Evaluating foresight in transnational research programming

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*The views expressed are purely those of the author and may not in any circumstances be regarded as stating an official position of the European Commission.

Keywords: transnational research programming, foresight evaluation, coordination of innovation policy

Abstract

There is a growing literature on the evaluation of foresight applied in different layers of innovation systems. This is not yet the case, however, in the realm of foresight supporting transnational research programming (TRP). Despite existing efforts relatively few case descriptions are available on the role and impacts of foresight in transnational research programming.

Starting from a review of literature on foresight evaluation and on transnational research programming, an approach is developed for evaluating foresight activities in support of transnational research programming. Our central research question is what is understood in this context by a successful foresight: when it contributes to addressing societal challenges? To increased competitiveness and growth? To improving good governance? To increasing resilience? To better R&I systems? To increased capacity building? Based on the theory of change, an integral and multidimensional evaluation framework is elaborated that also covers vertical, horizontal, temporal and inter-systemic coordination challenges. Still, the framework leaves room for foresight stakeholders to define individually what a successful foresight is and how they perceive the foresight exercise in which they were involved in this regard.

The framework is tested against the structural and thematic foresight exercise that was implemented in the context of the EU Russia S&T collaboration under the FP7 project ERA.Net RUS (the foresight project itself was presented at the Zurich Seminar and the related paper is forthcoming in Technological Forecasting and Social Change). The collaboration in this project is now continued under the ERA.Net RUS Plus project which includes the evaluation of the past foresight exercise in its activities.

The evaluation methodology relies on interviews and different tailor-made online surveys to funding agencies, foresight project participants and project proposal participants as well as targeted interviews of project coordinators and client organisations. The triangulation of methods is applied by way of using secondary sources such as data on participation in joint calls, national level discussions triggered by the project or changes in national policies, etc.

Lessons are drawn for the use and evaluation of foresight in programme cooperation in general, for Europe (in particular the European Joint Programming Initiatives and the ERA.NET Co-Fund projects) and for global programme cooperations. The paper also contributes to a better understanding of the appropriateness and costs and benefits of foresight for programme cooperation and thus to the potential added value when

deciding to embark on such an exercise or not within a programme collaboration context. More in general, by taking stock of earlier literature and reporting on the experiences of the first foresight evaluations in the context of transnational research programming the paper attempts to initiate a wider discussion on the role and impact of foresight in transnational research programming. The paper follows up on earlier work on 'Embedding foresight in transnational research programming', presented at the 2011 FTA Conference and published in Science and Public Policy (Könnölä & Haegeman, 2012). It also recommended to read this paper together with the paper 'FTA supporting effective priority setting in multi-lateral research programme cooperation: the case of EU-Russia S&T cooperation' forthcoming in Technological Forecasting and Social Change (Haegeman et al, forthcoming).

1. Introduction

In the context of recent years in which research is increasingly seen as a way to address (global) societal challenges, transnational cooperation in research programming is high on the agenda. In the EU the Europe2020 Agenda addresses two roles to research: addressing societal challenges and increasing competitiveness. In a context where resources for R&I are scattered among many public and private actors (Member States, the European Commission, regions, universities and public research centres, private companies and private research centres, etc.). Especially in times of crisis and limited resources, collaboration across borders in setting priorities for R&I is commonly seen as a way to get more results with the same or even less resources. However, the use of foresight in research programme cooperation is still rather limited. Preliminary analysis of ERA-NETs under FP6 and FP7 suggests that cooperation networks which continue over a long period of time (such as Woodwisdon, evolving from an FP6 ERA-NET over an FP7 ERA-NET to an FP7 ERA-NET+) tend to use foresight more often than networks that do not continue. Evaluating foresight in such collaborative settings can shed better light on the advantages of its use and thus increase the understanding of the added value of foresight among stakeholders involved in such collaborations. Advantages of foresight are multifaceted, and may be different for different stakeholders in the process. So we opt for a flexible approach, allowing for different understandings of what it means for a foresight to be successful or not. Another argument for evaluating foresight is the long-term nature of societal challenges which programme collaboration aims to address. Longer-term collaborations may need different foresight rounds or ongoing foresight. In such context foresight evaluation can offer learning opportunities for improving foresight, if the evaluation results are used as input for new foresight design (Georghiou, 2003). Finally, as with foresight studies in other contexts, also the need for effectiveness and efficiency are clear arguments for evaluating foresight efforts in programme collaboration.

We start from the existing knowledge base and look at the history of foresight evaluation, of the use of foresight in transnational research programming (TRP) and of the evaluation of foresight in collaborative programming.

2. Knowledge base

2.1 Foresight evaluation

A review by the FORSOCIETY project (Klüver & Hoff, 2007) of 18 national foresight exercises (out of which 11 included some form of evaluation) suggests that common evaluation schemes should link process and effects, that time between evaluations should not be too long (which tends to happen for e.g. large programme evaluations) and that evaluations need a systematic approach, because adapting evaluations too much over time hampers comparability. Over the last decade, a number of frameworks have been developed that aim at offering such systematic approach. Table 1 below summarises those efforts and their main characteristics.

Table 1: Overview of frameworks for foresight evaluation:

Foresight evaluation frameworks	Main characteristics
Typology for evaluating foresight (Georghiou & Keenan, 2004)	Evaluation criteria include: Efficiency of implementation; Impact and effectiveness; Appropriateness
Eight-step framework for evaluation (For-Learn, 2008)	The eight steps include: 1. Setting up the evaluation; 2. Defining the scope and approach; 3. Choosing and defining evaluation items for effectiveness; 4. Evaluating the effectiveness; 5. Choosing and defining evaluation items for efficiency; 6. Evaluating the efficiency; 7. Choosing and defining evaluation items for appropriateness; 8. Evaluating the appropriateness/relevance of foresight
Impact of foresight on policy-making (Da Costa et al, 2008)	The six functions include: 1. Informing policy; 2. Facilitating policy implementation; 3. Embedding participation in policy-making; 4. Supporting policy definition; 5. Reconfiguring the policy system; 6. Symbolic function.
Foresight knowledge quality assessment (Guimarães Pereira et al., 2007)	Checklist for quality assurance of knowledge flows in the foresight process, using the foresight base activities of futuring, planning and networking.
Framework to classify the impacts of various types of prospective analyses (Havas et al., 2010)	Linking effectiveness of foresight for innovation policy to its neat embeddedness in the innovation system and the wider policy context, using four dimensions of 'contextualisation' (governance culture, policy attention, socio- economic dynamics, and resource availability) and with implications for foresight functions (policy-informing, policy advisory, policy facilitating).
A foresight evaluation framework in dealing with grand challenges (Amanatidou, 2011)	Rationales, functions, impacts and grand challenge needs are combined in a cycle supported by specific internal and external conditions (or foresight principles) for dealing with grand challenges.
Dynamic foresight evaluation (Miles, 2012)	Foresight seen as a service activity between foresight practitioners, sponsors, and other stakeholders stresses the need to be aware of the complex interactive nature of foresight when conducting foresight evaluations.
Foresight and the sociology of expectations (Van Lente, 2012)	Lessons are drawn from the sociology of expectations for the objectives of foresight. These lessons therefore also affect the evaluation of foresight.
Impact of foresight on innovation performance (Harper, J.C., 2013)	Immediate, intermediate and ultimate/end impacts; evaluation criteria changing over time; advisory or strategic role versus instrumental role of foresight
An integrated approach for foresight evaluation (Sokolova, 2013)	Evaluation methodology focusing on three stages: 1. The preparatory phase; 2. Direct and comparative evaluation; 3. Synthesis and results.
Scientific criteria for evaluation of foresight studies (Peperhove & Luoto, 2013)	Assessment of scientific quality of foresight centred on two criteria: 1. Transparency as a precondition for duplicability and 2. The selection of the experts.

In terms of evaluation criteria most commonly used sets of criteria can be related back to the following four: efficiency, effectiveness, appropriateness, and behavioural

additionality[1] (See e.g. Georghiou & Keenan, 2004; For-Learn, 2008; Amanatidou, 2011; Harper, 2013). Some contributions focus on scientific quality, stressing the need for transparency and replicability (Peperhove & Luoto, 2013) and for quality in knowledge flows (Guimarães Pereira et al., 2007). Other authors stress the importance of complex stakeholders interrelations (Miles, 2012), different foresight stages (Sokolova, 2013), the quality of embeddedness of foresight in the innovation system (Havas et al, 2010) or the sociology of expectations and self-fulfilling prophecies (Van Lente, 2012). Many authors also distinguish between process versus result/impact evaluation. Regarding impact assessment distinction is made between immediate, intermediate and ultimate impacts, and between impacts on policy-making (See e.g. Da Costa et al, 2008) and societal impact (Amanatidou, 2011). The framework for foresight evaluation in transnational research programming presented in section 3 builds on the variety of elements of the above knowledge base.

2.2 Use of foresight in transnational research programming

Experiences in Europe

Collaboration between nations in Europe on research programming takes places through various instruments and processes. ERA-NETs have a long tradition in applying foresight in support of programme collaboration. Uses range from the identification of trends to joint priority setting and the networking of research and innovation communities across borders. However there seems to be a gap between those ERA-NETs that have 'discovered' the added value of foresight and those that have not. Analysis of longstanding programme collaborations reveals that ERA-NETs that, once collaboration networks start using foresight, they tend to continue applying the approach in 'follow-up' collaborations (Sources: NETWATCH and own analysis). In practice this can for instance take the shape of a dedicated foresight and programming Unit to support a long-term structural foresight to develop, maintain and update the strategic research agenda (see EMIDA ERA-NET/ANIHWA ERA-NET). But the networks applying foresight still represent a minority of the total number of ERA-NETs. This is quite different for the European Joint Programming Initiatives (JPIs). Most JPIs are applying foresight to some extent or are planning to do so. This may have to do with the fact that foresight (or forward-looking activities) has been identified as one of the framework conditions for joint programming (EC, 2008). Interestingly, whereas at the start of joint programming back in 2008 foresight was commonly seen as a way to identify societal challenges for which a JPI should be established (E.g. the foresight exercises as part of SCAR that have led to the identification and (and subsequent creation) of several JPI topics), nowadays, its use goes far beyond this initiating role. Table 2 shows an overview of roles foresight currently plays in each of the 10 JPIs currently running in the EU. Big differences exist among JPIs in the way foresight is being used. Most JPIs attribute an ad hoc role to foresight, focusing mainly on supporting the preparation or update of the strategic research agenda. Few JPIs attribute a more structural role to foresight, by using foresight both for strategic and programmatic purposes (JPI Oceans) or by focusing also on longer-term issues beyond 2020, e.g. through supporting the identification of breakthrough innovations by 2050 (JPI Urban Europe). Interestingly, JPI Urban Europe also seems to be the only JPI that plans to apply ongoing foresight over the longer term in order to keep updating the

[1] Amanatidou (2011) also make reference to the importance of cognitive capacity additionality, especially in a context of research addressing societal challenges.

strategy of the JPI. The above findings on the use of foresight resonate well with the aim of the paper to offer a clearer view on the potential added value of foresight in collaborative programming contexts through evaluating the efforts of past exercises. An increased understanding of the roles and potential impact of foresight may both contribute to an increase in the use of foresight as well as in attributing a more structural role to it.

Table 2: Roles of foresight in Joint Programming Initiatives (Sources: Netwatch, 2013; reports of individual JPIs).

Joint Programming Initiative (JPI)	Roles of foresight	Type of foresight
JPI Climate Change	- Participation of international foresight experts in the Transdisciplinary Advisory Board	Anecdotal
JPI Demographic	- Mapping of relevant national foresight studies - Identify potential for joint activities	Ad hoc
JPI Oceans	- Strategic debate about the future strategic orientation of research - Programmatic approach seeking solutions and joint actions	Structural (Strategic and supporting programming)
JPI Neurodegenerative diseases	- No specific role	-
JPI FACCE	- Identification of joint programming opportunities and initiatives through mapping	Ad hoc
JPI HDHL	- Identification of main trends and drivers of change for future development - Identify key future challenges and explore possibilities to reach shared visions by developing research questions. - Adjust and update the current Strategic Research Agenda	Ad hoc
JPI Cultural Heritage	- Analysis of trends and drivers - Anticipated changes to the CH research environment - Futures Literacy Scenarios	Ad hoc
JPI Urban Europe	- Determine specific research needs and roadmaps, short- and long-term policy measures, business opportunities and needs for new co-operation structures - Support identification of break- through innovations on functions of cities in future (2020–50)	Structural Long-term Ongoing foresight
JPI Water	- Identification of trends and drivers of research and innovation (foreseen) (SRIA, pp.10)	Ad hoc
JPI AMR	- Identify and characterise scientific challenges and their potential impact on society	Ad hoc

Experiences in the rest of the world

Several examples exist on joint foresight projects supporting international S&T cooperation between the EU and other regions of the world, in particular with Asia. The foresight study of New INDIGO on future S&T cooperation between India and Europe involved scientists, science policy-makers and programme owners from Europe and India (Blasy et al., 2012). KORANET (Dall et al, 2013) developed recommendations for European-Korean R&D cooperation by involving ministries and agencies from more than 15 countries in an interactive foresight process involving a vision of a very optimistic European-Korean R&D cooperation scenario, “back-casting” with the actions

needed to reach this desired cooperation status, and a roadmap with possible time horizon of implementation, feasibility and importance for each action. SEA-EU-NET (Degelsegger & Gruber, 2011) included a foresight exercise on determinants of future scientific and technological (S&T) cooperation between Southeast Asia and Europe, based on a driver-identification scenario workshop in Indonesia with policy-makers from both regions and on a survey of scientist's opinions using open email consultations and Delphi methodology. The results of the exercise are a reliable and comprehensive set of drivers perceived by key stakeholders as influencing the 2020 future of S&T cooperation between Southeast Asia and Europe.

The International Council for Science[2] conducted a global study in the future of international science, focusing on the key drivers influencing international science in the next 20 years and on ways to support international science collaboration to the benefit of society. One of the purposes was to support ICSU members and partners in their development of long-term visions and strategic thinking with regard to international science (ISCU, 2011). Another interesting global project constitutes the STAR-IDAZ[3] project. Funded under FP7, it focuses on coordinating animal disease research in 4 world regions (EU, the Americas, Asia and Australasia, and Africa and the Middle-East) and complements the already existing European projects EMIDA ERA-NET[4] and its follow-up ANIHWA ERA-NET[5]. The Foresight and Programming Unit (FPU) of the European projects also functions as FPU for the global project and aims to bring together 4 regional foresights in support of developing a global outlook on animal disease research. The FPU is an interesting example of how ongoing foresight[6] can be embedded into international research programme cooperation. The FPU is currently mainly financed by the ANIHWA project and partially by STAR-IDAZ, and the Executive Committee of the FPU is currently devising a business plan for securing the long-term sustainability of the FPU[7].

2.3 Foresight evaluation in transnational research programming

In the context of research focused on addressing long-term global challenges the above mentioned long-term sustainability and embeddedness of foresight in the research programming becomes paramount. In order for such ongoing foresight to be self-learning, foresight evaluation and feedback into future foresight design is essential. Surprisingly, close to no examples of evaluation of foresight in support of transnational research programming exist. One case that comes somehow close to a foresight

[2] The International Council for Science (ICSU) is a non-governmental organisation grouping national scientific bodies (representing around 140 countries) and international scientific unions (30 Members). The ICSU coordinates interdisciplinary research to address major issues of relevance to both science and society.

[3] www.star-idaz.net

[4] Coordination of European Research on Emerging and Major Infectious Diseases of Livestock (www.emida-era.net)

[5] Animal Health and Welfare ERA-NET (www.anihwa.eu)

[6] Also with the integration of the four regional foresights the work does not stop. E.g. the final report of one of the foresight studies (FORE-Med) states that the process "cannot be considered as completely ended, nor it would be after the delivery of the Strategic Research Agenda. It should be considered a continuous process. The identified research areas and priorities should be, in fact, updated regularly, since the foresight predictive capacity decreases while time passes by, in particular if, in the meanwhile, different actions are made instead of those suggested or foreseen. Moreover, providing the possibility of periodic meeting to a range of experts in different fields in the area would consolidate the network, supporting the creation of a cohesive Mediterranean team." (Bagni et al, 2014, p40)

[7] For a historical overview of the establishment and evolution of the FPU, see: http://www.scar-cwg-ahw.org/index.php/subgroups/infrastructure-and-foresight/.

evaluation is the brief assessment of strengths and weaknesses in the FORE-Med study as part of the STAR-IDAZ project (Bagni et al. 2014, p36). This paper aims to make a start with filling this gap by proposing a foresight evaluation framework for transnational research programming (section three) and by testing it for the case of EU-Russia S&T collaboration and the related foresight exercise in the context of FP7 project ERA-NET.RUS (section four).

3. A framework for evaluating foresight in transnational research programming

Based on the literature analysis and following an intervention logic as used in theory of change a framework for foresight evaluation is proposed, linking societal issues at stake to possible impacts that transnational research programming can achieve, and the role of foresight in this. This intervention logic is presented in figure 1. For a better understanding of evaluation in this context, we introduce three consideration levels: transnational research programming in society, the foresight exercise, and the evaluation of foresight. Each of the three levels is discussed below.

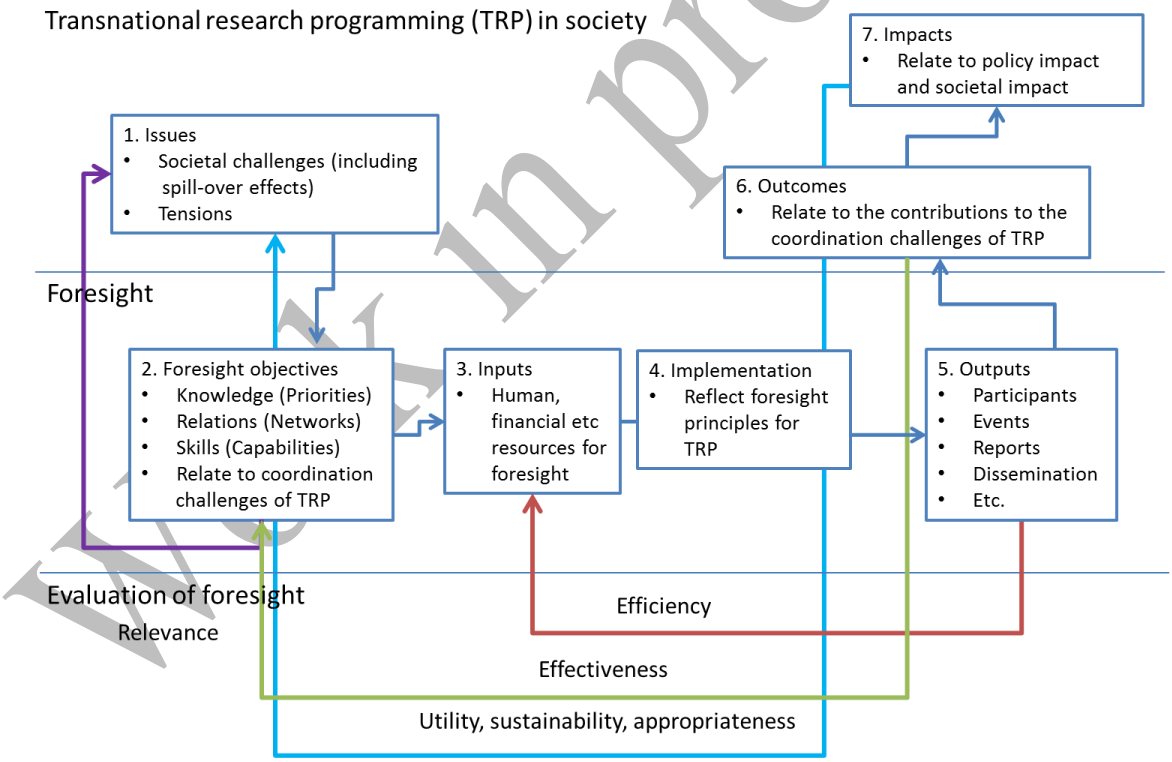


Figure 1: intervention logic for transnational research programming and the role of foresight evaluation

3.1 Transnational research programming in society

When considering societal issues at stake, the first thing that comes to the mind are the wide sets of interlinked societal challenges to be addressed, such as climate change,

demographic and healthcare challenges, etc. When considering reasons for using foresight in support of TRP the most obvious one is probably whether foresight can help address societal challenges in a better way. As this is unmeasurable, a more specific set of societal issues is required to make this operational. We approach this problem by taking the position of different stakeholders in TRP and considering the potential added value foresight in TRP can have from their specific perspective. Table 3 below looks at contributions of foresight in TRP from the point of view of different stakeholder groups, and relates them to different types of results.

Table 3: Foresight actors in TRP foresights and actor specific foresight objectives

Actors	Contribution of foresight	Description	Type of result
Actors involved in programming the research (Funding agencies, ministries, etc.)	Does foresight help addressing coordination challenges and related barriers in implementing TRP?	5 coordination challenges and related barriers can be considered: systemic, vertical, horizontal, temporal and multilateral coordination[8]	Outcomes
	Does foresight support transnational community building between relevant stakeholders?	Stakeholders to consider can include dominant, dormant and affected stakeholders[9]. Cooperation modes to consider: ad hoc versus sustainable cooperation mode	Outcomes
Research policy-makers	Does foresight help address the thematic research objectives?	Did foresight help understanding the context, setting the research priorities, and identifying research needs and gaps?	Outcomes and policy impact
	Does foresight help supporting general research objectives?	Did foresight help shaping better R&I systems, and did it contribute to implementing research policies (e.g. to better gender balance in research)?	Outcomes and policy impact
Policy-makers in non-research areas	Does foresight help address the thematic policy objectives?	Did foresight contribute to the climate change objectives, health objectives, etc.	Policy impact and societal impact
	Does foresight contribute to policies related to research policies?	Related policies may include: innovation policies, industrial policies (IPR, standardisation,…), social inclusion policies,…	Policy impact and societal impact
	Does foresight contribute to competitiveness and growth?	Is there more growth and job creation in the long term in sectors or thematic areas in which foresight is applied?	Societal impact
All policy-makers	Did foresight increase resilience (the preparedness for unforeseen events) of policies and research programmes?	Did foresight lead to flexibility in programmes and institutions? Is continuous foresight foreseen? Is foresight embedded in the policy cycle?	Outcomes and policy-impact
Researchers and citizens	Did foresight contribute to good governance?	Good governance is understood to be participatory, transparent, accountable, effective and equitable.	Societal impact

[8] For a detailed explanation of the coordination challenges, see Könnölä & Haegeman, 2012; Haegeman et al, 2013; Haegeman et al (forthcoming).
[9] For a detailed description of stakeholder types, see Haegeman et al (2012)

The different types of results include outcomes, policy impacts and societal impacts.

- Outcomes are understood as the short and medium term effects of the foresight outputs
- Policy impact is considered as any (medium and longer-term) impact the foresight activities have on policy decisions made in relation to the topic of the TRP (See e.g. Da Costa et al, 2008)
- Societal impact is understood as a change in society which can (partially) be related back to the foresight activities, or to the policy decisions on which foresight had a policy-impact. This is obviously a more long-term impact (see e.g. Amanatidou, 2011).

Note that impacts relate specifically to impacts of the use of foresight in TRP and how this has impacted on policies and on society, so not to impacts of the TRP as a whole.

3.2 The role of foresight

The roles and objectives of foresight have been widely described in literature. Different models exist for designing and running a foresight exercise, but most tend to include 4 basic elements: Foresight objectives, inputs, elements of implementation and planned outputs. As this is a less distinctive element compared to foresight in other contexts we focus on TRP specific elements. In the context of TRP the efficiency of foresight can also relate assessing the foresight against specific design principles for such foresight projects (Könnölä & Haegeman, 2012):

- Scalability: Ability to process contributions vertically from stakeholders who are accustomed to different levels of abstraction when considering regional, sectorial, national or European priorities
- Modularity: Process design where analogous sub-processes - or modules - can be enacted relatively independently from the other sub-processes (Könnölä et al, 2011).
- Flexibility: in the design and management of the foresight process in order to accommodate different national interests, capabilities and culture in transnational programming.

3.3 Evaluation of foresight

Below we address the issues of efficiency, effectiveness, and appropriateness.

3.3.1 Efficiency

For assessing the efficiency and quality of management of a foresight exercise, items in view of two different dimensions can be considered (For-Learn, 2008): the design of the foresight project and the implementation of the foresight project. The following elements can be considered within both dimensions: Embedding in decision making structure (Trade-off between freedom and impact), Linking to policy processes (consider existing, expected and emerging processes), design of participation (management structure, process phases), adequate coverage of participation (Age, Gender, Expertise, Geographical, Institutional, stakeholders), selection process of participants (co-nomination, etc.), quality of participation (attendance rate, etc.),

flexibility (managing risks and preparing for unforeseen relevant changes), choice of methods (adequacy of methods to attain the objectives within the conditions: skills, resources, time), chosen methods, communication (use of different media, interactions), accountability (transparent use of financial and other resources).

In the context of TRP the efficiency of foresight can also relate assessing the foresight against the specific design principles for such foresight projects: scalability, modularity and flexibility.

3.3.2 Effectiveness and appropriateness

Effectiveness evaluation focuses on 'the attainment of both the initial objectives and the objectives possibly refined during the project' (For-Learn, 2008). Hence, the effect of the project is evaluated in view of the relation between the objectives and the project outputs, results and impacts. Appropriateness looks at whether the objectives were appropriately addressed in the project. In this paper the questions in table 3 will be used to assess effectiveness and appropriateness.

4. Testing the framework: the case of the ERA.Net RUS structural and thematic foresight exercise

European Research Area Networks (ERA-NETs) have been introduced by the European Commission to bring Research, Development and Innovation (RDI) funding organisations together, for coordinated research programming and funding initiatives in a transnational setting. ERA-NETs can be either thematic oriented, have a horizontal focus (e.g. on SMEs), or a regional focus. Our case, the ERA.Net RUS[10] has been regionally focused on RDI cooperation of the EU and of associated countries to the FP7 with Russia. The ERA.Net RUS project managed to successfully pool resources of funding agencies from 11 EU Member States (MS) and countries associated to the EU's Framework Programme 7 (AC), and from Russia. Two pilot joint calls were implemented, one for funding of 'Collaborative S&T Projects', and one for 'Innovation Projects'. With a total budget of €10.3 million, a total number of 42 joint projects were funded under the two calls in 2011.

In this ERA-NET a foresight on EU-Russia RDI cooperation has been implemented in the years 2010-2014. Before we assess the preliminary foresight impacts according to the criteria discussed in the chapters above, we first provide a short overview of the foresight approach. The ERA.Net RUS project has included both a structural and a thematic foresight (see figure 2 below). The structural foresight refers to institutional solutions and instruments (e.g. funding programmes) for the cooperation, whereas the thematic foresight refers to relevant thematic priorities of interest both for the EU and Russia.

In the structural foresight strand four different cooperation scenarios were elaborated in detail and validated in workshops. The scenarios and its framework conditions and

[10] The project was implemented in the period 2009-2014; detailed information on it is accessible at: http://www.eranet-rus.eu/en/198.php

critical variables were then assessed in a broad Delphi survey among researchers, policy-makers and other experts involved in EU-Russia R&D and innovation cooperation.

The thematic foresight[11] strand was initiated with a meta-analysis of foresight exercises for identifying key thematic priorities for EU–Russia RDI cooperation. The analysis was backed-up with expert interviews. A second Delphi survey round was based on the results of the first round and focused on thematic areas for research and innovation cooperation. On the basis of a first prioritisation by the ERA.Net RUS Group of Funding Parties (a selected group of RDI funding organisations from the EU, associated countries to FP7 and Russia), thematic roadmapping workshops with scientific experts were organised in the four broad fields of nanotechnologies, health, social sciences and humanities, and environment and climate change.

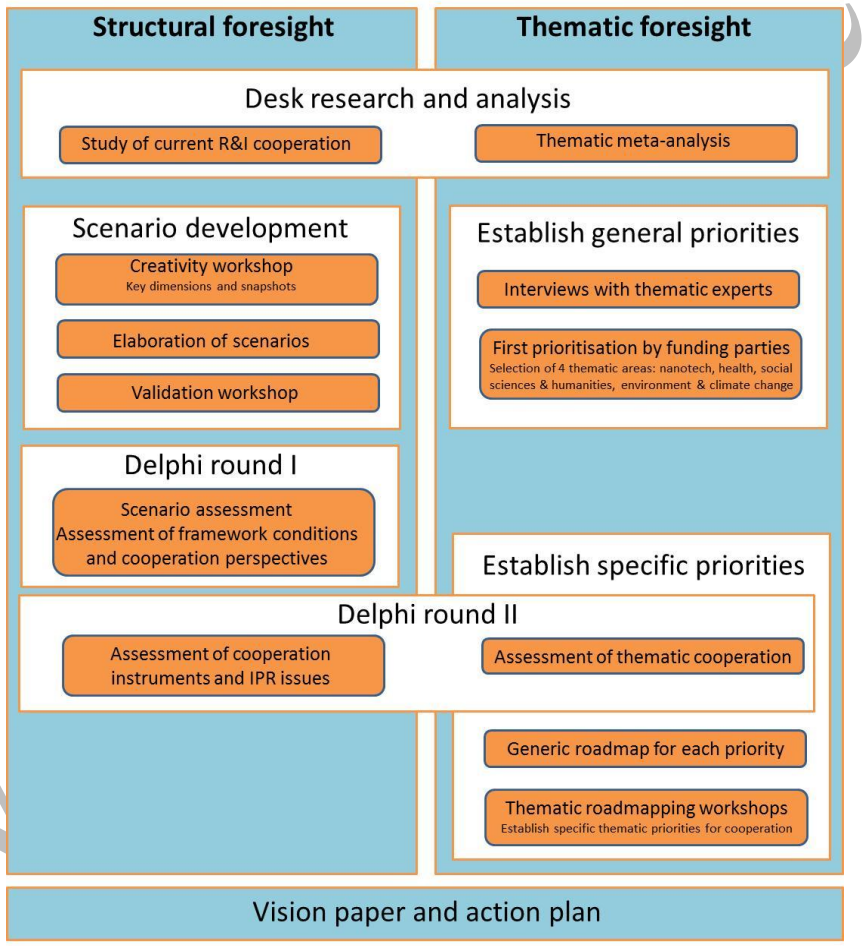


Figure 2: Structural and thematic foresight process of the ERA-NET.RUS project

The foresight and the resulting scenarios have provided a basis for suggesting measures for improving the RDI cooperation and for developing a sustainable joint funding programme between EU MS/AC and Russia. These measures and possible programmes have been outlined and published in an ERA.Net RUS Vision Paper and an Action Plan

[11] For a detailed description of the thematic foresight strand, see Haegeman et al (forthcoming).

for implementation up to 2020.[12] The Action Plan included a range of measures and concrete actions proposed, covering the legal framework for cooperation, the policy dialogue, joint agenda setting, joint funding activities, information and dissemination, and finally a proposal for a follow-up funding activity to the ERA.Net RUS Plus in the form of a cooperation according to article 185 Treaty of the European Union. The document was discussed in the Group of Funding Parties at a dedicated conference in July 2013. The feedback gathered was used to improve and detail the document further. The final version was then presented at the high-level opening of the EU-Russia Year of Science 2014 in Moscow (officially launched in November 2013), at a time when there seemed to be still excellent potential for advancing the cooperation. The political environment was facilitating the cooperation, with the EU Commissioner for Research and Innovation, and the Russian Minister of Education and Science opening the series of events over three days. The situation seemed bound to develop towards a positive scenario outlined in the foresight.

To assess the preliminary impacts of the foresight, qualitative expert interviews were conducted in autumn 2014, about 10 months after the end of the exercise. The experts interviewed have participated in the foresight, but have not run it.[13] In the following we evaluate the foresight exercise using the framework presented in chapter three.

4.1 Efficiency

The general efficiency assessment of a foresight exercise is not addressed here for the ERA.Net RUS case as it is not specific to the TRP context. For an overview of the TRP specific element of efficiency – the assessment of the case against the design principles of scalability, modularity and flexibility – we refer to Haegeman et al (forthcoming). See also table below.

Table 4: Application to foresight design principles for large-scale foresight to the ERA.Net RUS case

Foresight principle	Application to foresight principles to the ERA.Net RUS case
Scalability	• Different levels of abstraction were used in the thematic delphi questionnaire (see e.g. figure 2) and in the thematic roadmapping design (see e.g. figure 3). In the delphi researchers could vote at three different levels at the same time (both for societal challenges and for research areas) (Input scalability) • A two round voting was organised in each workshop, both for general and for specific priority areas, with each round being independent from the other round. Topics only receiving votes from Russia or only from EU MS/AC were eliminated (multiple votes for the same topic were not allowed). In the specification of the most relevant topics, the rankings resulting from the two voting rounds were taken as first orientation point (input and administrative scalability) • Topics and challenges, which overlapped were merged into thematic clusters. The final topics were formulated in consensus among the participating scientific experts, under the guidance of the foresight moderators (administrative scalability) • Experts from varying countries/regions (geographical scalability), backgrounds and sectors • Open questions in structural delphi delivered information from very different levels of granularity, that was merged and regrouped into key messages

[12] The Vision Paper and Action Plan were published under the title "Working Document: Towards a vision for research, technology and innovation cooperation between Russia and the EU, its Member States and Associated Countries (Spiesberger et al, 2013).

[13] Interviews were performed with an advisor to the Russian Ministry of Education and Science, the manager of the ERA.Net RUS call secretariat, representatives of funding organisations from the EU, associated countries to Horizon 2020 and Russia, a European Commission official managing EU-Russia STI cooperation – overall 5 key experts; research and interviews are still ongoing to broaden the response base.

Modularity	• Structural and thematic foresight ran in parallel but with key interaction points, e.g. structural scenarios include a thematic future dimension • Generic roadmap development ran in parallel with Delphi round 2 and were brought together in the thematic workshops • An English and a Russian questionnaires were used that ran separately and in parallel
Flexibility	• Flexibility, especially during the thematic workshops was crucial for adapting the foresight design and management to decisions taken on the spot about certain tensions in setting joint research priorities • Due to the fact that thematic interviews did not prove to be a sufficiently productive methodological approach to specify relevant thematic areas for the cooperation, the focus of the second round delphi was partially shifted to assessing the importance of societal challenges and thematic fields which became a main part of our second Delphi survey round.

4.2 Effectiveness and appropriateness

Does foresight help addressing coordination challenges and related barriers in implementing TRP?

For an overview of the ex-ante and ex-post assessment of the thematic and structural foresight against the coordination challenges and related barriers, see Haegeman et al (forthcoming). See also table below.

Coordination dimension	**Elements in the foresight in the ERA.Net RUS case reflecting each dimension**	**Ex-post assessment of foresight exercise regarding each dimension**
Systemic coordination	• Mapping of the current national R&I systems and their differences, current thematic priorities, etc. • Structural foresight including elements related to (current and future) national R&I systems and how this affects cooperation (SWOT analysis includes the national R&I systems; questions in Delphi include national obstacles and framework conditions for cooperation; scenarios include evolution in national R&I systems and their effect on cooperation)	• Differences in systemic issues at national level between EU Member States and Associated Countries could be included • Regional level systemic issues not integrated • Some delphi respondents suggested to include more questions on the overall state and prospects of Russian education, science and innovation spheres
Vertical coordination	• Mapping of ongoing and recent cooperation activities at different levels • European nomenclature for societal challenges (Horizon 2020) are used for priority setting of national R&D budgets • Involvement of thematic experts from European Commission in thematic roadmapping workshops between MS/AC and Russia • Foresight project linked to important international event (2014 EU Russia Year of Science)	• Regional level was not systematically integrated in the foresight design
Horizontal coordination	• Structural foresight focusing on wider issues than just R&I (such as education systems, business environment, migration policy, cultural issues, regulatory framework, etc.) • Thematic foresight departs from interdisciplinary societal challenges • Experts from a wide variety of scientific fields involved in scenario workshops, delphi and thematic workshops • Thematic workshops were coordinated by non-thematic experts	• Involvement of relevant other ministries/departments at national level was not structurally part of the foresight design • User involvement was limited to researchers and did not include end-users/citizens/interest groups • Delphi to some extent biased towards basic research due to sample selection
Temporal coordination	• Structural foresight focusing on medium and long term, thematic foresight focusing on short and medium term • Structural foresight addresses the issue of sustainability over time of the S&T cooperation • Vision paper and action plan address short and long term • Structural scenarios include structural roadmaps with milestones up to 2020 • Differences in policy cycles addressed in the vision paper	• Mapping of duration of current national programmes in selected thematic areas could have been relevant
Multilateral coordination	• Mapping of ongoing and recent bilateral and multilateral cooperation activities at varying levels (regional, national,	• More variable geometry thematic cooperation alternatives between

	transnational) • Bilingual delphi questionnaires[14] and attention to semantic differences • Multilateral and multilevel voting: In the two voting rounds in each thematic workshop topics are only taken into account when EU MS/AC and Russian partners assign substantial votes (applying single voting: one vote maximum from each organisation for the same topic) • Action plan addresses actions from multilevel and multilateral actors	different non-hierarchical governance levels could be interesting to explore (e.g. a MS, a region of an AC, and Russia)

Table 5: Implications of 5 dimensions of coordination for the design, management and implementation of a large-scale foresight exercise

Does foresight support transnational community building between relevant stakeholders?

> For the researchers it was a very useful networking opportunity in thematic workshops. Policy makers have met regularly in the ERA.Net RUS forum of the Group of Funding Parties, and the foresight used this opportunities for its activities. Therefore the foresight events were "*more a contact among the usual involved experts, from the Funding Parties from the EU, associated countries to FP and Russia."*

Does foresight help address the thematic research objectives?

> The most relevant preliminary practical impact was achieved with the thematic roadmapping workshops. *"For us, as managing institution of the ERA.Net RUS Plus call, the selection of topics in the frame of the thematic roadmapping workshops […] was the most important output. We have received from the Funding Parties only positive feedback on the thematic workshops." (DLR)*
> A joint call under ERA.Net RUS Plus has been launched for innovation and S&T projects, whereby for the latter one the topics have been decided through the thematic foresight exercise.

Does foresight help supporting general research objectives?

> Several measures compiled and suggested in the Vision Paper and the Action Plan have already been implemented meanwhile. Apart from the joint call under ERA.Net Rus Plus, also the EU-Russia S&T agreement has been prolonged at the beginning of 2014, and the EU council group Strategic Forum on International S&T Cooperation (SFIC) established a Working Group on Russia. The foresight and its condensed Working Document were presented to the Working Group on two occasions in 2014, and the document sent to the group members as an input for drawing up a roadmap on EU RDI cooperation with Russia.

[14] Both questionnaires were not completely independent from each other. The EU MS/AC target group included a limited number of Russian experts, who reside permanently or temporarily in the EU MS/AC. The same goes for the Russian target group.

Also spill overs of the procedure to other ERA-NETs took place. The ERA.Net RUS Plus call manager was approached by several other ERA-NETs on how the procedure for priority setting and topic selection was done within ERA.Net RUS Plus. The approach was considered a good practice: *"Colleagues from other ERA-NETs were all enthusiastic how this topic selection was done in ERA.Net RUS, and asked for advice how to implement it in their ERA-NETs."*

A task force linked to the EU-Russia S&T agreement and its S&T committee was suggested. But this task force has not been formed yet, due to time constraints of the possible actors involved, and lack of availability of supporting personnel (e.g. via ERA.Net RUS Plus).

While several measures were implemented, one interviewee outlined that *"There are also repercussions of the current difficult political situation between the EU and Russia on the measures suggested in the foresight: for example the comprehensive cooperation in the frame of a joint funding initiative according to art. 185 is currently not on the agenda.*

Regarding Germany, the unit for S&T cooperation with Russia within the Ministry required several copies of the Working Document, when the preparations of the SFIC Working Group Russia started in spring 2014.

Does foresight help address the thematic policy objectives?

Four general priorities were identified, in which specific topics for the joint call were specified based on the thematic foresight. The four general priorities are nanotech, health, social sciences and humanities, and environment and climate change. It is too early to see a policy or societal impact in those areas.

Does foresight contribute to policies related to research policies?

A crucial output of the foresight was the Vision Paper and Action Plan, which was published under the title "Working Document: Towards a vision for research, technology and innovation cooperation between Russia and the EU, its Member States and Associated States" (Spiesberger et al, 2013). A Russian interviewee highlighted that the document was disseminated to Russian policy makers and organisations, and that it was used in the discussions with the Ministry of Education and Science on the ERA.Net RUS Plus project and on cooperation with the EU in general.

Does foresight contribute to competitiveness and growth?

No impact could be identified at this stage.

Did foresight increase resilience (the preparedness for unforeseen events) of policies and research programmes?

Respondents mentioned in unison and spontaneously the scenarios developed for EU-Russia RDI cooperation as the output they remembered: *"The four scenarios and the scenario posters is the first output coming to my mind. They*

made a lasting impression." Other outputs were mentioned by interviewees only as a result of the ongoing interview.

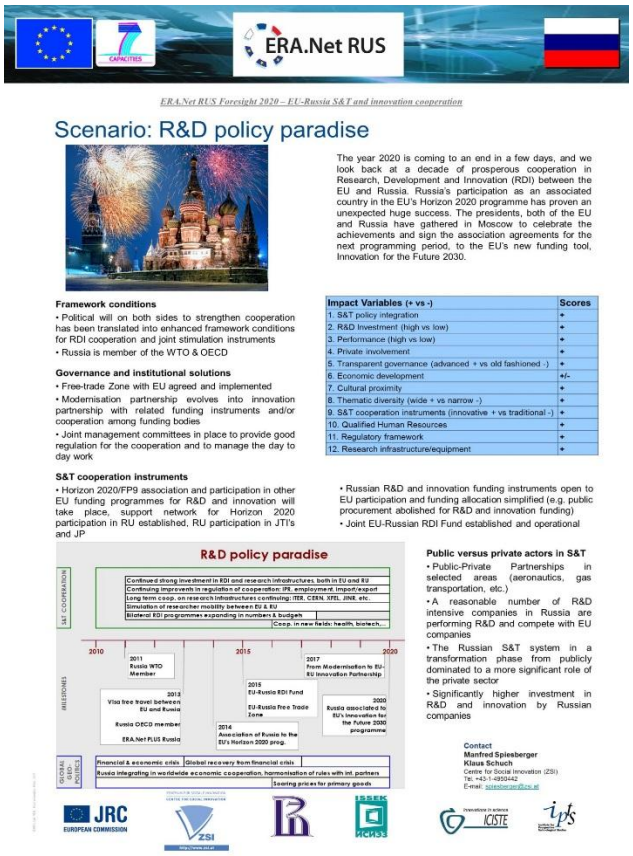
Four different scenarios were developed in the foresight through desk research and a series of workshops. One positive scenario outlined an increasing and intensified RDI cooperation between the EU and Russia and was entitled "R&D policy paradise". One negative scenario ("Same problems, reORIENTation") highlighted disintegrating and decreasing trends, and two scenarios described a stagnation or continuation of the status quo of cooperation (see below for the positive and negative scenario posters). Each scenario is composed of a snapshot of what S&T cooperation between the EU (and its Member States and Associated Countries) and Russia could look like in 2020, as well as a roadmap explaining the events and milestones that could take place for the snapshot to materialise.

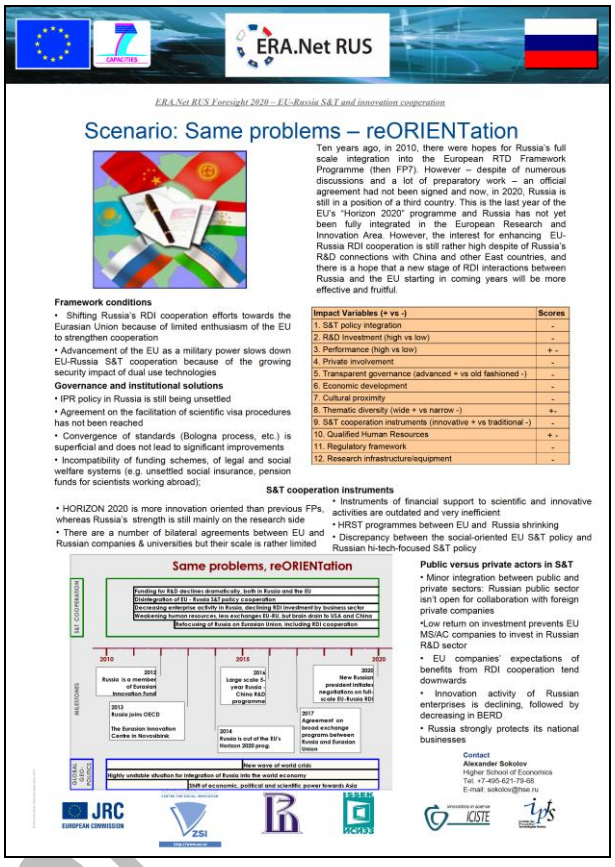
The attractive illustration via posters and in addition a detailed story telling made the scenarios easy to grasp and left an impression. The scenarios showed possible directions, how S&T cooperation could develop. In the Delphi survey, these scenarios were tested for probability and desirability of scenarios. The survey population consisted mostly of researchers from the EU Member States, from associated countries to the FP, and from Russia involved in active scientific cooperation, as well as of policy makers.

Scenario 1 "R&D policy paradise" was the most optimistic regarding RDI cooperation intensity and more than 95% of respondents considered it as rather or very desirable. However, more than two thirds of respondents thought it as rather or very unlikely to happen. For the other three scenarios we could observe similar response patterns: more than 60% of respondents considered the more pessimistic scenarios as rather or very likely to happen. However, between 84% and 90% of respondents considered these scenarios as rather not or very undesirable. Therefore scenario 1, being the most desirable but rather unlikely, was identified as goal scenario.

The realities of politics in the wake of the conflict in Ukraine and the mutual sanctions between the EU and Russia in the course of 2014, have not yet led to strong negative repercussions on RDI cooperation. Yet new cooperation initiatives have been made complicated to impossible and a trend to the negative scenario with a disintegration between the EU and Russia more realistic. Trends of a stronger reorientation of Russian cooperation policies to the Eurasian cooperation and to Asia could be observed over recent years already and are being intensified.

To sum up, the foresight was able to devise scenarios with realistic possible development trends, which were presented and disseminated in a suitable form. Developments over the years have confirmed the scenarios. A high response rate to the scenario assessment in the DELPHI survey and the spontaneous mentioning of them in the qualitative interviews further confirm their relevance. Scenarios enhanced the capacity to live in an unpredictable world (increasing resilience).





Did foresight contribute to good governance?

"Good governance is, among other things, participatory, transparent and accountable. It is also effective and equitable[15]. And it promotes the rule of law. Good governance ensures that political, social and economic priorities are based on broad consensus in society and that the voices of the poorest and the most vulnerable are heard in decision-making over the allocation of development resources." (UNDP, 1997).

Table 6: Contribution of the ERA-Net Rus foresight to good governance

Elements of good governance	Contribution of the foresight exercise
Participatory	Researchers, policy makers and other experts involved in EU-Russia RTI cooperation were included in the delphi sample. In total, nearly 7000 experts were contacted for the survey. The response rate (23%) was relatively high, reflecting high interest in the topic of the survey. End-users/citizens/interest groups were not involved in the exercise.
Transparent	The bottom-up priority setting process through dialogue and voting procedures was much appreciated by the funding organisations. "*In the end everybody among the Group of Funding Parties was happy with the [thematic] workshops and how they were implemented. Nobody could complain afterwards on the topics of the call, as everything was done in a transparent, bottom-up procedure, which turned out to be the perfect solution for the problem of defining the specific topics of the call – which*

[15] Equity: All men and women have opportunities to improve or maintain their well-being, including not only income, but also access to education by everyone, etc.

	is potentially prone to conflict."
Accountable	As the project has been co-funded by the EC under FP7 it follows the rules regarding accountability that apply for such projects.
Effective	The process of topic selection contributed to integrating the Russian Ministry of Science and Education in the ERA.Net RUS Plus Group of Funding Parties at a late stage, when the core group of funding parties was already formed and only shortly before the call launch. "*Our organisation has worked closely with the Russian Ministry of Education and Science on integrating the Ministry in the ERA.Net RUS Plus call. In this context the foresight process and the transparent and cooperative approach used in the thematic workshops were much appreciated by the Ministry. This helped to convince the Ministry to join the ERA.Net RUS Plus call, at a later stage when the core Group of Funding Parties was already formed."*
Equitable	Based on the outcomes of the delphi, recommendations were included in the Vision Paper with regard to improvement of the education system in Russia.

5. Discussion

5.1 Moving forward the framework

In the approach presented a successful foresight is considered a variable, which can be understood differently by different stakeholder groups and even individual stakeholders. Moving the approach a step further, individual stakeholders could be asked to give different relative importance to different 'success categories'. Then relative importance can be combined with scores on each category, thus mapping a three-dimensional evaluation of the foresight (Dimensions: different stakeholder groups, relative importance of each criterion, scores on each criterion). In addition, the qualitative findings can be complemented by quantitative analysis, e.g. using indicators for measurement of impact. Data for the case of ERA.Net RUS for such indicators are available and will be added in a next version of the paper.

5.2 Policy implications

The paper follows up on earlier work on 'Embedding foresight in transnational research programming', presented at the 2011 FTA Conference and published in Science and Public Policy (Könnölä & Haegeman, 2012), and 'FTA supporting effective priority setting in multi-lateral research programme cooperation: the case of EU-Russia S&T cooperation' forthcoming in Technological Forecasting and Social Change (Haegeman et al, forthcoming). The approach proposed and tested for the case of EU-Russia S&T collaboration offers a structured approach to evaluating foresight in a context of collaborative programming. The paper attempts to initiate a wider discussion on the role and impact of foresight in transnational research programming, by showing the variety of possible benefits foresight can bring to such environment, and thus rationalising the debate on the use of foresight in TRP. Within Europe, the approach can help advancing the understanding and use of foresight especially in the context of Joint Programming, a

programme cooperation process between Member States in which foresight has been recognised as a key framework condition. In this context foresight evaluation is still underdeveloped, partially because of the early stage in which many Joint Programming Initiatives still are. Mutual learning with foresight efforts from the Knowledge and Innovation Communities (KICs), such as the KIC ICT-Labs, may also further advance the understanding of the use and evaluation of foresight. Beyond Europe the approach and first findings can support the understanding and use of foresight in global collaborative programming in addressing global challenges. An interesting example is the Global Network of Animal Disease Research (Star-Idaz), grouping research programming in different world regions for developing joint research agendas, supported by a long established foresight and programming unit. The type of continuous foresight applied in this project is a nice example of a more long term impact of the foresight efforts in the past within this network, and suggests that foresight may play an important role in global governance of research programing in the future in order to adequately address global challenges.

6. Conclusions

Based on earlier work on embedding foresight in transnational research programming (TRP) and on a review of literature on foresight evaluation and on transnational research programming, a structured approach has been developed for evaluating foresight activities in collaborative programming. The concept of what it means to run a 'successful foresight' is put at the centre of this approach, leaving room for foresight stakeholders to define individually what a successful foresight is and how they perceive the foresight exercise in which they were involved in this regard. The framework is tested against the case of S&T programme collaboration between EU Member States and Associated Countries and Russia. Lessons are drawn for the use and evaluation of foresight in programme cooperation in general, for Europe and for global programme cooperations.

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