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       Societal Interaction Plans – a Tool for Enhancing Societal Engagement of
       Strategic Research in Finland.

Societal Interaction Plans – a Tool for Enhancing Societal Engagement of Strategic Research in Finland.

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Abstract

In this paper we investigate the practices and capacities that define successful interaction of research groups with stakeholders in mutually beneficial processes. We studied the Finnish Strategic Research Council's (SRC) first funded projects through a dynamic governance lens. The SRC introduced a societal interaction plan (SIP) approach, which provides a window into exploring how active societal interaction reflects the call for dynamic, sustainable practices and new capabilities to better link research to societal development. We found that the capacities of dynamic governance were implemented by integrating societal interaction into research. SIP designs function as ecosystem platforms, rather than traditional project management models. The research groups utilised the benefits of pooling academic knowledge and skills with other types of expertise for mutual gain. They embraced the limits of expertise and reached out to societal partners in order to truly *broker* knowledge, and transfer skills and perspectives to solve grand societal challenges.

Key words

Societal interaction, strategic research, dynamic governance, co-production of knowledge, knowledge ecosystem

Funding

Introduction

The Grand Challenges of humankind have stressed the need for and status of research. Sudden global crises, such as environmental disasters and pandemics, exacerbate the urgent need for verifiable research knowledge and applications. Such situations also challenge the process and governance of research, and its ability to implement new procedures which engage all relevant stakeholders and decisionmakers in ways that increase societal impact.

The Responsible Research and Innovation (RRI) framework has been proposed to guide research processes in this direction. The rise of new funding instruments with a specific focus on societal interaction between researchers and other stakeholders reflects a Europe-wide evolution of science-society relations. Today's researchers function in a rapidly changing environment and operate between multiple pressures, with norms and expectations arising from innovation policy changes in European and national contexts. (Stilgoe, Owen and Macnaghten 2013)

In this situation, researchers have responded to the call to develop societally-oriented practices by developing new ways to collaborate across disciplines, sectors and professions in an open search for solutions to support transformation in society (Mazzucato 2018). The change has also been documented in policy developments, such as EU strategies developing from 'Science and Society' to 'Science in Society' and further to 'Science with and for Society'.

The EU has pushed the implementation of the new RRI framework by funding many research programmes. One of these was MASIS which included a Europe-wide survey about different practices in European countries. One continuation of these projects was the FP7-funded 'Public Engagement Innovations for Horizon 2020' project. The aim of the project was to identify, analyse and refine innovative public engagement (PE) tools and instruments for dynamic governance in the field of Science in Society.

Several projects[3] established to develop understanding and practices around the RRI have begun to question the separation of the concepts and sought to approach the RRI field as a whole when research and innovation are interlinked parts of a continuum (Smallman and Patel 2018). Moving towards a broader understanding of public engagement as an element of RRI, focus has changed from ends and products to the means through which researchers and other societal actors build and uphold interaction. Increasing attention should be paid to the process of engagement and interaction (Stilgoe and Wilsdon 2009).

In addition to advancing the meanings of the quadruple helix model, recent developments have also identified linkages to (service) design (Howlett 2019),

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3   See for example the SISCODE project (www.siscodeproject.eu), the RRI tools project (www. rri-tools.eu), the RRI practice project (www.rri-practice.eu)

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and social innovation (Domanski and Kaletka 2018). One strand of development is ongoing regarding the meaning, form and evaluation of societal impact (see e.g. the ENRESSH network on www.enressh.eu). Rather than looking only at the socio-technical developments or knowledge transfer, the current understanding of broader impact refers to ways of 'giving back' to society. It includes various types of participatory methods ranging from interactive dissemination, public consultation and advisory practices to the building of epistemic communities. Muhonen, Benneworth and Olmos-Penuela (2019) identified four main categories of impact pathways of which two, reaching for and driving societal change, refer to goal-driven and societally oriented research. In these categories, researchers deliberately align themselves with societally topical themes, anticipate potential windows of opportunity and proactively seek to influence societal change.

An orientation towards grand societal challenges poses the science, technology and innovation (STI) policies with new demands. More knowledge is needed on how the interaction between researchers and their societal partners functions in settings in which the societal partners are active agents in the project. Whereas the challenges facing STI policies were technical in nature in the past, they are now more complex and ambiguous and require participation of a range of actors with expertise in multiple fields. Today's decision-makers are faced with too many priorities, limited resources and demands posed by rapid changes in both internal and external environments (Porter 2007). Hence, governance cannot be static but rather needs to be a process of continuous learning and adjustment. It should acknowledge that the essential challenges are dynamic in nature.

Considering these developments and new initiatives, the data from the first call of the Finnish Strategic Research Council (SRC) funded projects continue to have value. This funding instrument reflects the Europe-wide developments towards more inclusive research and was designed to follow the RRI policies. While there have been studies on the interaction approaches of researchers, we approach the issue from a new angle by focusing on the role of the interaction plan in the construction of engagement-oriented research projects. More knowledge is needed on how the new requirement for strategic research, the SIPs, have been implemented and how the thinking and working methods of innovative researchers are formed in practice. This means investigating the practices that knowledge producers and users utilise in the process of identifying problems and solutions in a closely interactive atmosphere. The SIPs provide a window through which we can explore how the required, active societal interaction reflects the call for dynamic, sustainable practices and development of new capabilities which better link research into societal development.

In this paper, our focus is on the first call for funding through the Strategic Research instrument, and its active emphasis on combining high quality scientific research with actively implemented societal interaction plans (SIP). We have

explored the societal interaction practices and identified capacities and processes that define successful interaction and that research groups deemed necessary for the implementation of the projects. Timewise, the focus is on the first six months of project implementation, on how and with what sets of logic the plans were constructed and adjusted at the beginning. We analysed the content of societal interaction plans (SIPs), and the benefits of SIPs for the research groups and stakeholders, to uncover the practices and capacities that were needed to implement the plans.

Our goal in this paper is to address the following questions

1) What are the practices for better societal interaction, as proposed by research groups funded by the Strategic Research Council?

2) How did the societal interaction plans contribute to new capacities and practices of researh at the commencement of the projects?

Subject and setting

The Strategic Research funding

The Strategic Research Council was founded in 2014 as part of a government decision-in-principle on the comprehensive reform of research institutes and funding. The SRC funds long-term, programme-based and multi-disciplinary research, which is oriented to finding solutions to grand societal challenges. The SRC aims to serve the renewal and development of Finnish society by joining multi-disciplinary research groups with experts working on the same challenges outside academia. As such, it converges well with the mission-oriented thinking of the EU where research aimed at finding solutions to grand societal challenges is encouraged through specific funding (Mazzucato 2018).

The SRC introduced a new two-part ex-ante review model for applications. One part looked at quality regarding the projects' societal relevance as described in societal interaction plans, while the other focused on research excellence. There was peer review of both parts by separate panels. (Jokela and Vauhkonen 2019).

The SIPs were required to present the aims of interaction for the entire project. They were designed to guide the planning and implementation of the research process in ways that support the systematic participation of decision-makers, civil society and companies for the life of the project. As such, the SIPs required a more comprehensive process to be included in the research process than in conventional communication and dissemination plans. Details of the partners as well as intended actions, tools, distribution of tasks and timelines constituted distinct parts of the model. These are summarised in Table 1.

Table 1. Required parts of the interaction plan (SIP) for the first call of the SRC.

Target groups / stakeholders / partners	Tools of interaction	Responsibilities and implementation	Schedule
Central actors from the point of view of the theme, programme and utilisation of research results in the phases of the project.	What are the interaction practices and channels during the phases of the project?	How and by whom is interaction put into action?	How is interaction timed at the beginning and during research?
What are the knowledge needs of utilisers? How have these been mapped? How can these actors utilise the knowledge? How do they benefit from interaction with researchers?	How are interaction processes timed (e.g. in relation to drafting of a law or other projects)?	What previous references does the research group / consortium have from interaction? Interaction requirements should be considered when choosing partners.	How is the utilisation of knowledge produced in the project secured during the funding period and beyond?
In which sectors and how does change occur?	How is collaboration with the media managed (including social media)?		

Competition for funds was fierce. The SRC received 130 applications, of which 13% were selected for funding. The selected projects excelled on both their research quality as well as their societal relevance.

The SRC first call in 2015 had three themes, called 'programmes': Climate-neutral and resource-scare Finland (PIHI), Equality in Society (EQUA) and Disruptive Technologies and Changing Institutions (TECH), each focusing on grand societal challenges (Table 2).

Table 2. 16 SRC projects and thematic programmes.

	Thematic programme		
	Climate-neutral and resource-scarce Finland (PIHI)	Equality in Society (EQUA)	Disruptive Technologies and Changing Institutions (TECH)
Projects	Transition to a resource efficient and climate neutral electricity system (EL-TRAN)	Finnish Childcare Policies: In/Equality in Focus (CHILDCARE)	Cloud Computing as an Enabler of Large-Scale Variable Distributed
	SmartSEA - Gulf of Bothnia as Resource for Sustainable Growth	Social and Economic Sustainability of Future Working Life: Policies, Equalities and Intersectionalities in Finland (WeAll)	Energy Solutions (BC-DC)
	Sustainable, climate-neutral and resource-efficient forest-based bioeconomy (FORBIO)	Tackling Inequalities in Time of Austerity (TITA)	Digital Disruption of Industry (DDI)
	Novel protein sources for food security and climate (ScenoProt)	Preventing Social Exclusion: What Works and Why? (PSE)	Platform Value Now: Value capturing in the fast-emerging platform-ecosystem (PVN)
		Work, Inequality and Public Policy (WIP)	Robots and the Future of Welfare Services (ROSE)
		Arts as Public Service: Strategic Steps towards Equality (ArtsEqual)	Smart Energy Transition - Realising its potential for sustainable growth for Finland's second century (SET)

Data and method

The SIPs under study were initially analysed in connection to the PE2020 project carried out in 2014-2017 (Aarrevaara and Pulkkinen 2016). Out of the 16 funded projects, this article focuses on 13 which after negotiation, agreed to participate in the study. Interviews were held with 18 people, the person responsible for societal interaction, and/or the project leader. The projects represented all three thematic programmes equally (Table 3).

Table 3. Division and number of interviewees.

	Thematic programmes		
	Climate-neutral and resource-scarce Finland (PIHI)	Equality in Society (EQUA)	Disruptive Technologies and Changing Institutions (TECH)
No. studied projects	4	4	5
No. project leaders	4	2	4
No. interaction leader	2	3	3

The interviews were semi-structured, and focused on the following categories:
- The aims of the project and societal interaction
- Interaction partners and reasons for the consortium composition
- Interaction activities and expected impacts; reasons for choosing them
- Stage of planning when interaction issues were introduced, and when planned interaction activities were timed for implementation
- Skills required from the research group

Analysis of data was done following inductive content analysis (Bryman 2004). The discussions were recorded and transcribed verbatim. The analysis utilised both the written interaction plans and the interviews. The initial analysis was inductive and attentive to data, focusing particularly on the logic of how interaction plans, partnerships and actions were designed, and reasons given for adjustments at the beginning of the projects. NVivo software was used for systematic coding of the material. The coding used in the analysis was based on the terminology of the interview questions, but these were complemented with aspects regarding process, learning and utilisation of expertise, following the conceptual framework.

The projects studied had only been on-going for six months at the time of data collection. The focus was on how the interaction plans and partnerships were constructed and how they evolved during the early months of implementation. This focused attention particularly on how the research groups envisioned the role of interaction, its building and upholding during implementation.

The 13 projects we studied were mainly led by university senior scholars and in most cases the interaction leader worked at the same university. However, partners consisted of a combination of researchers from universities and research institutes, predominantly public state research. Civil society organisations (CSO), public agencies, companies and international institutions were included in the consortia (Table 4).

Table 4. Leadership organisations, interaction leaders and type and number of partners by thematic programme

Thematic programme	Leader	Interaction leader	Other partners
Climate-neutral and resource-scarce Finland (PIHI)	2 universities 2 research institutes	2 universities (same as PI) 2 research institutes (same as PI)	11 universities 13 research institutes 1 company
Equality in Society (EQUA)	3 universities 1 research institute	2 universities (of which 1 same as PI) 1 CSO 1 government agency	11 universities 3 research institutes 1 CSO 5 public agencies
Disruptive Technologies	5 universities	4 universities (same as PI) 1 university of applied science	21 universities 11 research institutes 1 university of applied science 1 CSO 1 company 1 public agency

Note: PI = principal investigator

Conceptual framework

Dynamic governance in STI refers to reciprocal interactions between researchers and non-academic stakeholders such as industry, civil society organisations, government and citizens. It is the ability to handle issues in a rapidly-changing environment and to adjust policy formulation and action continuously in order to serve particular collective interests (Porter 2007). Through dynamic governance the creation and exchange of knowledge is multi-directional and open-ended. Interaction takes place as an exploratory, inductive process and sets performance standards for responsible research and innovation (Guldbrandsen 2014). A more co-creative, multi-directional approach also supports the pooling of (human) resources in a manner that allows different types of expertise to be used in problem solving (Howaldt 2014).

Dynamic governance provides a framework for studying the societal interaction of researchers systematically. The focus of the dynamic governance framework is on adaptive policies and continual evaluation of action. These are ways to ensure that organisations and actors can anticipate future developments, to appraise and revise them critically, and to utilise expertise across boundaries. These three preconditions – thinking ahead, again and across – form the basis of an open and participatory environment that produce dynamically capable people and agile processes (Neo and Chen 2007). However, combining expertise across boundaries opens up potentials as well as tensions when participants bring forth differing viewpoints. While some capacities support dynamism, others inhibit it in the interaction between different types of actors (Gómez and Ballard 2013). In order to tap into pools of extended

expertise, the ability of people to reflect on their knowledge and its relation to others is essential. This means going beyond the networks that consist of similar types of actors or knowledge.

Dynamic governance provides capacity-based criteria for exploring the elements of interaction: anticipation, reflexivity, trans-disciplinary resource mobilisation and continuity (Neo and Chen 2007, Rask, et al. 2018). Each of these is reflected through interaction practices aimed at serving the goals of projects, such as user-centric open innovation frameworks where public and private actors collaborate to meet jointly shared goals (e.g. living labs).

Anticipation refers to the ability to plan actions in a strategic manner for the home institution of an actor and partner the institutions. It refers to foresight capacities to prepare wisely for future developments. Reflexivity rests on the will and skill of actors to analyse issues from different points of view, and to allow their own perspectives to be challenged while challenging those of others. Trans-disciplinarity reflects a scholarly approach that not only sees a phenomenon studied with the tools of several disciplines, but goes further to mix these under a shared approach (Rask, et al. 2018). As such, trans-disciplinarity encourages researchers to shake the foundations of their traditional disciplinary boundaries in order to grasp a complex phenomenon with a holistic approach (Strober 2010). It focuses on problems that cross disciplinary boundaries and cannot be solved with the tools of one discipline or through lighter multi-disciplinary actions (Neo and Chen 2007). Continuity refers to the need and ability of research projects to link actions to a longer chain of events, and to allow for evolution within a project. It also provides a necessary factor to balance rapid changes and to ensure longer term sustainability of actions (Stilgoe, Lock and Wilsdon 2014, Rask, et al. 2018).

From a dynamic governance point of view, societal interaction should support the solving of jointly defined problems in a manner that promotes learning by all participants through the use of continual feedback loops to evaluate actions (Romme and Endenburg 2006). Attention is placed on the capacities of participants and their ability to use them as catalysts in the development of context-wise practices. Using it as an approach to explore interaction is a way to study the governance of those who associate together in changing circumstances. Furthermore, it emphasises the role of aims as guiding principles in the interaction and in-built negotiation of interests, as well as practices to serve these aims. It sheds light on the processes that support the resilience and sustainability of the solutions and follows the impact pathways which lie behind dominant mechanisms of interaction (Muhonen et al. 2019). This means tapping into mechanisms through which societal impacts arise over time.

Contextual learning and circulating knowledge remain close to the actual process of knowledge production by shifting attention from attribution to the contribution of involved actors (Spaapen and van Drooge 2011). In short, the

critical point in applying a dynamic governance model is looking for the presence or absence of dynamics of exchange, tension of changes and collaboration (Guldbransen 2014).

Findings

Interaction practices in the projects

One of the main findings of the study is that interaction practices are strongly integrated into the research process itself. They are not treated as a separate part alongside or subservient to research. Interviewees reported that researchers approach societal interaction as a trade in which information moves in all directions in order to support the main aims of the project and the creation of new knowledge. Researchers expect to get ideas from and be challenged by partners outside the scientific community. There is a clear expectation of mutual gain. In short, the projects viewed goal-oriented interaction as a holistic guiding principle for the work.

As regards the practices such as citizen hearings and science communication, a clear majority of the interviewees considered these too traditional and out-dated. They fitted poorly with the active interaction approaches the projects had adopted. Hence, such practices were used as communication activities, separate from and more one-directional than interaction. In most cases, these were outsourced services acquired from beyond the scholarly community. Communication practices were connected to short-term, or one-off, situations with little continuity or ability to provide support in managing changes in the long term.

One of the core aims in a clear majority of projects was to increase or deepen cooperation with the societal partners through co-working methods. The focus on enhancing joint working methods rested on an understanding that the ability to identify problems correctly and find sustainable solutions is inherently dependent on a strong and open working environment. Interestingly, representatives of about half of the projects also stated that their intention was to function as *intermediaries* between societal partners of different types. This included bringing together unlikely actors, even adversaries of sorts in e.g. environmental and care-related issues. The intention was to facilitate their discussions and thus help build functioning collaborative networks that have the courage to deal with uncomfortable perspectives. They intended to use the SRC project as a platform to tie the partners closer together in their efforts to solve shared problems, while using scientific knowledge production as a tool.

Consequently, the SRC required split between internal and external interaction was deemed irrelevant or badly focused. A clear majority considered the split to be artificial for projects that are geared to active interaction throughout and potentially beyond the lifetime of the project. Partners in long projects that need to meet changing needs of society must be able to adjust to changing circumstances and needs.

According to most interviewees, the work done with societal partners constitutes interaction, i.e. deep internal communication, not external communication. Instead, the external part is viewed as the communication through which target groups entirely outside the consortia are approached with information, a call for discussion or a one-off event. Several projects reported that they had to revisit their communication and interaction plan to fit better with the implementation reality. In such cases, interviewees from several projects deemed the external consultants' input helpful in strategic (external) communication planning, but less suitable for planning deeper interaction. Projects across the programmes noted that they needed in-depth understanding of the working realities of their fields, and thus preferred to utilise internal, more substance-understanding experts for interaction tasks. External communications expertise was sought as outsourced service to help with flyer or policy brief layouts and webpage design, for example.

The project leaders did not expect all researchers in the consortia to adopt interactive approaches. However, most had ensured that those managing crucial tasks, such as work package leaders, were both willing and able to utilise interactive practices. Those holding central positions in the consortia had been selected in part because of their capacities and interest to work with different types of experts. Internal on-the-job training was also used to strengthen interaction skills of the researchers, alongside external communication training.

In all cases, societal interaction came into the planning so early in the process that it wasn't possible to differentiate between the research and interaction. While the research challenges and goals may have formed the impetus for the projects, ten projects in all three programmes noted that successful implementation of the project rested on building the work on constant juggling of ideas, needs and testing platforms between and across the partners. Such juggling allows roles of initiation, critique and development to be played by all partners. The interviewees stressed that the approach leans on a strong sense of equality between researchers and societal partners from industry, public administration and civil society, both formal organisations and informal local communities. This working method is also what is expected to create societal impacts through partners from industry, government, civic institutions and research institutes.

According to the interviewees, the principles of co-creation are adapted broadly. They refer to it as an approach that assumes the planning and implementation (i.e. development) in question to take place both in the research and practitioner communities. A similar presumption can be seen in connection to impact. The interviewees in all projects generally expected that the impact demand is targeted towards researchers. However, they direct a similar expectation back at the societal partners, be they policymakers, business actors or civil society organisations. The meaning of reciprocity is highlighted in the expectation of an equal partnership. This means that the researchers deem the interests of societal partners as well as their

own to be of equal importance, and thus expect similar treatment when it comes to serving others.

None of the projects settled for building a SIP on the needs of the scholarly community. The projects were mainly concerned with the national and European level, societally relevant themes, despite the SRC projects' focus on Finland. For example, several PIHI and TECH projects noted that digitalisation is a broad theme which recognises the importance of political decision-making. Researchers understand these as opportunities for the scientific community to intervene based on research results.

Despite the societally oriented approach, the research groups considered research interventions and scientific frameworks to also be a good basis for broader societal action and applied an advocacy-based method to interaction. This approach is referred to as 'drizzling' in the interviews. 'Drizzling' takes place throughout the lifespan of the project rather than at particular points in the process. It epitomises a move away from phase-based thinking when activities with partners are timed to specific periods or moments in the project. Nearly all SRC projects intentionally applied a continuous interaction approach.

The carrying idea of 'drizzling' is that knowledge is created and used through the interactive working methods in small parts. According to one TECH project, 'drizzling' resembles a leaking tap: absorbable amounts of knowledge are dropped often, as a continuous flow and in a way that links to the working realities of the partners, instead of pouring a bucketful all at once. The scientific process is made visible through cooperation, in addition to actual scholarly presentations. Hence, 'drizzling' provides an opportunity to implement interventions in a living lab type of environment, which encourages adjustments at all stages from planning and implementation and final evaluation. The work is strongly focused on building a more sustainable, collaborative relationship with public decision-making bodies, civil servants, businesses and civil society organizations.

The project leaders ensured that the SIPs matched the policy planning, formulation and evaluation processes, and less the decision-making as such. The interviewees emphasised that stakeholders need to have evidence to support the decision-making process. Providing such evidence requires time that decision-makers seldom have, and an acknowledgement of the quality assurance processes of research. The researchers' problem occurs if the evidence is based on hastily produced results, which have been put to use before being verified. All interviewees from the projects were aware of this contradiction either from own experience or research in the field. They had considered it in their plans by allowing time for discussions and utilising multiple methods to strengthen likelihood of success.

Focusing on policy planning, formulation and evaluation processes was an informed choice in most cases. Research groups applied the continuous interaction practice fully aware of the challenges it might pose to research quality. The

interviewees distinguished activities with societal partners as those that are continual and closed to the partners with a direct stake in the project, from those that were open to large target groups or the public and one-off events. Closed and continuous engagement practices supported the involvement of established experts. There was also room for lay people in open and unique operating models, but there was no continuity in these engagement practices.

, Most of the projects reported that while they understood public debates regarding tensions between research quality and societal interaction, they did not consider it a problem. On the contrary, the interviewees noted that it was beneficial also from a quality perspective to subject researchers to new angles arising from non-academic interests. They needed to revisit how they could uphold research ethical principles was seen as a natural part of all research projects. Interviewees linked the discussion to the politicised atmosphere surrounding the establishment of the SRC, which raised concerns about plans to strengthen political steering of independent research.

Capacities of dynamic governance

The projects placed strong emphasis on reflexivity in multiple ways. Over 75% of the projects were based on the view that researchers alone could not find the right questions to pose, nor solutions to the questions within only their own or closely related disciplines. Reflexivity is highlighted by the importance given to the ability to communicate ideas clearly and openly to partners. Interviewees emphasised the importance of dialogical communication skills as a requirement for forming a joint understanding of the societal challenge being tackled and how it ought to be approached. This includes an understanding of jargon and the need to avoid it when discussing issues in a mixed group.

Furthermore, it is the human interaction and negotiation skills more than conventional science communication skills, which are deemed particularly necessary in providing the basis for piecing together multi-disciplinary expertise. The interviewees described reflexivity as negotiation of sorts. It takes place in processes of knowledge creation as a mutual exchange in which all parties have the opportunity to share knowledge and ask questions.

The projects highlight important operational and hands-on capacities, which support anticipation capacities. They show a practical anticipatory approach linked to a clear target orientation. These capacities are utilised to prepare the partners better for future demands. This is not only evident for the project as a whole, but also to each interaction activity (workshops, events etc.). The interviewees emphasised a systematic objective-driven practice even in relation to everyday routines such as meetings, communication (e.g. leaflets) and conferences.

Further to support anticipation capacities, the personnel adopted rational time-management and prioritisation practices, which tie the partners' work practices

together but also allow on-the-job training. Interviewees in most of the projects and in all programmes reported having diverse career paths with work experience from industry, public services and civil society, in addition to academia. It provided them with deeper and broader understanding of working methods. In several projects, the key researchers were accustomed to non-academic work cultures. Thus, they were able to choose the most fitting engagement and participatory tools from a larger toolbox than perhaps the average academic researcher. Their diverse backgrounds provided them with understanding and practical skills on how to attract various groups, market participatory events to different organisations, and the argumentation and presentation styles that work on them. Interviewees from 70% of the research groups stated that they intentionally challenged familiar working methods within their consortia, in order to identify solution paths to complex problems.

As for transdisciplinarity, researchers and their societal partners try to combine not only their knowledge and expertise but also their interest in future developments of their fields. Their shared interests exceed the limits of their own, narrowly defined field (e.g. a specific scholarly discipline or business sector) and extend to the boundary areas between them. The interviewees considered transdisciplinarity to be a self-evident part of their projects because the research themes and phenomena under study are highly complex and impossible to solve without reflecting on the linkages across fields. They reported sharing a vision of future solutions and potential being found in the boundary areas, rather than the separate sectors or disciplines. In the TECH projects in particular, the interviewees described their SIPs as ecosystem platforms on which the projects address emerging problems rather than refining additions to the research plans. For them, the key capacities are implemented in broad networks.

The implementation of SIPs also provides a source for collection of complex data, and as such, interaction is seen inherently as a part of the research design. Interaction is a tool for identifying development areas that can serve interests both in the substance, sectoral and personal spaces that the partners have. While most state clear scientific goals, these are seldom considered to be the most important part of the project. Instead, the projects emphasise the broader societal aims and deem their interest in influencing political decision-making as part of the societal goals. Research is thus one of the crucial tools in reaching these aims.

A key finding regarding emerging working practices relates to the relationship between research groups and societal partners. These rest on how interaction and non-scientific partnerships are viewed. A differentiating issue between the projects relates to whether interaction is seen to be an in-built part of the project or an external "addition". This is strongly coupled with who are counted as being part of the core consortium and societal partners, and people who are seen merely as target groups for communication activities.

Forming a shared understanding is emphasised in all projects, and the term stakeholder is used to stress the meaning of all those who have an active *stake* in the project, i.e. partners of different types. This refers to researchers and societal actors alike. The need for in-depth, substantive knowledge is seen as a prerequisite for real progress, which frames the role of researchers. Close and continuous interaction ensures that the required perspectives are not only made visible, but that they are also systematically subjected to critical analysis by all partners. The projects stressed that the crux of the matter under study might be found somewhere that is unexpected, research-wise. The interviewees considered it more likely to find a critical component through cooperation that challenges the conventional way of thinking and working. This realisation was a driving force of in most of the projects across the programmes.

A main capacity highlighted by interviewees in most of the projects lay outside the four pre-defined ones: attitude. While it may not compare to anticipation, reflexivity, transdisciplinarity and continuity as a capacity, it was nonetheless defined by the interviewees as an essential marker needed for success. The research groups stressed the importance of an open and confident attitude as a cornerstone for being able to access the creativity and knowledge of all partners. Furthermore, they emphasised that it is this attitude and attached humility that allowed them to embrace their gaps in knowledge but also tap into their strengths in a competitive manner.

These researchers have experiential knowledge on how the actors they want to influence work and at which levels knowledge is needed and used. This applies to all projects but in different ways, depending on whether their focus lay mainly on developing company practices (PIHI and TECH) or social practices (EQUA). In all the projects, the interviewees reported being experienced with societal interaction from different contexts They were thus knowledgeable about how political processes function in practice and who has influence in such processes in their fields. This knowledge was applied in pursuit of solutions to grand societal challenges. Interviewees from over 50% of the projects also considered such translational ability and broader processual knowledge a useful skill to transfer and spread to academic colleagues.

Discussion

The SRC included a new requirement, an extensive societal interaction plan for strategic research funding. This approach marked a shift from the traditional academic communication and dissemination model by requiring a broader interaction plan with stakeholder participation. The new requirement converted the RRI framework into practice.

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From a public engagement point of view, the new approach was a push to change the traditional academic communication plan model to a model emphasising more varied, long-term and active interaction. This constitutes yet another step in the shift from a linear form of knowledge dissemination to an interactive approach (Owen, Macnaghten and Stilgoe 2012). An important element of such research is active and continuous collaboration between those who produce new knowledge and those who benefit. In the studied projects we see a clear pattern of this type of approach. They not only enhance co-creation but create conditions able to utilize new types of joint forums and open data. They encourage exchanges between researchers and stakeholders in order to co-produce new knowledge (Spaapen and van Drooge 2011, Pulkkinen and Hautamäki 2019).

Responsible and dynamic governance of science and capacity development are in the projects coupled with the increase of interaction and participation (Muhonen, Benneworth and Olmos-Penuela 2019, Kazadi, Lievens and Mahr 2016, Trencher, et al. 2014). This coupling can be illustrated by grouping them into process, implementation and cross-sectoral factors. They provide an outlook on the role of practices and capacities in utilising interaction for shared benefit.

The SIP requirements are implemented in the projects through practices and capacities in different intensities. In Table 5, the focus of working logic and partnerships are marked in italics, with + and – signs used to denote positive or negative role in the *interaction* as well as intensity of each in the work of the projects. Sections with multiple + signs hence mean that the approaches are utilised to a high degree, i.e. in most of the projects. Each of these are exemplified with the practices and capacities identified in the projects. Emphasis lies heavily on balancing the needs of the partners – researchers and non-academic ones – as well as using various types of interaction practices in order to serve these needs. In addition, process-awareness and knowledge of processes beyond their own organization are highlighted, alongside abilities to adjust plans while not losing sight of the strategic goals of the project. On the other hand, splitting external and internal interaction timewise is deemed irrelevant. Collaboration with media plays an important role but is not at the core of interaction but rather the purely communicative activities with set target groups. The same applies to outsourced services.

Table 5. The realisation of the SIP requirements.

	Actors	Tools of interaction	Responsibilities and implementation	Schedule
Process factors	Central *actors and expertise* regarding the theme, programme and utilisation of research results in different *phases* of the project. + Integration of interaction in research	Various kinds of interaction *practices and channels* during the project. ++ Learning in living labs	*What types* of actors put interaction into action. + Attitude of key personnel	How is interaction timed *initially* and adjusted *during* the programme. - Goal-orientation and time-management through objectives
Implemen-tation	The knowledge needs of *partners* and how they can utilise the knowledge. How partners adjust to changes in their own and others' needs during implementation. ++ Drizzling by researchers	How are interaction processes implemented and *adjusted*. ++ SIPs as ecosystem platforms	What previous references do consortium *partners* have from interaction across *transdisciplinary* and *professional boundaries*. + broad work experience combined with critical analysis of limits of expertise	How is the *sustainability* of knowledge use secured *during and beyond* the lifetime of the project. + Researchers as intermediaries
Cross-sectoral factors	In which *sectors* and how do partners *push* for change. + Understanding of a stakeholder and shared interests	How is collaboration with *media,* including *social media,* managed. +/- Continual+closed vs. one-off+open events	What tasks are *outsourced*. - Communications services (webdesign, leaflets)	Timing of internal and external interaction -- Broad understanding of consortium

The partners in different combinations had previous experience of close cooperation. Due to this, reflexivity and an appreciation for a range of expertise were in-built in the projects to a fairly high degree. Cooperation with societal partners was considered to be a self-evident part of the research project as a whole alongside challenging one's familiar working methods to find solutions to the grand societal challenges.

In most cases, the research groups were actively searching for ways to broaden their own perspectives, which they realised were not enough to find working solutions. This realisation came early in the planning phases. Most research groups were looking for partners who could bring a different type of expertise to the whole.

Their working model is closely related to the logic of open innovation as a practical reflection of dynamic research governance, and the use of dialogical methods that spurs contextual learning (Spaapen and van Drooge 2011, Kazadi, Lievens and Mahr 2016, Alhanen 2013). These researchers share an interest in influencing development of their field through practical action, *in addition* to having an impact through scholarly work.

The projects had a limited number of external consultants doing or supporting societal interaction. In most cases the responsibility for societal interaction was allocated to a researcher working in a dual role. The leaders of societal interaction generally had experience in the field and an interest and positive attitude to develop interactive practices. The consortia mixed multiple types of expertise from a range of professional backgrounds but relied on their own innovativeness, and ability to adjust and pool skills to handle interaction. The projects were planned by 'first-movers' who had no example cases to follow and had to be creative in the building of their proposals. Thus, they had waited for a new type of funding instrument that would see the benefits of their academically unconventional working methods. Instead, outsourcing was focused on communication services, such as designing visual identities, leaflets or webpages.

The capacities of dynamic governance appear as two wholes rather than as four separate types. Reflexivity and trans-disciplinarity are strongly coupled. They form a coherent approach to solution-based research. Reflexivity is viewed as negotiation that takes place in the processes of knowledge creation and circulation (Delanty 2001, Brown and Duguid 2001). In asking for research data or perspectives from the 'field', researchers consider it only fair that they, in return, give back something equally valuable to their partners. A vision of co-design as a working method and a dialogic governance of the knowledge production process (Stilgoe, Lock and Wilsdon 2014) is a key defining element in how reflexivity is manifested in the projects. Above all, it is a question of attitude.

The projects were initiated on a research focus, but quickly integrated societal interaction into the core routines of the project. Rather than proceeding through the traditional academic way they took a more straight-forward approach and asked the partners directly about their needs, gaps in knowledge and ideas. This approach was visible in their research proposals, which secured their funding. The research groups utilised the network governance principles in their working and interaction practices already in the planning phase (Hakkarainen, et al. 2004).

Exchanging ideas, crossing disciplinary boundaries and working in a network-based environment is a natural approach in these projects. The coupling between reflexivity and trans-disciplinarity is further indicated by the background of many of the researchers. Their working histories are diverse and multi-sectoral, instead of following a clear academic career path. This allows them to apply different working methods and networks naturally.

Capacities of dynamic governance – anticipation, reflexivity, transdisciplinarity, continuity – were implemented in broad networks consisting of researchers and their societal partners. The aim of their SIPs was societal transformation (Schneider, et al. 2019). This approach is illustrated by the emerging practices tapped into in the projects during the first months of implementation. While designing innovative SIPs to begin with, the level of innovativeness is most visible in the practices that were kickstarted at the beginning of implementation when the mixes of professional expertise were brought together in practice.

Another reason for the network-model to be preferred in the projects was that they addressed emergent problems. In most cases the SIP implementation serves as a source for the collection of complex data. SIP implementations are part of the research design but in a way that makes the partner become an active subject in the process, rather than being an object. This close collaborative relationship based on mutual gain crystallizes in the term 'stakeholder'. Instead of being viewed as an interest and target group of communication activities outside the consortium, the societal partners and the research groups are all seen as involved actors who share a 'stake' in the project, its methods, findings and applications. The knowledge is created in context and reflects different perspectives by integrating scientific and societal approaches.

There was extensive variety in the societal interaction practices in the projects, but they share a strong common trait: they are built to a high degree on the logic and goal of utilising contextual learning in their pursuit of dynamism (Kazadi, Lievens and Mahr 2016, Spaapen and van Drooge 2011). The attitude towards societal interaction rests on it being integrated into the research rather than being a separate part of the activities. This core notion follows the logic of open innovation and co-creation more than the idea of societal impact of science. It goes beyond the conventional premise of public engagement as an extension that exists alongside research. The research groups appeared to understand the benefits of pooling their knowledge and skills with those of other types of experts. They reached out to societal partners to not only engage them but to *broker* knowledge, and exchange skills and perspectives in order to gain new ones. Their approach seemed to rest on a practical understanding of relational knowing (Österlund and Carlile 2003)

Based on the data from this study, the societal interaction plan requirement caused an evident behaviour change in the scholarly community. One-way, linear interaction with stakeholders was not enough for accessing research funding in the new context. Interaction plans committed experts and knowledge utilisers in a way that implemented transparency and accountability in a new policy context (Olssen 2016, deBoer, et al. 2015). It was not only the academic indicators of research results that mattered but also how knowledge and interaction between the scholarly community and the operating environment were realised. This change should not be seen merely as a change in policy, but more broadly as a change in the legitimacy

of the scientific community for society. Once legitimacy of the scholarly community becomes a key factor, its verification has become an essential part of the research process for these projects. Indeed, in the SIPs of each project, legitimacy was a mutual concept because it is defined in the interaction between scholars and stakeholders. Of these 13 SIPs there is no single model, but different mutually agreed models depending on the operating environment. Creativity and flexibility were the core defining element in them.

From this perspective, it seems that the 13 projects were able to create dynamic governance for research. The projects were well prepared to implement SIP methods. However, it was also obvious that these methods would not have been implemented without the SIP requirements for funding, at least not to the extent realised in the momentum of gaining the funding (Brankovic 2017). The interpretation of the legitimacy of activities as mutual consent also leads to the conclusion that scholars and stakeholders defined and refined scientific, political and other societal objectives during the projects.

All the projects were trans-disciplinary, which provided a broad and continuous perspective on utilizing knowledge for society and informed decision-making. This increased the ability of projects to reflexivity, at least in terms of knowledge utilisation.

The formulation of SIP tools took shape in the early stages of the SRC-funded programmes. This was essential to the emergence of a mutual consent approach. Initially, 13 project approaches emerged that eventually became part of their governance model. They were characterised by the commitment of key actors and project beneficiaries from the planning stage. When all actors had the opportunity to influence project objectives and interaction practices, the operational agenda and the results of the studies became inseparable.

Concluding remarks

In this paper we have investigated how societal interaction plans (SIP) can help orient research activities to respond better to the grand challenges of society. We found that the SIP model, as delineated by the Strategic Research Council of Finland, makes a sharp distinction to previous models of societal interaction, by requesting researchers become deeply involved in stakeholder collaborations in their daily research activities. As there is a risk that such extended societal interaction will result in an overwhelming burden for academic researchers, we found an interesting SIP "working model" emerging from the daily practices and perceptions of the project managers we interviewed. They characterised this model through the metaphor of "drizzling" whereby societal interaction is not something spectacular or event-based aimed at high visibility but happens in small quantities and in a cumulative manner

on a continuous basis. The actions are well-targeted, resource-wise, goal-oriented and carried out daily. This can be contrasted with a more resource-consuming model in which interaction would be an external showcasing of the projects for wider society, requiring enormous additional resources from the research consortia.

We also found that SIPs are supportive of new capacity building within the scholarly community but also among their societal partners. As found in previous studies (Rask, et al. 2018), innovative societal interaction can effectively contribute to capacities of anticipation, reflexivity, transdisciplinarity and continuity. Capacity building occurs in the ways that SIPs are approached as something akin to ecosystem platforms which increase research quality through dynamic governance of research. They are reflected in efforts to integrate non-academic networks into research routines and in creating space for researchers who also have experience outside academia. Our data show that the capacities of dynamic governance are particularly visible in researchers' ability to combine analytical knowledge with non-academic expertise and process skills, and by being capable of organising these into the interaction practices of research projects.

When the SRC was established, no other national research agency in Europe had implemented an equivalent operation model with a SIP as a funding requirement. The underlying starting points by European national research agencies underlined non-economic social outcomes such as societal products as outputs, use as societal references, and societal benefits as changes in society (Bornman 2012, Bozeman and Youtie 2017). The societal interaction plan approach differs from this policy. The difference lies in that the role of knowledge utilisers is part of the process to define research and focuses on the early stages of planning. From this point of view, societal interaction is primarily a concept defined by the key actors, which include both the core research group and the closest societal partners. For this reason, the SIP model determines the process and goals for societal impact, not only the activities.

Apart from the Science with and for Society programme of the EU, the SIP model is not widely used in the European research area. As such, there is much work to be done to mobilise the good experiences gained from the use of this approach. As our data suggest, most project managers considered this kind of operational model to be relevant for working with research projects focusing on complex societal challenges. The more there is complexity involved and different societal perspectives and voices, the more there is need for practical tools and approaches for managing the new connections throuh dynamic solutions. To facilitate a transition, the relevance and usability of the SIP model need to be established through further empirical research. Our results suggest that their main benefits lie in better legitimacy, and more effective mobilisation of academic and non-academic resources, without compromising research integrity.

Societal interaction has a unique function in building better and more diverse networks for researchers. Encouraging researchers to involve decisionmakers, policy

planners, and other key stakeholders also encourages them to acknowledge the interdependencies and mutual gains in solving shared problems. This can push them to find innovative ways to design research agendas which reflect and align academic research interests with those of broader society. In the evolution of societally interactive research, it is crucial to understand that one of the characteristics of successful consortia lies on building the interaction solidly on the knowledge production needs. A functioning interaction plan is thus less focused on visibility and consensus, and more on mixing complementary expertise in a manner that embraces difference of interests. This calls for strategic ability and a goal-oriented approach to manage knowledge across boundaries (Carlile 2004).

The SRC and its experiment with SIPs represents a cutting-edge approach in the transition and renewal of academic work. It provided guidelines and conditions, while leaving room for creative solutions to define the topic and interaction approach. This has been shown to be an effective way of ensuring that change occurs. It is important for STI research to evaluate whether this is in the interest of responsible research activity. Despite some obvious problems, such as the naive expectation that societal interaction could be preliminarily programmed timewise, our data suggest that SIPs are a step towards more interactive and responsible research models. While the orientation is therefore right, more knowledge of its long-term effects on research funding and performing organisations will be needed.

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