
8	Formas-yearly conference-, symposia-, WS-support	Formas	Conferences, symposiums and workshops. There are three calls per year with three dates. Contribution to the costs for the organisation of conferences and workshops (meetings). The application must contain: aim, prel. programmes, Scientific Committee, invited speakers, number of participants, time, place and detailed budget. Meetings in Sweden are prioritised. Can be used for travel and accommodation for foreign participants, costs for meeting facilities and similar. Not for salary costs. Principal applicants need not have a doctor's degree.	www.formas.se
9	Formas-Communication project	Formas	Communication projects within Formas responsibilities. Next call is due to open 2016-03-30.	www.formas.se
10	Urgent Grants 2016	Formas	Urgent grants enable scientists to address recently identified research issues. For example, this may be an extreme event, such as storm-felled forests, defects in building construction resulting in collapse due to snow build-up, emission of environmentally hazardous substances following a disaster, or other specific circumstances that necessitate a study to be initiated immediately. Applications for urgent grants may also be submitted to make use of material that is available temporarily. Last day of application:	www.formas.se

			30/12/2016.	
11	ERA-NET Cofund Smart Urban Futures	Formas	JPI Urban Europe fourth call – the ERA-NET Cofund Smart Urban Futures (ENSUF) – supported by the European Commission under the Horizon 2020 programme, opened December 16, 2015. Three call topics are defined: • Concepts and strategies for smart urban transformation, growth and shrinkage • New dynamics of public services • Inclusive, vibrant and accessible urban communities. For this call a two-stage procedure will be adopted. In the first stage, consortia are invited to submit pre-proposals. Pre-proposal deadline: 15th March 2016.	www.formas.se
12	Formas yearly Open Call	Formas	The Swedish Research Council Formas annual open call will open March 3rd 2016 for applications within the Research Council's three areas of responsibility – Environment, Agricultural Sciences and Spatial Planning. The call will close April 14th. The research that is funded should be of the highest scientific quality and have a high likelihood of benefiting society in the short-term or long-term. In addition the research should produce knowledge that will contribute to the sustainable development of society – a development that meets the needs of today without jeopardising the resources available to future generations. This presupposes that the health and welfare of humans and animals, biodiversity, the environment and the viability of nature, economics, ethics and social cultural values are taken into consideration.	www.formas.se
13	Strategic Innovation Program BioInnovation	Formas, Energy Agency, Vinnova	The strategic innovation agenda Bio Innovation announces SEK 32 million for projects that clearly address bio-based innovations in public funded activities. The purpose of the call is to stimulate innovations of new bio-based materials, products and services developed in collaboration with publicly-funded activities. Innovations should have market potential of publicly-funded activities in Sweden, as well as the potential to achieve export success. Deadline for application to Vinnova is 5th April 2016.	www.formas.se
14	Sustainable Community building.	Formas	A number of calls for proposals: research projects, research projects for young researchers, development and demonstration projects, visiting scientist/postdoc and graduate schools. The overall objective of the call is to develop new knowledge that will contribute to the development of sustainable community building. The initiative also	http://www.formas.se/sv/Finansiering/Utlysningar/Hallbart-samhallsbyggande/

			aims to strengthen research and increase cooperation between academia, industry and society. The call covers a total of 211 million kronor over a five-year-period. The call will be open in September/October 2015 and close in February 2016. Decisions on funding are planned to be taken in June 2016.	
15	Formas-Communication project	Formas	Communication projects within Formas responsibilities. Due 2016-03-30 Principal applicant need not be a doctor.	www.formas.se
16	Formas-yearly conferencs-, symposia-, WS-support	Formas	Conferences, symposiums and workshops. Three calls per year with three dates. Contribution to the costs for the organisation of conferences and workshops (meetings). The application must contain: aim, prel. programs, Scientific Committee, invited speakers, number of participants, time, place and detailed budget. Meetings in Sweden are prioritised. Can be used for travel and accommodation for foreign participants, costs for meeting facilities and similar, not for salary costs. Principal applicant need not be a doctor.	www.formas.se
17	Open and directed calls	FORTE	Forte funds research for people's health, working life and welfare. Forte regularly conduct call for proposals in co-operation with other research funding agencies.	www.forte.se
18	Common	Geological Survey of Sweden (SGU)	The Geological Survey of Sweden, SGU, is the expert agency for issues relating to bedrock, soil and groundwater in Sweden. SGU provides support for geo-scientific research and targeted fundamental research at Swedish universities and colleges. The aim of the research is to meet the needs of society of applied geology and contribute to a sustainable development according g to an adopted research agenda for 2015-2020. In May every year, SGU is sending out information of the year's call to all interested universities and colleges. In Mid-September applications need to be submitted to SGU and the evaluation process begins. Decisions on funding are taken in January the following year.	www.sgu.se

19	No name	Helge Ax:son Johnson Foundation	The goal of the Foundation is to practice charity, to support the literary and artistic activities and to promote scientific research. Contribution to the pursuit of scientific research is assigned to both scientific institutions and to individual researchers for some of the application-specified research project. Financial support is preferably given to qualified graduate students and young scientists, and can only refer to less costly research tasks as well as to support teaching and study activities in the country. Application deadline is 1st February 2016 (same date every year).	www.haxsonj.se
20	No name	Knowledge Foundation (KK)	The Knowledge Foundation is the research financier for universities with the task of strengthening Sweden's competitiveness and ability to create value. The Knowledge Foundation strives to help Sweden's new universities create internationally competitive research environments, work long-term on strategic profiling and increase cooperation between academia, industry, institutes and society. Calls are based on 3-year-cycles; present period is 2016-2018 with different thematic calls both in spring and autumn every year.	http://www.kks.se/medel/Utlysningar/Startsida.aspx
21	No name	Knut and Alice Wallenberg Foundation	The Foundation's purpose is to "promote scientific research and teaching or study of beneficial use to the country". For project grants and for contributions to national critical infrastructures, the Foundation applies designated deadlines. Project applications must be registered with the Foundation no later than 1st February every year. The projects will normally be of basic scientific nature focused to a coherent scientific question. Applications of different direction than infrastructure can be submitted at any time during the year. The Governing Board meets normally four times a year and deals with applications as the evaluation is completed.	http://www.wallenberg.com/kaw/
22	No name	Lars Hiertas Minne	The Foundation accepts applications from non-profit associations or individuals. Grants can be given to specific social purposes as well as for public crafting and businesses. The Foundation also accepts proposals from individual researchers for projects in all subject areas. There is a yearly call open 15 August - 1 October. The decision of funding is announced in December.	http://www.larshiertasminne.se/ansokning /

23		Länsförsäk-ringar Alliance	The Foundation of Länsförsäkringar Alliance Research Fund supports research that is close to people's everyday security. The research is to contribute to increased economic and physical security in society. It is one of the components in the Länsförsäkringar Alliance involvement in the local community. If you represent qualified research environments or research groups tied to the Swedish universities, colleges or research institutes, you can apply for grants from the Research Fund.	http://www.lansforsakringar.se/stockholm/om-oss/forskning/sok-forskningsbidrag/
24		MISTRA	Mistra (the Swedish Foundation for Strategic Environmental Research) supports research of strategic importance for a good living environment and sustainable development. To pinpoint solutions to key environmental problems, Mistra funds research programmes in priority areas. Annually, ahead of new investments, Mistra issues about two calls for funding applications. The aim is that research of top scientific quality should be put to practical use in companies, public administration and NGOs. In this way, Mistra's investments are intended to foster sustainable development and boost Swedish competitiveness. A new call for Mistra Innovation will open 12th February 2016 and will close 8th April 2016.	http://www.mistra.org/utlysningar.html
25	Common	MSB, the Swedish Civil Contingencies Agency	Knowledge development plays a strategic role in MSB's work for a safer society. As research is the most important way of developing knowledge MSB has the task of directing, ordering and ensuring the quality of research conducted on its behalf. MSB primarily supports applied, needs-oriented research. The aim is to generate practical applicable research findings that will lead to an increased ability to solve societal problems. To stimulate research on civil contingencies MSB allocates approx. SEK 120 million annually to a variety of research activities, for example, funding for major research programmes, individual projects, and competence and structural support. During 2016 MSB is planning for multiple thematic calls. They are described in the MSB's research plan for 2016. Some will open during spring, others during the autumn.	www.msb.se/sv/Om-MSB/Forskning/Utlysningar/Pagaende-utlysningar/

26	Appropriation 2:4 Emergency Preparedness	MSB, the Swedish Civil Contingencies Agency	Under certain conditions and for a limited period, special funds may be granted to enhance the effect of society's overall emergency preparedness or the overall ability to manage crises. The Parliament therefore appropriate annually approximately SEK 1.1 billion to such efforts by certain funding, called "2:4 Emergency Prevention" that is managed by MSB. Next time for application for funds from appropriation 2:4 Emergency Preparedness is in September 2016.	https://www.msb.se/sv/Forebyggande/Krisberedskap/Anslag-24-Krisberedskap/Myndigheter/
27	Nordic Centres of Excellence: Advancing the bioeconomy transition in the Nordic region	Nordforsk	NordForsk primarily provides support to cover expenses associated with implementing collaboration between participants from the Nordic countries. Support from NordForsk comprises supplementary funding for cooperation between researchers who are already receiving grants from national or other research funders. Presently, there is a call for pre-proposals for Nordic Centres of Excellence: Advancing the bioeconomy transition in the Nordic region. This new two-phase call for proposals for Nordic Centres of Excellence is within the Nordic Bioeconomy Programme. The programme aims to fund three Nordic Centres of Excellence within a budget of NOK 90 million. Application deadline for the first phase is 16 March 2016.	http://www.nordforsk.org/en/funding
28	No name	Oscar and Lili Lamms Foundation	The Foundation of Oscar and Lili Lamm is to financially support scientific research for Swedish nature conservation, in particular problems linked to soil conservation, water conservation, landscape management and plant protection. Grants or scholarships may be sought for graduate student services, research, student theses and the arrangement of scientific symposia. The calls for proposals are thematic and the 2016 call will be directed on landscape management. The call is anticipated to open in April 2016.	www.stiftelsenlamm.a.se
29		Region Skånes miljövårdsfond	Region Skåne's distributes every year money from an environmental protection fund. The funding is for projects that nurture and develop the natural and cultural environment in southern Sweden and contributing to environmentally sustainable development, in accordance with the strategic program for the Region of Skåne. In 2015 the fund also contained earmarked money in support of climate actions. The next call will be open 15th Augusti – 15th September 2016.	http://utveckling.skane.se/utvecklingsomraden/miljo-och-klimat/region-skanes-miljovardsfond/

30	Common	Royal Swedish Academy of Sciences	The Royal Swedish Academy of Sciences is an independent organisation whose overall objective is to promote the sciences and strengthen their influence in society. Funds may be requested for general research in Earth Sciences and geography, and especially for the scientific nature of geographical research in the country, preferably in the Sarek mountain area. The next call opens in mid-October 2016 (for distribution of funds 2017).	www.kva.se
31	No name	Stiftelsen J. Gust. Richerts Minne	Scholarships from J. Gust. Richert Foundation are awarded yearly to promote research, education and training in the fields of environmental protection, energy, the built environment and transport technology. In 2015 SEK 6.1 million was distributed to 29 applications. The next call is open from 1st February 2016.	http://www.sweco.se/sv/Sweden/Om-Sweco/Priser-stipendier-och-sponsring/J-Gust-Richert-stiftelse/
32	Common	Swedish Agency for Economic and Regional Growth	The Swedish Agency for Economic and Regional Growth is a national government agency tasked with promoting entrepreneurship and regional growth. Current calls: Horizon2020 - Fast Track To Innovation (2016-10-25) Planning support and support to demonstration projects within "Demo Environment" (16-03-18) ,Regional Investment Support(16-12-31), and Regional support to the development of enterprises (16-12-31)	www.tillvaxtverket.se
33	No name	Swedish Association of Graduate Engineers - the Environmental Foundation	The Swedish Association of Graduate Engineers support environmental research, theses, studies, environmental information by their Foundation for the Environment. The Environmental Fund's purpose is to support and promote research, projects and studies aimed at improving the physical environment in Sweden and the neighborhood. Last day for application is 30th April 2016.	www.sverigesingenjorer.se
34	No name	Swedish Association of Local Authorities and Regions (SALAR)	The Swedish Association of Local Authorities and Regions, SALAR, is both an employers' organisation and an organisation that represents and advocates for local government in Sweden. All of Sweden's municipalities, county councils and regions are members of SALAR. SALAR is together with the Swedish Transport Administration, running a research program that is supported by a fund. The fund is for research of the design, use and management of the transport system. The cornerstone is community based research in both the short and long term. Presently, there are 7 prioritised areas of research.	http://skl.se/samhallsplaneringinfrastruktur/trafikinfrastruktur/forskningutveckling.294.html

35	Rural Develop-ment Program	Swedish Board of Agriculture	The Board of Agriculture is the Government's expert authority in matters of agri-food policy, and is responsible for the agricultural and horticultural sectors. The Rural development programme 2014-2020 consists of financial support and contributions that are designed to develop rural areas. Environment, sustainable development and innovation is a priority.	www.jordbruksverket.se
36	No name	Swedish Construction Industry's Development Fund (SBUF)	SBUF is the construction industry's organisation for research and development. SBUF's aim is to promote development in the building process in order to create more favorable conditions for constructions contractors by enabling them to benefit from research and conduct development work. SBUF has 7 meetings a year, three of which also deals with applications for grants for research projects. Dates are available at their website.	http://www.sbuf.se/Sok-bidrag/Ansokning-och-rapporteringstider
37	Common	Swedish Environmental Protection Agency	The Swedish Environmental Protection Agency (EPA) is funding research in support of the EPA's and the Agency for Marine and Water Management, with such as to reach the environmental objectives. The next calls are expected to open i May 2016.	www.naturvardsverket.se
38	No name	Swedish Farmers' Foundation for Agricultural Research (SLF)	The Swedish Farmers' Foundation for Agricultural Research is the Swedish agricultural industry's organisation for growing knowledge by funding research and development. The purpose of the foundation is to strengthen the competitive ability of the Swedish agricultural sector. The Foundation makes annual calls for applications for grants for R&D projects. Only research performed in Sweden is finances but the Swedish part of multinational projects can be financed by the foundation.	www.lantbruksforskning.se
29	Riksbankens jubileumsfond	Swedish Foundation for Humanities and Social Sciences (RJ)	The Swedish Foundation for Humanities and Social Sciences (RJ) is an independent foundation with the goal of promoting and supporting research in the humanities and social sciences. Grants for programmes, projects and infrastructure are announced once a year in coordinated application calls. Grants for research initiation, usually in the form of conferences and academic networks, may be applied for at any time. In addition, RJ provides focused inputs in research areas identified primarily by the foundation's 'sector committees'. The research system is supported by thematic, proactive inputs to supplement the researcher-initiated projects. This year's call closed 27th January 2016.	www.rj.se

40		Swedish Foundation for International Cooperation in Research and Higher Education (STINT)	The Swedish Foundation for International Cooperation in Research and Higher Education, STINT, was set up by the Swedish Government in 1994 with the mission to internationalise Swedish higher education and research. STINT offers a wide variety of grant and scholarship programmes to support internationalisation at Swedish educational establishments. STINT is currently inviting Swedish university leaders to apply for Strategic Grants. Applications should be submitted by the president of a Swedish university no later than 8th March 2016.	www.stint.se
41	No name	Swedish Foundation for Strategic Research (SSF)	The Swedish Foundation for Strategic Research (SSF) supports research in natural science, engineering and medicine that strengthens Sweden's competitiveness. SSF issues open calls for proposals for research grants, which are awarded in competition. In order for SSF to approve a research grant, the research should be scientifically excellent and commercially exploitable in Sweden. The research must lie within the areas prioritized by SSF. Presently, there is a call with SEK 400 million for "Industrial Research Centres" (IRC). Last day for proposals is 4th May 2016.	www.stratresearch.se
42	Common	Swedish National Space Board	The Space Agency is encouraging Swedish actors' participation in the EU framework program Horizon 2020 and therefore offers a planning grant for the costs associated with applications for any of the calls of the framework program. The applicant can be either partner or coordinator of the project and the project must have an adequate connection to space activities. Applications are processed on a continuing basis. Last opportunity to submit an application for a planning grant is eight weeks before the current Horizon 2020 call for proposals closes. Last day for application is 30th June 2016.	http://www.snsb.se/sv/Mediebank/Forskare/Utlysningar/
43	Common	Swedish Radiation Safety Authority (SSM)	Each year the Swedish Radiation Safety Authority (SSM) is funding research for about SEK 80 million. SSM is granted by the Government to conduct and support research. A purpose is that Sweden should develop a high national competence in the fields of nuclear safety, radiation protection and nuclear non-proliferation. Research should also be a scientific support in the Authority's supervisory work. In the beginning of each year the research needs are analyzed.	www.stralsakerhetsmyndigheten.se

44	Common	Swedish Research Council	The Swedish Research Council is an authority within the Ministry of Education and Research. The Swedish Research Council has a leading role in developing Swedish research of the highest scientific quality, thereby contributing to the development of society. The Swedish Research Council provides funding for basic research of the highest scientific quality in all disciplinary domains. Open calls are available at their website. Additional calls may also be launched in the course of 2016, for example at the request of the Swedish government. The Swedish Research Council is also involved in financing and long-term planning for national infrastructure and Sweden's participation in international infrastructures within all subject areas.	www.vr.se
45		Swedish Transport Administration	The Swedish Transport Administration supports research that contributes to the development of the transport system to satisfy the requirements and expectations of citizens and businesses, such as efficient and secure foundations of roads and railways. For a project to be considered for funding it has to connect to one of the target areas in the transport development plan. Any annual general open call is not advertised. Instead, special announcements are made when there is a need for such.	www.trafikverket.se
46	BIG	Swedish Transport Administration	Research programmes for efficient and secure foundations of roads and railways. (Priority research areas in 2014-2017.) The Transport administration together with the Royal Institute of technology, KTH, Chalmers University of technology, CTH, Luleå University of technology, LTU and SGI initiated the establishment of a long-term programme of research and innovation (R & I) in conjunction with the construction sector and other universities and research institutes. 10 year program with evaluation after 4 y.	www.trafikverket.se
47	No name	Swedish Waste Management Association	The Swedish Waste Management Association provides, through its concerted development effort, funding for development projects in the field of-waste management. Four million SEK is earmarked for the financing of projects in the priority areas 1) Prevention and reuse 2) consumer behavior 3) raw materials and marketing. Project size 100-800 thousand SEK. Smaller projects can be found running through the development efforts for incineration, landfill and biological treatment. Applications have	http://www.avfallsverige.se/rapporter/avfall-sverige-utveckling/

			to be submitted before 31st March 2016 and 30th September 2016.	
48	No name	Swedish Water & Wastewater Association - Development Unit (SVU)	Swedish Water Development (SVU) is the local authorities' own R&D program on municipal Water & Wastewater technology. The business is predominantly focused on applied research and development in the interest of Swedish Water members. There are also specific calls on prioritised areas. Currently two calls are open on Sustainable Community Building and on Waste water treatment in transitional areas. Application are to be submitted by 19th February 2016.	http://www.svensktvatten.se/
49	No name	Sven Tyrén Foundation	Tyréns is a consultancy company in the urban and rural planning sector that supports research by the Sven Tyrén Foundation. The R&D support of Tyréns is focused at four areas which are Climate, Environment and Health, Advanced contructions, Efficient Building Processes, Maintenance and renewability. By Sven Tyréns Foundation there is annual funding of a number of projects and doctoral students for development of the community building sector.	http://sventyrensstiftelse.se/
50	No name	Wenner-Gren Foundations	The Wenner-Gren Foundations (The Wenner-Gren Center Foundation for Scientific Research, The Axel Wenner-Gren Foundation for International Exchange of Scientists and The Foundation Wenner-Grenska Samfundet) support international scientific exchange for example by awarding fellowships to Swedish researchers or by arranging international symposia.	www.swgc.org
51	Common	Vinnova	Vinnova promotes sustainable growth by funding needs-driven research and stimulating collaborations between companies, universities, research institutes and the public sector. Vinnova also is the national contact agency for the EU framework programme for research and innovation. Their programmes and calls target actors in society who are important for Sweden's innovativeness. Some of the calls are open to international and bilateral collaborations. Vinnova develops a number of programmes and activities within strategic areas. Every year Vinnova invests about SEK 2.7 billion in various initiatives. All calls are available at the website. Some calls like the call **Building Innovation 2016-2018** is always open for application and decision takes place six times a year. The calls of **Challenge Driven innovation** close on the last Thursday of January and August each year. For more info, see: www.vinnova.se/cdi. **Innovations**	www.vinnova.se http://www.vinnova.se/sv/Ansoka-och-rapportera/Utlysningar/Effekta/Byginnovationen-2011-2016/ www.vinnova.se/cdi http://vinnova.se/sv/Var-verksamhet/Strategiskt-viktiga-kunskapsomrade

			for a sustainable society is a program that last between 2013 och 2016, and includes a number of calls (A call focused on environment and transport closes in March 2016).	n/Transport-och-miljo/Innovationer-for-ett-hallbart-samhalle/
52	VINNMER Marie Curie Academy. VINNMER Industry Outgoing. VINNMER Marie Curie Incoming.	Vinnova	"VINNMER Marie Curie Academy". Mobility aid for experienced researchers. 50% of the salary 1-3 years. "VINNMER Industry Outgoing". Mobility aid for experienced researchers. VINNMER Marie Curie Incoming."	www.vinnova.se
53	BioInnovation	Vinnova, Formas, Energimyndigheten	The strategic innovation agenda Bio Innovation Announces 32 million euros for projects that clearly address bio-based innovations in public funded activities. The purpose of the call is to stimulate innovations of new bio-based materials, products and services developed in collaboration with publicly-funded activities.	www.bioinnovation.se
54	No name	ÅForsk Foundation	The Foundation's purpose is to promote research and technological development, primarily in its purpose areas: Energy, Environment, Safety & Sustainability, Infrastructure, Materials, Processes and products from renewable sources. In 2015 the foundation awarded research grants totaling SEK 25 million. Application of research grants has to be submitted before 1st March 2016. Applications from young scientists with new and creative ideas are given priority.	www.aforsk.se

Below some international calls and/or funders:

No	Name	Funder	Description	web-site
International				
1	COST European cooperation in Science and Technology	COST	COST aims to enable breakthrough scientific developments leading to new concepts and products. It thereby contributes to strengthening Europe's research and innovation capacities. COST does NOT fund research itself, but supports networking by the means of different tools such as meetings, short term scientific missions, training schools and dissemination activities through COST Actions. Submission of COST Action proposal is possible at any time throughout the year. The next Collection Date is anticipated to be 23 February 2016.	http://www.cost.eu/participate/open_call www.cost.esf.org
2	Horizon 2020	European Commission	Funding between 2014-2020 by Horizon 2020 - research and innovation framework programme.	http://ec.europa.eu/research/participants/portal/desktop/en/home.html
3	Nordic Innovation	Nordic Innovation	Nordic Innovation is a Nordic institution working to promote cross-border trade and innovation. Working under the auspices of the Nordic Council of Ministers, Nordic Innovation is a key player in implementing the Nordic trade, industry and innovation partnership programme. The open call on the Nordic Built Cities Challenge will run until 31 October 2016, but is now closed for new entries. The ain is to support an open, multidisciplinary, needs-driven competition to develop and visualise Nordic innovative solutions for liveable, smart and sustainable cities.	www.nordicinnovation.org
4	BONUS Blue Baltic	BONUS	The Baltic Sea program for research and innovation, BONUS that focus on transnational research and development has now opened its third call "Blue Baltic". Blue Baltic is the biggest BONUS call so far and has a budget of 30 million euro and includes 11 thematic areas. The call is devoted to academic researchers, research institutes and to enterprises – the idea is that new innovative solutions to the environmental problems in the Baltic Sea can be developed and tested. The call will close 10 March 2016 and all projects must also be pre-registered on 9 February to submit a full proposal. Project start will be in early 2017 and stretch over three years. Contact in Sweden is Formas.	http://www.bonusportal.org/

5	Common	Nordic Project Fund (NOPEF)	The Nordic Project Fund Nopef, has a specific aim to strengthen the international competitiveness of Nordic enterprises by providing co-financing for feasibility studies that support export projects and the internationalisation of Nordic enterprises. Nopef finances feasibility studies within the fields of the environment, climate and green growth. The feasibility studies should contribute to direct or indirect environmental improvements and increased environmental consciousness in the project countries. Nopef may participate with up to 40% of the approved feasibility study costs in connection with international business set up.	http://www.nopef.com/pages/eng/front.php?lang=EN
6	WaterWorks 2015	Funders from 23 countries	The ERA-NET Cofund initiative WaterWorks2015, a collaboration of Water JPI and FACCE JPI, will set up a programme on sustainable water use in agriculture to increase water use efficiency and reduce soil and water pollution. This theme is common to the Strategic Research Agendas of the two collaborating JPIs. The call is expected to open on 16.2.2016 with a closing date for pre-proposals on 19.4.2016. Funders from 23 countries have allocated initial national call contributions of in total approximately 18 M€ from National funds plus 7.9 M€ EU top up will generate a call budget of in total over 26 M€.	http://www.waterjpi.eu/
7	Biodiversa	Funded under Horizon 2020 (ERA-NET COFUND scheme), the EU Research and Innovation programme.19 european states and 32 partners	Funding pan-European research on biodiversity and ecosystem services. Aims at one call per year.	www.biodiversa.org
8	FACCE-JPI	21 countries	FACCE-JPI provides and steers research to support sustainable agricultural production and economic growth, to contribute to a European bio-based economy, while maintaining and restoring ecosystem services under current and future climate change.	www.faccejpi.com
9	Advancing the bio-economy transition in the Nordic	Nordforsk	NordForsk launches a new two-phase call for proposals for Nordic Centres of Excellence within the Nordic Bioeconomy Programme. The programme aims to fund three Nordic Centres of Excellence within a budget of NOK 90 million.	http://www.nordforsk.org/en/funding

	region		Application deadline for the first phase is 16 March 2016.	
10	Smart Urban Futures	JPI Urban Europe: ERA-NET - 18 countries and 26 funders.	"Topic: •Concepts and strategies for smart urban transformation, growth and shrinkage, •New dynamics of public services, •Inclusive, vibrant and accessible urban communities. The call is addressed both to research institutes, universities, municipalities, businesses, nonprofit organizations, innovators and social entrepreneurs. Preliminary appl due 2016-03-15, Full application sept 20, 2016.	http://jpi-urbaneurope.eu/ensuf-call/
11	Water JPI	20 partners including Sweden.	Joint Call Management for providingand steering research and innovation in the water sector. Joint Call funded under WaterWorks2015	http://www.waterjpi.eu/
12	LIFE	EU	The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. *The Natural Capital Financing Facility (NCFF)* is a new financial instrument which will provide financing opportunities in the form of loans or equity investments for revenue-generating or cost-saving pilot projects promoting the preservation of natural capital, including climate change adaptation projects *Private Finance for Energy Efficiency instruments (PF4EE)* is a new financial instrument which will provide loans for investments in energy efficiency projects prioritised by National Energy Efficiency Action Plan	http://ec.europa.eu/environment/life/
13	ESPON 2020 Cooperation Programme 2020	ESPON (Member States and ERDF)	The ESPON 2020 Programme aims at promoting and fostering a European territorial dimension in development and cooperation by providing evidence, knowledge transfer and policy learning to public authorities and other policy actors at all levels. On-going calls include 1) Applied research, 2) Targeted Analyses, 3) Scientific Platform 4) Transnational Networking Activities.	www.espon.eu

14	European Territorial Cooperation 2014-2020 (INTERREG V)	ERDF	Instruments to reach territorial cohesion by means of transnational and cross-border cooperation by linking research, innovation and regional development. Ongoing calls that Sweden participates in: Nord, Bothnia- Atlantic, Sweden-Norway, Central Baltic, South Baltic, Öresund-Kattegat-Skagerrak, Baltic Sea Region Programme, North Sea Programme and Northern Periphery Programme.	http://interreg.tillvaxtverket.se/

Annex VI: Workshop agenda and list of participants

INSPIRATION - HORIZON2020 CSA

INtegrated Spatial Planning, land use and soil management Research AcTION

www.inspiration-h2020.eu

Statens Geotekniska Institut och Forskningsrådet Formas bjuder in till:

INSPIRATIONs National Stakeholder Workshop

14 januari 2016

8.30-16.30

Sjöfartshuset Festvåningar – Skeppsbrorummet, våning 1
Skeppsbron 10
111 30 Stockholm

PROGRAM

Tid	Aktivitet
8.30-9.00	Kaffe/te och smörgås
9.00	Välkommen! Program och syfte med dagens WS
9.10	INSPIRATION: Introduktion till projektet
9.30	Presentation av resultaten från intervjuer och insamlade underlag:
10.00	Grupparbete 1 i formen ”World Cafe”[14] - Vi förflyttar oss mellan tre temabord och diskuterar de presenterade resultaten, vad vi vill tillföra/ändra och eventuella prioriteringar.
11.00	Presentation och diskussion av resultatet från World Café-övningen
12:20	LUNCH
13:20	Grupparbete 2 - Syntes och slutförande av input till den nationella rapporten
14.30	Kaffe/te
14.50	Fortsättning, grupparbete 2
15.30	Presentation och summering av grupparbete 2, möjlighet för sista justeringar av respektive syntesen av respektive tema
Ca 16.30	Avslut
16.45	Mingel, dricka och tilltugg på Statens Geotekniska Institut, Kornhamnstorg 61 (gångavstånd)

De Teman som behandlas under dagen är:

Tema a: Strategisk FoI-agenda

Tema b: Forskning – implementering

Tema c: Finansieringslandskapet

[14] För beskrivning se t.ex. **https://en.wikipedia.org/wiki/World_Café_(conversational_process)**

List of participants

Name	Organisation
Anna Yman	SWECO
Charlotte Cederbom	Swedish Geotechnical Institute
Dan Berggren-Kleja	Swedish Agricultural University
David Bendz	Swedish Geotechnical Institute
Elisabet Göransson	The Swedish Research Council, FORMAS
Göran Risberg	Geological Survey of Sweden
Hjördis Löfroth	Swedish Geotechnical Institute
Johan Skarendahl	the Swedish Centre for Innovation and Quality in the Built Environment (IQ samhällsbyggnad)
Karin Willis	Stockholm county adm board
Klas Köhler	Repr of all Sw County Adm boards on behalf of EPA
Lisa Granelli	The Swedish Research Council, FORMAS
Lisa van Well	Swedish Geotechnical Institute
Marianne Lilliesköld	Swedish Environmental Protection Agency
Marlene Ågerstrand	Department of Environmental Science and Analytical Chemistry (ACES)
Mats Tysklind	Umeå University
Ruben Aronsson	SBUF (the construction industry's organisation for research and development)
Sebastian Axelsson	Vinnova
Yvonne Ohlsson	Swedish Geotechnical Institute

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