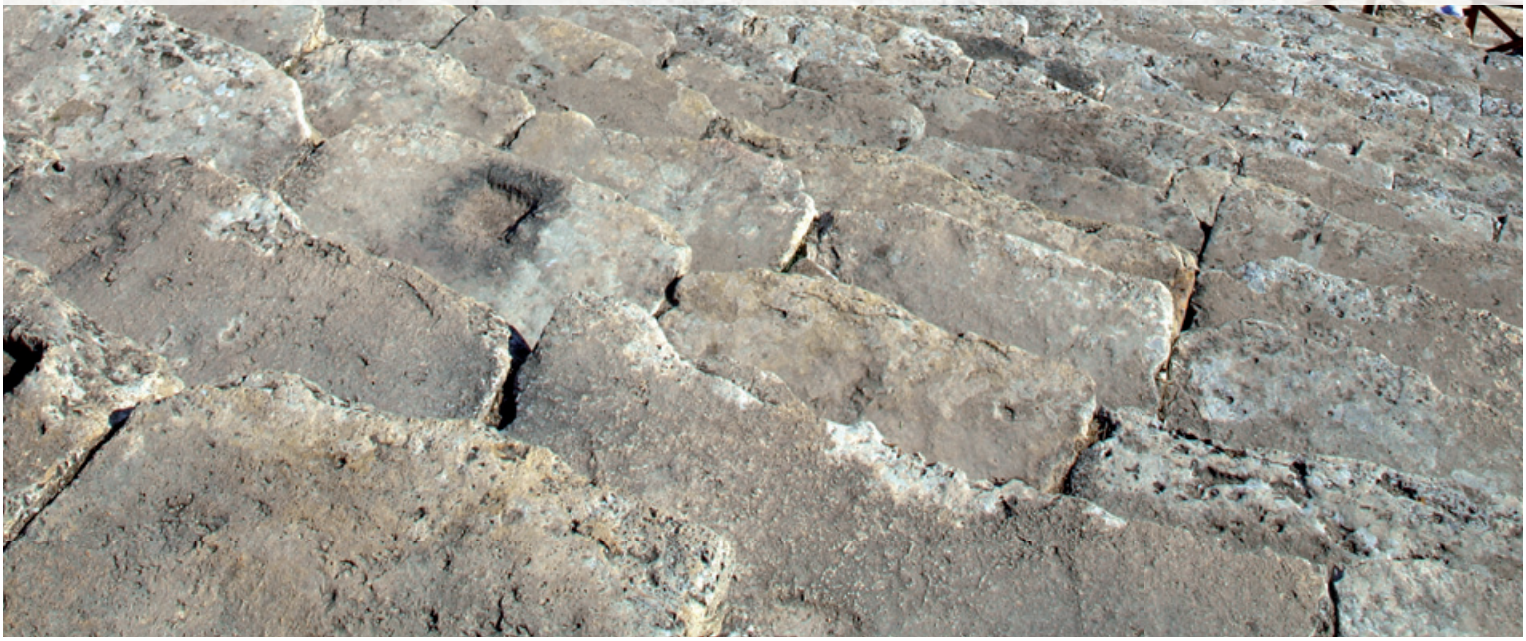
Science in Society: a Challenging Frontier for Science Policy

Policy Recommendations from the ESF MO Forum on Science in Society Relationships



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- Development of best practices and exchange of practices on science management, to benefit all European organisations and especially newly established research organisations.
- Harmonisation of coordination by MOs of national programmes and policies in a European context.

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Authors

This report has been written by the Chair and Co-Chairs of the ESF Member Organisation Forum on Science in Society Relationships.

Acknowledgements

ESF is grateful to the Chair of the MO Forum Science in Society Relationships – Jean-Pierre Alix (CNRS, France) –, to the Co-Chairs – Manuela Arata (CNR, Italy), Stefan Bernhardt (FWF, Austria), Pirjo Hiidenmaa (The Academy of Finland) and Camilla Modéer (Riksbankens Jubileumsfond, Sweden), to the members and observers of the MO Forum, as well as to Diego de la Hoz (ESF) for his inputs, and to the coordinator of the Forum, Laura Marin (ESF) for the high quality of organisation and management of the Forum.

Cover picture:
Hierapolis theatre

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Foreword and summary of Conclusions

Is the position of science changing in our society? Society has changed much (and is still changing rapidly) under the influence of science and technology. But it seems that, following the endeavour of growth after the Second World War, science now finds itself in an ambiguous situation. On the one hand, research promises a better future, yet on the other, new criticism arises from many sides and provokes a decrease of trust in science by the public[1]. A consequence of this ambiguous position is the difficulty for democratic regimes to increase their support for science. This leads to the proposal that a new frontier has emerged for science policy: to include "science in society" (SiS) as a necessary and important component.

This means that research must be respected and protected as a free-minded activity, but also harnessed to help to cope with future challenges, such as smart cities, ageing, renewable energy, care of the environment, development, new modes of transportation, and so forth. We propose that this requires an approach of both *cooperating and keeping the right distance with society* (in a balanced manner). This proposal, which should be understood in a long-term perspective, reaches beyond the organisations represented by ESF Forum members themselves, and involves other social groups and their bodies across wider society. The Policy Recommendation focuses on the role that research organisations may play in future European society, based on a two-way communication with other principal social actors.

For centuries science has provided knowledge and progress for mankind. When civilisations have been supportive of this human activity, it has led to numerous discoveries and technological advances in antiquity, and in great civilisations such as China, Mesopotomia, Persia and Egypt, until the Renaissance[2]. Especially in Europe, a new conception of science – the so-called classical science – emerged, based on the ability to predict phenomena effectively. Bacon concluded that "knowledge is power", and Descartes suggested that we "would be as masters of nature" by developing science. The endeavour remains active, and moreover is now proceeding at a rapid pace in many parts of the world.

Scientific activities were first embedded largely in academies. Then, during the 19th and 20th centuries, European societies established a series of new research institutions within and outside universities. Many scientists were progressively employed as professionals. They represent today a real capacity and a strong potential for both understanding and shaping Nature and society.

Over time, and today more than ever, researchers have been expected to address questions that are relevant both to science and to society (such as the European 'challenges' mentioned above). That is the reason why the question of mastering this process (that is, science policy and management) has continued to exercise minds over the decades.

Our research organisations are thus implicated in shaping the world: not only by drawing new maps, but indeed by changing the terrain as well. This is the background for recent diagnoses arguing that the relationships between science and society are shifting – from a segregated model that made it adequate to talk about science **and** society, to a more integrated model that talks about science **in** society.

1. In most European countries.

2. This report is not aimed at telling the whole story of science. We ask readers to forgive us for dealing with tens of centuries in so few lines.

But despite the great interest in scientific discoveries, culture and philosophy remind us that "science without conscience is the ruin of soul"[3], and open the status and role of science in our society to public debate. Should scientists see themselves as implicated in the defining of grand challenges? This is seen as a prerequisite for becoming part of the solution; being able to grasp how the grand challenges have relevance 'inside' our research organisations – and not only 'out there' in society.

In previous eras where science was considered as a common good embedded in 'Progress' and 'Future Concepts', the debate remained largely positive in science's favour. Scientific knowledge was supposed to flow into society in a natural and smooth way, bringing progress and benefit along the way. But today the huge trend of investment in research, potentially leading to significant amounts of new knowledge and innovation, sometimes meets opposition.

History tells us that a linear relationship between time and 'progress' is not relevant. So it is with the relationship between science and society. Conflicts are nothing other than normal phenomena, especially in accelerated periods of strong innovation or scientific discovery. We have witnessed a (relative) decrease of trust in science and innovation in many European countries during the last 40 years and this is something that needs to be acknowledged and taken into account. People want to have a say about scientific activity because it partly influences their future. Democracy wants to be more active in science.

There is a need for the active participation of researchers in such a debate. Compared to the past, more opportunities have emerged for discussion about science in society thanks to the recent rapid evolution of modern communication technologies. Studies of science in society have been carried out over the last thirty years, where the values of science were confronted with other sets of values in society. The time has come to consider their results and to propose that this kind of social activity is undertaken. Although it is different from conventional scientific research, it should nevertheless become a real duty for scientists and their institutions. Classical ethics of science consists essentially of sharing common values between scientists around the world[4]. But science is not limited to its own internal process: influencing the world is something that is done by both scientists and societies. So, being aware of the potential consequences of the translation of scientific knowledge in society is part of science's responsibility, a responsibility that is shared with other partners in society. Translation in this context means the 'migration' of scientific knowledge from its original culture to join other types of knowledge in society. There is no single, simple and linear translation of this type; there are multiple modes of translation, which depend on different elements within society or institutions dedicated to activities within society such as education, economy and innovation, relationship with democratic powers, mass media and the public, and so forth. The constant interaction of scientific knowledge with other cultural activities within society is an important process that enables societies to evolve, and creates new links between society and science. Due to the major growth of scientific activity in the 20th and 21st centuries, the landscape of SiS has changed significantly, and needs to be revisited.

Much is already being done in SiS activities, embedded in cultural and historical conventions, but these activities must be developed further to meet the new challenges arising in Europe and in the world. Each research organisation should develop new SiS activities in its own way, depending on its context and remit.

This report aims to highlight the role of science in society, to raise awareness of how scientific knowledge is translated into society, and to encourage better practice in the relationship between science and society. In order to achieve a better society and increase the quality of research and innovation, this MO Forum recommends that the following aspects be taken into account by ESF Member Organisations (MOs).

Conclusions

- Quality in SiS activities is needed.
- Clear commitment to SiS in MO science policy and strategy has to be enhanced.
- Transparent SiS processes must be put in place within the organisational structures of MOs and other research funding and performing bodies. SiS processes must also be seen as an essential and central part of a researcher's work. A cultural change must be encouraged through staff policies, organisational strategies and education of researchers.
- Researchers and research groups must be properly rewarded for their work in this area.
- More experiments concerning instruments, activities and methods should be encouraged. Sharing experience and best practice through networks for exchange within Europe on a regular basis would increase efficiency in SiS.
- Networks to jointly develop systems for indicators, evaluations and measurements are needed. There is a need to coordinate efforts for greater impact. Organisations need the instruments to do this and this involves ensuring that SiS activities are formally evaluated, which is not the case today.

3. Rabelais (1524)
4. Described as 'communalism', 'universalism', 'disinterestedness' and 'organised skepticism' (CUDOS) by Robert Merton (1973)

1.
Introduction: mandate, objectives and methodology of the Member Organisation Forum (MO Forum)

In late 2007, in parallel with the efforts of the Heads of European Research Councils (EUROHORCs) and ESF to foster the development of the European Research Area, the French Member Organisation *Centre National de la Recherche Scientifique* (CNRS) suggested that ESF should start activities on the 'Science–Society Relationship'. The initiative was taken further by CNRS and ESF, resulting in the organisation of a 'CNRS–ESF SCSS Strategic Workshop: Roadmapping Science in Society – Impact, Evaluation and Accountability' on 30 June–1 July 2009, attended by representatives of 24 ESF Member Organisations, as well as by other stakeholders and experts in the area of science–society relationships.

Another step towards setting the issue of science–society relationships on science policy agendas in Europe was the release of the 'EUROHORCs and ESF Vision on a Globally Competitive ERA and their Road Map for Actions' (2009), the first action of which calls for (2009:6):

> *Strengthen[ing] the relations between science, society and the private sector and intensify the dialogue between research organisations and political actors at the European level.*

To support this process, in October 2009 the ESF Governing Council approved the launch of a dedicated ESF Member Organisation Forum (MO Forum) on 'Science in Society Relationships'. Subsequently, at a Steering Committee in January 2010, EUROHORCs endorsed a *mandate* to CNRS to lead the development of this action (see Annex A.1).

The MO Forum on 'Science in Society Relationships' began work in early 2010. Chaired by Jean-Pierre Alix from CNRS, and co-chaired by Manuela Arata (CNR, Italy), Pirjo Hiidenmaa (The Academy of Finland), Camilla Modéer (Riksbankens Jubileumsfond, Sweden) and Stefan Bernhardt (FWF, Austria), it attracted the interest of 35 ESF Member Organisations (MOs) and one observer (see Annex A.5).

MO Forum members took up the challenge of studying ways to transform traditional linear thinking into a two-way communication when it comes to science–society relationships. The traditional view tends to rely solely on current practice in science communication departments (or offices or services). The MO Forum has offered a platform for ESF MOs [Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs)] to exchange information on practices, experiences and policies established by ESF MOs in the development and management of the science–society relationship, as well as to suggest joint recommendations. Furthermore, this MO Forum represents a step forward in the larger process of addressing another challenge highlighted in the 'EUROHORCs and ESF Vision on a Globally Competitive ERA and their Road Map for Actions' as follows (2009:6):

> *At the national level, structured interactions exist between research organisations and the political levels and policy makers. Internationalisation of*

research, research policy and funding pose new challenges to these interactions as accountability, communication and policy making must more and more be addressed at the European or even global level. This requires that new international mechanisms are created. In doing so, it is important to be sensitive to cultural, ethical, political and economic diversity.

The MO Forum has focused, through dedicated working groups, on the following issues: identification of good practices that leave behind the traditional linear thinking when it comes to science–society relationships; capacity building beyond traditional public relations officers; academic recognition for researchers who embrace public engagement activities; fostering evaluation in the sense of making actions in this domain accountable.

The report deals successively with the long-standing discussion of "science in society", describes and analyses (some) current practices in Europe, and suggests positive recommendations to ESF MOs who want to improve their practice.

2.
Science in society: a long-standing discussion

"The whole of science is nothing more than a refinement of everyday thinking"
Albert Einstein [5]

2.1 The definition of science we used

Science may be considered as a broad field which includes a body of publicly proven knowledge that is separated into specific fields (disciplines). Research may be defined as the exploration of new fields or new questions, as exploratory activities by scientists in search of new approaches which contribute to our understanding of the world as well as to influence the world.

In this report, we took into consideration both aspects; so 'science' refers to science or research, and covers both abstract and practical activities, and encompasses all sciences, including humanities and social sciences as well as natural sciences, medicine and engineering.

'Science policy' covers all aspects of those activities, not only from the point of view of knowledge production, but includes visions of science in society, and policy made by public and private authorities. Our approach aims to show the importance of interactions between the construction of knowledge and the needs expressed by society for new knowledge, and tends to affirm that these interactions are a key new component that need to be taken into account when formulating science policy.

2.2 A 'broad-brush' historical contextualisation

Science as a policy issue in Europe and elsewhere sparkled and developed during the 20th century with the creation of national institutions and the reinforcement of research activities in universities and academies. One significant example is the "Manhattan project" (dedicated to the development of atomic weapons) during the Second World War. Gathering a number of capacities, it set a model for research activity: educated and carefully selected people were supported by substantial public funds, and were successful in mastering the fission reaction predicted by theory. But it was also a time for considering the ethics of the applications of scientific theory. After the war the model was extrapolated by the US government into many fields including health, agriculture, space, and so on. It was also used by developed countries to create or enhance research councils and funding agencies. The aim was to attract the very best people to join science, to perform excellent research funded by taxpayers. This approach has enjoyed a long life and has resulted in many scientific discoveries and is still a common practice in several countries.

During the 1960s and 70s, the perspective was further extended into industry and the market: innovation could arise through dedicated sectoral research and research conducted by firms themselves. Research has since been considered to give a competitive advantage to nations, and a component that gives companies a strategy to enlarge their markets. This set of ideas still influences science

5. *Einstein* (1950).

policy makers in many countries, including emerging countries.

By the late 1970s strong criticism emerged suggesting that science might have consequences that were not necessarily deemed good for society. Hope and expectation associated with science started to be contested, mainly driven by concerns about detrimental impacts on the environment. In certain countries the general public progressively demanded participative processes[6] concerning decisions that may have effects upon society. From the end of the 20th century and beyond, there has been a growing insistence (also from academia) on more co-evolutionary and interactive processes in policy models relating to science and society[7].

While science and technology have become entangled in a complex way in many aspects of our lives, a linear conceptualisation of this relationship has been commonly supported: science would bring (one-way) progress and benefits to society in exchange for scientific freedom, that is allowing scientists to work autonomously. This linear conceptualisation has been criticised for oversimplifying the complexity and dynamics that have emerged in the relationship between science and society[8,9]. Outside the science studies tradition, in a more orthodox tradition, scientists like Ziman[10] and Kitcher[11] reached similar critical conclusions.

2.3 Science-Society relationships in Europe over the last few decades: evidence from science and the humanities

Scientists researching the relationship between science, technology and society[12] have increasingly stressed the dynamic and intertwined character of this relationship and, significantly, have suggested ways of how productive interactions and relationships can be fostered and enhanced[13].

When looking at the framing of science and society relationships in Europe over the last few decades evidence shows that policy discourse in this area is tightly tied up with academic discourses, to the point that there has been over time a convergence in the specific vocabulary used by academics in the field and policy-makers, although not necessarily carrying the same meaning across the two sets of actors.

Europe has experienced a number of discursive and programmatic shifts with regard to the framing of science –technology–society issues. A brief look at these shifts shows changes in discourse but also continuities as the old 'layers' of policy discourse overlap and blend with the new ones (see Figure 1).

Drawing on Felt[14], the policy discourse dating back to the late 1980s framed science-technology-society issues largely as a *problem to be solved* by intensifying classical one-way communication efforts (from science to the public) and then monitoring the impact on citizens' knowledge and attitudes through large-scale surveys (e.g. Eurobarometer). These efforts were inscribed in the early so-called 'Public Understanding of Science' paradigm[15]. As the paradigm goes, filling gaps in the public's knowledge was supposed to make citizens aware and supportive of scientific and technological progress.

A second discursive 'layer' arose with the European Commission's 'Raising Awareness Programme' (FP5) which called for the inclusion of critical aspects of science and technology in public communication, underlined the need to attract young people and in particular women into science and finally stressed that researchers should increase their involvement in these activities.

A third 'layer' of discourse arrived in the early 2000s with the introduction of the key notions of public 'dialogue' and 'participation', calling for new forms of governance in science and technology affairs. Programmatically speaking, this shift became evident in FP6 with the attention to 'Citizen and Governance in a Knowledge-Based Society' and 'Science and Society'. These two specific programme lines in FP6 allowed for some foundation of research concerning these issues at the European level, followed by more convergence between academic and policy discourses.

This led to the fourth 'layer' to date with the 'Science in Society' (SiS) programme line in FP7, which puts emphasis on the integration of societal and techno-scientific development. Current discus-

6. Alix (2009).
7. Caracostas and Muldur (1997).
8. Wynne (2006).
9. Historians have mentioned that the role and place of science may oscillate in societies (between support and/or reluctance).
10. Ziman (2000).
11. Kitcher (2001).
12. This field sometimes denoted as STS (science and technology studies) or 'research on research' includes historians of science, researchers from cultural studies, philosophers, theory of science (a quite strong element in science, technology and society)
13. For an overview see e.g. Spaapen et al. (2007). The EC reports *Taking European Knowledge Society Seriously* (Wynne and Felt, 2007) and *Challenging Futures of Science in Society* (Siune and Marcus, 2009) suggest that new ways of working as well as new knowledge forms will have to be developed in order to foster more productive interactions between science and society. The first report mainly addresses policy makers while the second targets the research community.
14. Felt (2010).
15. After the eponymous report by the Royal Society in 1985.

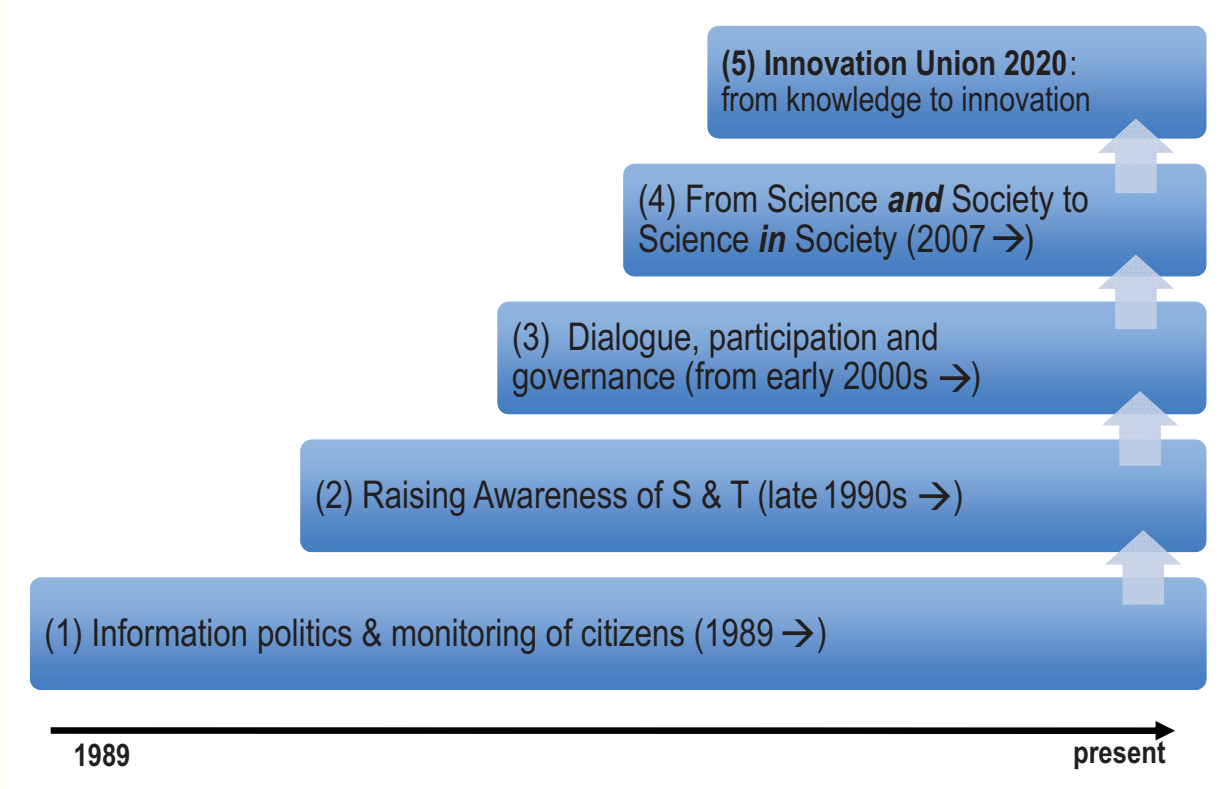

Figure 1. The five layers of discourse framing science and society relationships (after Felt, 2010)

sions surrounding the new Framework Programme after FP8, Horizon2020, can anticipate another, fifth, 'layer' to come under the name of 'Responsible Research and Innovation'.

As indicated above, continuities can be perceived behind quite radical rhetorical changes. Most notably[16], science–society activities in MOs have not really been especially open to the possibility of discussing alternative options, adhering to a large extent to the classical linear communication model, even if sometimes formulated in new ways such as "public consultation" and later "public participation"[17]. The re-thinking of the involvement of social actors[18] that we now see highlights how the so called 'deficit model'[19] is simultaneously abandoned and reified in these approaches. And they draw out a lesson; there seems to be a continuing failure of scientific and policy institutions to place their own institutional cultures under the spotlight and to take advantage of the dialogue. At best, in the Netherlands, the UK and the Nordic countries much effort has been put into inviting 'society to speak back to science', of experimenting with different types of stakeholder involvement in order to establish the much sought-for two-way dialogue and the productive interaction between science and society; of moving beyond the linear model usually practised by science communication services.

Inviting other parties to participate in ways that make it interesting for them to stay involved and engaged seems to be connected to the ability of the research system to open up and recognise the limits of its knowledge. More complex, dynamic and open understanding of the relationship between science and society, require the development of new competences and skills both in the research system and in policy. The challenges are of an institutional as well as an individual kind. This request is, for example, insistently present in the recent report from the European Commission *Challenging Futures of Science in Society*[20] that concerns how science must become adaptable in order to support open

16. When one way communication models are seen as out of favour, such activities are simply renamed, or serve a different purpose (public relations).
17. Rowe and Frewer (2005).
18. The term 'stakeholder' is of frequent use in this discussion. Some think it smacks too much of 'those with special interests', and reduces the political dynamic between science and society to games of interests. We prefer the approach which defines the general political regime as democratic, based on common rules which build democracy, in which science has a role to play as a full actor among other social actors.
19. The so-called deficit model was analysed by Brian Wynne (1991) as (a) a one-way communication from science to other parties in society and (b) not corresponding to the real frame of SiS, which is a reciprocal and multi-partner game.
20. Siune and Marcus (2009).

learning processes in policy development and decision-making. It requires what the report calls the development of "further skills" by researchers, as they must be able to explain their premises, conditions of validity, uncertainties, areas of ignorance, values and conditions of applicability to certain contexts.

All in all, when it comes to strengthening the relationship between science and society, further development of the more interactive science policy model seems the way to go. Researchers, citizens and policymakers need more regular opportunities to talk about the choices they are making, the assumptions their work carries, and the purposes to which it might be directed.

2.4 A continued cycle of diverse and intertwined 'translations'

Sociology of science and innovation has proposed "the three translations"[21] metaphor to describe the interactions of science and society. Translation means here that a social group (or actor) in society uses a specific language and culture to address its activities. So scientists have their own perception and view of society. When it comes to the transfer of scientific knowledge to other actors, this implies a translation from one set of values to a new one, from one culture to another, in which some of the previous knowledge may disappear, and some new knowledge appear, because the 'recipient' culture may be different from the 'emitting' culture, and thereby act like a filter or an amplifier. Reciprocally, when a challenge or an issue in society is expressed on a political level, it needs translation to reach the scientific community, and to be transposed into a scientific question. So the time and activities needed to facilitate such two-way translations cannot be considered as unimportant.

The first translation operates from society to science, asking questions to be listened to by researchers, and to be transformed into research questions. Many problems, including general challenges at a large scale (climate change for example, or pandemics or water disposal) or at smaller scale (such as pollution of a river, or the development of a new industrial process), are considered able to lead to good and interesting questions for research itself. Not all questions can be directly addressed, but rather they present a series of problems whose solutions call for more or less basic research, but which always need a scientific culture.

The second translation starts when a research question arises in the process (e.g. inserted in a culture or episteme, asking to explore new fields, able to define an experimental procedure and methodology, to gather data, and to discuss conclusions). This phase is under the direct responsibility of scientists, and is their common responsibility: responsibility to realise research integrity[22], to show proofs of conclusions and to accept criticism from colleagues across the world.

The third translation occurs when a result is accepted (such as a publication or patent): knowledge is on the way back to society; to the whole of society when it concerns education or culture, to a specific partner when it concerns specific decisions (companies or governments, for example).

Those three moments in SiS do not necessarily fit within a linear scheme, which would be somewhat idealistic. The three translations are at work simultaneously, and it makes the landscape complex and sometimes fuzzy. But they may show that reciprocal influences are in action, involving several types of actors; actors who are therefore never "out of dialogue", but are exchanging information at different scales of time, space and configurations of interest.

As a short conclusion, science policy may be limited to the second translation (production of knowledge) or may include the whole of the described translations. That view seems to correspond better to the current state of societies in Europe, where production capacity of science has reached a high level, and where interactions of science with everyday life has increased tremendously in the last decades.

2.5 Science and society relationships: an issue for research organisations

In the view of this MO Forum, several concrete reasons reinforce the view expressed above. They can provide justification for recommending that measures need to be taken in order to strengthen the relationship between science and society following the interactive (two-way) model.

Creating scientific understanding gives potential power to the partners involved, especially when new knowledge issues from a 'co-production'. Co-production may use a large series of interactions, at different scales of space and time, and concrete forms. Many types of partners are involved. We propose to represent the real diversity of SiS situations

21. Callon (2003).

22. ESF report 'Fostering Research Integrity in Europe' (2010)

– and of possible objectives and justifications – as follows:

- Citizens of many modern European countries naturally expect to be given a say on matters that might affect their lives substantially. Especially in a knowledge-based society, where knowledge is becoming the main source of production, and where the welfare of individuals and groups depends crucially on the availability of, and access to, the right kind of knowledge, citizens can rightly insist on having a say on how knowledge is produced and to whom it gets distributed. Arguably this is their democratic right and the scientific community should have a special obligation to listen to the concerns of citizens who may be adversely affected by the application of certain forms of research and even ensure that these concerns are voiced in the first place. It follows, therefore, that public awareness and recognition is necessary for ensuring sufficient political and financial support of science (by governments and parliaments). Taxpayers' endorsement of the purpose and priorities of publicly funded research has to be earned. This applies to all fields of science, including the humanities and social sciences.
- Researchers can benefit greatly from interacting with the public, which can provide substantial help in identifying and framing important problems and maybe even provide cues to their solution. This use of public participation to improve the quality of research, which can be seen as a parallel to user-driven design in commercial or social contexts, is especially pertinent to grand challenges facing society. Other benefits for researchers include new skills, increased profile and career promotion.
- The economy has become an important partner, where good ideas, schemes and models contribute to the "competitive advantage". Some scientific fields have become very close to innovation and applications, in a market-driven game where many cards are played at the world scale, even if innovation may be local in its first steps. This kind of SiS relationship can provide innovation and jobs. It also provides an opportunity for science to both contribute to and receive input from an important part of society.
- The quality and pertinence of content in primary and secondary education, as well as in higher education, have a strong connection with research in universities and other research institutions to best educate future generations: knowledge acquired during a person's time in education is supposed to create a deep culture among students so that it can be used in the long term in personal and professional fields.
- Talent recruitment is becoming a pressing concern in most European countries, as young people tend to choose what are perceived as more profitable or exciting career paths. More engagement is needed to stimulate a real and lasting interest in science. Evidence from the UK is that enabling schools to engage with contemporary research (for example through continuing professional development for teachers) is one of the most effective ways to inspire the next generation of researchers.
- Last but not the least, a shared and balanced approach of responsibilities of actors has to be taken into account, as suggested above. The term "responsibility" should not be taken to mean that science should be led only by social challenges, or vice versa.

Again, all of the above contextualise the definition of science policy: science policy cannot be solely dedicated to the best way to produce knowledge or to contribute to the innovation process, but has to include or to articulate relations with all the key actors in society, and with culture in general.

From a concrete point of view, though the different motivations behind SiS activities may support certain actions rather than others (for example, public recognition may be sought by rather conventional means, while strengthening the democratic rights of citizens may require more genuinely interactive forms of communication), it is often possible to realise different objectives by more or less the same means. Even traditional one-way science communication will, if successful, create a certain amount of public engagement, and almost invariably influence the scientist's own awareness of the SiS relationship. And interactive formats may be needed for securing substantial recognition and creating genuine interest among the public. So although there is good reason to focus on specific objectives and groups, one should not ignore the potential positive side effects of SiS activities or rule out the possibility that a general effort to strengthen SiS across the board may turn out to have an equally broad and varied positive impact.

Though the different, albeit more or less interrelated reasons make a case for strengthening the SiS relationship, it must be recognised that the more ambitious agendas in this area are likely to face considerable scepticism by researchers and science policy makers, some of which may not be completely unfounded. There is still a general fear

among scientists that the autonomy of science will be compromised if the public is consulted and actively engaged in practical scientific matters[23]. As an example, sceptics might point to the worrying impact of creationism on the public perception of science in the United States, and, more generally, to the apparent popularity of blatantly unscientific beliefs and worldviews.

These worries deserve to be taken seriously. They show that governing science and society relationships is not an easy undertaking, and provide further evidence that initiatives should be implemented with sensitivity to the cultural and political context. Still, it should be made clear from the outset that strengthening the relationship between science and society does not mean discarding scientific expertise. Rather it is motivated by the *fact that the use and significance of scientific expertise is something which concerns all of society.* It is an open question where the appropriate domain of autonomous decisions on behalf of the researcher ends and that of democratic debate begins, and drawing the line between the two domains – or legitimacies – is both a continuous task and a matter for public discussion.

What are the practices of MOs? Are they coherent with approaches proposed above? Chapter III will analyse practices in Europe.

23. Graur (2007).

3.
Current practice among ESF Member Organisations

The MO Forum has observed that no evident description of the many actions led by Member Organisations (MOs) in 'Science in Society' (SiS) was available. Our decision then was to build our conclusions on observations we were able to make among members of the Forum and their near environment. The information gathering of the Forum was consequently based on several approaches.

In April 2010, the Forum prepared a questionnaire to map out SiS activities across ESF MOs. Sent to all ESF members in June 2010, this questionnaire was answered by 27 of them. A total of 19 responses were received from funding agencies (17 governmental and two private foundations), one from an academy, four from research performing institutions and two from "others" (NGOs or private foundations).

In this chapter, we first present concrete results of the observations, and then make some general conclusions.

3.1 SiS among ESF members: facing a diversity of concrete situations

The analysis of the survey results is to a large extent about research funding and research performing organisations (RFOs and RPOs, respectively) and what they currently do in the field of SiS. RFOs are experts in science policy and research funding. Their core competence is to provide funds for research; they are facilitators and enablers. They are typically not research performers themselves. So, their role in society is different from RPOs, which employ scientists and perform research much in the same way as universities do. RPOs have tradition and status in the field of SiS and they carry out a variety of activities in this regard; they typically have large staff numbers and dedicated structures for SiS activities. They are largely known among scientists and the broader public; and they are frequently consulted by the media whenever information on scientific issues is needed.

The survey was addressed to the top management with strategic responsibility in the organisations. The responses were provided directly by directors in eight cases, the rest by departments with a range of titles: 'Communications' (7), 'Research Policy' (3), 'Public Engagement' (3), 'Science in Society' (3), 'Scientific Programmes' (1), 'Development' (1), and 'Knowledge Transfer' (1). This is yet more evidence that SiS activities can be seen from different viewpoints and can be organised in many different ways. Although "Science in Society" today is most often aligned to the framework of 'communications', other frameworks appear to be relevant.

3.1.1 Mission of SiS as described in the strategies of RFOs and RPOs

All the RFOs that responded to the survey mention science in society or other similar activities as part of their strategy – indeed, there are various wordings that are used to refer to the actions and their impact in society depending on traditions and interpretations of the issue.

There is a large variety of SiS definitions in mission statements and strategy papers of RFOs and RPOs. The main categories are "visibility", "knowledge transfer", "interaction/dialogue", "engagement" and "impact". Some of these highlight the transmission of knowledge and information; some reveal deeper collaboration, interaction or engagement.

The box below lists some examples of phrases used:

- … the objective of creating new knowledge and expertise beneficial to economic, social and cultural development;
- to promote/spread/transfer scientific knowledge…
- to contribute to the application of research results…
- to advise public and private entities, and government";
- … impact on business, public sector and third sector;
- … interaction between research community and society;
- … public engagement/participation;
- … public understanding of science;
- … dialogue with the public about research;
- … the role of science in society;
- … knowledge transfer between research and trade and industry;
- … cultural/social/economic significance of science;
- … visibility of science and its results;
- … bringing together scientists, experts in the world of politics, business and public administration, and interested laypersons."

Box 1. SiS definitions in mission statements of MOs

3.1.2 The target audience of SiS actions by RPOs and RFOs

Generally speaking most of the actions are general, and no special target group[24] is mentioned. Some RFOs on the other hand do list several target groups – pupils, students, adults, professional groups, media, industry are mentioned – which suggests that no relevant priorities have been set. When a priority is given to one or two target groups, the most preferred group is youth, pupils or schools. In order to raise interest/awareness in pupils, in some agencies teachers have been identified as a target group.

In a number of cases, politicians and decision makers are selected as a target group. The type of politician or decision maker is not specified.

The most important target groups for RPOs are governments, parliaments, higher education, industry and media. Some institutes additionally aim at education, the health sector, children, cultural institutions, and so on.

24. Researchers themselves were not considered as a target group. But they might have been. Collaboration between scientists about SiS is not very common, even if it is possible to find examples. Collaboration will be anyway one of the points in the recommendations chapter.

3.1.3 Activities

There is a remarkable number of SiS activities which have been reported by ESF MOs. All respondents have put in place several actions to promote science in society. The most popular include information activities, press and media relations (press conferences, press releases), publications, speeches and presentations. Big research institutes in Southern Europe for instance publish a press release almost every day (300–350 a year). Their activities are high in number: they give lectures (30–49 per year), publish books or booklets, organise research laboratory open days, stage public debates, hold large science festivals or exhibitions, as well as carry out other activities.

While providing information is seen as a one-way action, there are also a remarkable number of two-way communication formats, such as public dialogues, public debates or interactive settings which can be described as activities close to or at the core of a contemporary understanding of SiS.

The following list is an attempt to provide a tentative classification – a typology – of activities reported by ESF MOs in the course of the survey:

- ***Information and communication:*** press releases, websites, press conferences.
- ***Events:*** open communication forum, science festivals, science weeks, info days, café scientifique, exhibitions, workshops, lectures, debates, research open days ("hands on"), theatre (e.g. Darwin theatre), road shows.
- ***Services:*** help-desks for journalists (find an expert), inquiry service (for lay people).
- ***Advice:*** policy advice, counselling.
- ***Awards and prizes:*** competitions: awards on social impact for young researchers, awards for SiS activities, competitions for pupils on science.
- ***Funding instruments:*** outreach projects, researchers applications for specific SiS funding, public science schemes.
- ***Public participation/engagement activities:*** consultations on research programmes, panels (expert panels, laymen panels), committees on research programmes.
- ***Guides:*** working with media (for researchers), working with scientists (for media), impact toolkit (for researchers), planning impact, impact assessment.
- ***Training:*** researcher training (how to work with media), journalist training (how to work with researchers).

Box 2. Classification of reported activities

3.1.4 Who is the actor?

In RPOs and RFOs information and communication units are the key actors behind SiS initiatives. The initiative is therefore on the institutional side (irrespective of their status as RFO or RPO), so the audience mainly plays the role of the reactive participant.

RFOs and RPOs publish press releases and organise events where researchers are invited as guest speakers. Some of these organisations provide training for researchers and/or the media.

A small but strong group of MOs (eight RFOs according to the survey) provide funding for outreach projects or similar activities, where researchers promote SiS.

Some RFOs and RPOs invite panels and expert groups to contribute to the research policy or research programmes.

3.1.5 Motivation

MOs were asked to indicate their main motives to promote SiS. Some organisations list several objectives; some mentioned only the most important one. The list below shows how many times each of the motives was selected as the most important objective.

The variation is not huge, but it can be concluded that the role science has in society is connected to the economy and industry – i.e. 'hard' values – more than cultural or social development, i.e. 'soft' values.

• Growth of economy	10
• Innovation	9
• Research career	9
• Democracy	7
• Culture	6
• Social development	3

Box 3. Motivations

The phrases used when describing the motivations reveal more about the 'soft values' (social development, culture, democracy):

- "Better understanding of science"
- "Visibility of science"
- "Goodwill for research – and money; investments in science or its applications (health care, etc.)"
- "Input for research projects or programmes, research policy; programmes to be defined by users"
- "To help teachers"
- "To attract young students for research career"
- "Stimulate children's curiosity"
- "Increase scientific culture, to promote scientific values"

Box 4. Soft values underlying motivations

3.1.6 Resources

The amount of resources (budgets) used for SiS was not covered in the survey. Instead, respondents were asked to report the type of resources which are typically employed with SiS activities.

Most of the organisations use their own internal resources (13 replies) in the form of their own staff and own administrative budget. Eight out of 27 organisations use research resources for SiS. This means that they allocate funds for researchers, who apply for this kind of support.

Four organisations receive funding from outside, sponsors or other sources. EU funding is also mentioned – but only by three respondents.

Co-funding is familiar to seven organisations. The type of partner or co-funding is not described further. Co-funding can be used regardless of the source or own funding (internal, external, research funding, sponsors, and so forth).

The size of the organisations is not indicated in the survey but the staff involved in SiS activities is indicated, varying between 0 to more than 20. Most of those who have dedicated structures or staff have between two and nine employees in the relevant departments.

3.1.7 Areas for improvement

The research funding agencies were asked to describe their needs to improve SiS in their own organisations. A variety of issues were mentioned:

- Transferred skills needed for SiS
- Ethics
- How to work as a partner with media/politicians
- International partners on SiS
- Evidence of impact
- Dedicated structure: how to create an organised structure instead of ad hoc activities
- Unambiguous statement of SiS: expectations and responses
- Follow-up of SiS actions
- Evaluation of activities: sensitive and reliable methods
- More formats for action
- Open dialogue between scientists and audiences
- Dissemination channels
- Hands-on activities
- Evaluation of impact

Box 5. Issues to improve SiS in MOs

3.2 **Conclusions from the survey and case studies** (see cases in annex)

3.2.1 **SiS actions do exist in MOs, and have done, sometimes, for a long time**

SiS activities are different from research itself, and their scope is *sometimes* directed to one target. There are several well-organised and well-developed events and communication formats which have an established status in their contexts. A number of typical examples and cases are described in Annex 4. **To summarise, one can conclude that providing information on science and research findings is the most typical SiS action.**

Very few activities are two-way (or multi-way) oriented, especially across national borders: a minority of MOs have participatory processes with stakeholders or different audiences. A responsive or critical view of research is missing.

Evaluations of quality or effectiveness as well as analysis of impacts on society are extremely rare. The relation of SiS actions to strategy of the institution cannot be easily understood.

SiS in other contexts is important to note. There are several types of establishments for funding SiS activities outside MOs (European Commission, private foundations, etc.) that may play an important role, and which are complementary and cooperative with MOs. But these were not surveyed on this Forum, which focused on the role MOs should take in SiS.

3.2.2 **The cultural context as a deep determinant of SiS activities**

Science and society relationships always ought to be considered in a cultural context. The success of activities oriented to forge these relationships depends to a large degree on where and how they are implemented. Their transferability, scalability and impact are strongly connected to cultural factors.

A sign of the importance of cultural diversity is that the risk associated with specific scientific developments and technologies is perceived very differently throughout Europe (Jasanoff, 'Design on Nature', 2005). There are countries where public debate on controversial SiS-related issues has a long tradition, whereas in other countries this is far from being the case. And the traditions may differ depending on the political traditions used to solve problems and conflicts, which are embedded in fundamental laws and parliamentary processes. Flexibility and cultural sensitivity must be factored in without simply assuming that the unequal economic resources and considerable differences between the educational systems of European countries constrain the type and amount of activities which may be carried out successfully.

3.2.3 **Evidence of number and diversity**

In practice, SiS is understood in a diversity of ways, as reported several times in the Forum and from the survey. There is no single model to fit all RFOs and RPOs and this is something to bear in mind when good policy practices are discussed. The spectrum goes from SiS as a part of information and communication strategy to SiS as a part of research policy. In this latter sense, SiS can be considered as meriting dedicated attention *per se* (e.g. a Science in Society programme) and/or something that should be embedded in all programmes and for all researchers. Information or communication is a one-way action. MOs produce press releases or organise press conferences, and journalists receive this information. One can argue that events, presentations and debates are interactive but are essentially an example of one-way information – the topics are chosen by the scientists and the agenda is prepared by the scientists. In the same way, research laboratory open days and shows give opportunities to do experiments and work hands on with scientific questions and methods. These are a means for learning about science. There are also several large and time-consuming events, which are professional: examples include Darwin theatre, science festivals and cafés scientifiques.

3.2.4 **One-way, reciprocal and dialogical communication?**

Far less common is the two-way interaction, which includes activities such as panels, public consultation of research programmes or science policy-making, and public engagement with research results, research methodology, research programmes, research policy, ethical questions, applications of research results.

3.2.5 **No evaluation is presented or available**

There appears to be no description or analysis of the genesis, processes and impacts of SiS actions, whatever their size. The measurement of impact is missing. No indicators are described. Actions are only documented: the number of events, press releases, the size of audience, and so on.

3.2.6 **The level of actions**

The activities described and listed by the members can be classified on two levels: either individual researchers and research groups (the micro level) or research institutes and funding agencies (the meso level). Above these two classes of actor there are governments and policy makers (the macro level).

Collaboration and similar motivations are needed through all these levels.

3.2.7 **Benefits and risks**

What are the benefits and what are the risks of such a complex set of exchanges? SiS activities are valued by those MOs which participated in the survey. Three conceptualisations emerge from the survey as cross-cutting:

- Science is for the benefit of society: society can use the research findings to increase the knowledge base, improve the welfare system, generate economic growth, and improve daily life, and that is the best reason for funding science.
- Involvement of the public is for the benefit of science, for better compilation of research programmes, conveying new ideas and questions, for assessing the ethical aspects of research, for supporting future funding, and so forth.
- More dialogue-based approaches are needed for the better understanding of science and scientific processes, to foster curiosity towards science, and to enhance innovation and development and for science to become aware of the wishes, values and concerns of the public.

So actors should express explicitly their expectations, on what kind of values they are based and what the time scales are, so that the game for exchanging would stay tacit, and override the classical asymmetries.

From Chapter III we may conclude that there are real and numerous connections between research communities and society at large.

The description of SiS actions by MOs reveals:

- The number and diversity of SiS activities, attached to national and cultural contexts;
- Their complexity due to the multiplicity of actors and reciprocal influences of different natures. But also the dominance of one-way activities, and the emergence of two-ways actions;
- The very few European actions;
- The weak connection with the strategy of MOs;
- That benefits may be expected from a SiS context. They should be framed by a shared view of which interests of partners are (a) expressed and (b) negotiated, and not just facing each other;
- The absence of collaboration between macro, meso and micro levels of science policy in SiS;
- The absence of indicators and evaluation of SiS activities.

Chapter IV will elaborate recommendations to increase the vision and benefits for science and for society.

4. Improving interaction with society – the need for strategy and action

The need for reinforcing the relationship between science and society is clearly apparent. The Forum's deliberations, the survey, case studies and data analysis provides irrefutable evidence that even though much is being done, there is a great need for major efforts for improved, dialogue-based interaction between researchers and society.

The Forum clearly realises and wishes to emphasise that 'Science in Society' (SiS) actions are performed in a wide diversity of contexts and cultures, in various countries and in different types of organisation within a country or across borders. Thus there is no single model to fit all countries or organisations. However, while paying great attention to this, the Forum can nevertheless draw a number of common conclusions concerning policies as well as concrete measures.

Two-way dialogue is a key feature. This requires a broad understanding of two different cultures that in many ways use different languages. Society's culture is based on democratic values where all are equally important. Science on the other hand is an elitist culture based on logical thinking. To achieve success in promoting a closer dialogue between these to cultures clearly needs a sincere desire by the two parties to interact. Thus there is a mutual need for understanding and cooperation.

The recommendations contained within this report are aimed at helping Member Organisations (MOs) to develop the governance of SiS relationships further. To really improve the relationships each MO needs:

1) Commitment to SiS in research policies and strategies – shared by all employees of the MO.
2) Actions (funding, activities, structures) appropriate to the objectives and to the context and culture of the MO.

4.1 Commitment to SiS in policy, strategy and action

Society's endorsement of the purpose and direction of publicly funded research has to be earned. To preserve a common responsible future, with respect for freedom of science and for public confidence in researchers, it is imperative that the scientific community becomes more proactive in opening a dialogue with society. The science and society interface is extremely versatile and interactions can take place in a multitude of ways. Thus it forms a highly complex network.

Governments and parliaments support science and innovation, and as such practise SiS within a political context. Thus SiS should become a key component of national research funding organisations (RFOs) and research performing organisations (RPOs) strategies.

It is the advice of the MO Forum that RFOs and RPOs demonstrate more clearly strategic commitment to SiS and that they promote SiS actively across their own organisations and to other actors. The message would also have symbolic importance as a response to individual scientists who think that SiS responsibility and tasks should be commonly defined and shared between individuals and institutions.

4.1.1 First step: Internal state of the art

We advise that each MO should perform an audit and analysis of the status of SiS and SiS actions in

its organisation. The state of the art could be made by comparison with data from the MO survey, or with other specific data to be collected within the area of the individual MO. Some analysis[25] shows that research locations are in many cases strongly related to their own specific environment of their own research community in connection with other relevant disciplines, professionals, enterprises or lay groups.

4.1.2 Second step: Mission statement of the organisation

RFOs and RPOs should develop a "mission statement", an articulate definition of SiS appropriate to their organisation. Each MO must develop its own SiS policy and mission statement taking into account relevant local factors. The mission statement should be adopted, understood and used consistently across the organisation and in its operations.

Embedding SiS activities into top-level strategies should be a combination of general SiS principles and realistic actions. The situation is specific to each MO. It should ensure focus and emphasis on SIS activities, and this needs to be supported through financing of activities and training, as well as a reward and recognition system for SiS work. There will also need to be a clear strategy for internal and external communication about SiS.

Key considerations when developing MO SiS policy and mission statements should be:

- SiS concerns all scientific disciplines.
- MOs should work to make individual researchers, research groups and institutions aware of the importance and benefits of SiS.
- Different actors in society ought to be heard. Target groups should be clearly formulated.
- How SiS perspectives and activities can best be incorporated into the MO's operations.
- Researchers, research groups and RPOs need to be rewarded for SiS activities.

4.2 Enhancing better practices

Once a strategy for SiS has been agreed within an organisation, the next step should be to "enhance better practices". That is to say, to monitor, analyse, improve and develop current SiS promoting policies, capacities and activities, and to introduce appropriate new measures in order to fulfil strategic requirements and comply with the organisation's mission statement.

The approach to achieve this will depend very much on the type of organisation. The MO Forum stresses the fact that all SiS measures are extremely dependent on culture and context. Successful measures in one place cannot simply be transferred to another but must be analysed and adapted to work well in a new environment.

4.2.1 Key recommendations for Research Funding Organisations (RFOs)

RFOs can be small or large, public or private, typically employing from 20 to 200 administrative staff. The main focus for organisations of this sort should be to ensure that there is sufficient funding for SiS activities. RFOs also have a responsibility to evaluate the quantity, quality and impact of SiS activities and to use this evaluation to reward researchers and research groups accordingly. Measures appropriate for RFOs are:

- Start by surveying the current situation. Is the present model working and does it fit with the mission statement with regard to SiS? Analyse if the funding situation with regard to SiS activities is optimal for the task. Is it within the research grant, or is there a separate fund for SiS, or a mixture of the two?
- Identify how to monitor what activities researchers funded by your MO currently participate in. Consider the audience being targeted, the impact, the quality, the cost (in terms of time and money). In what ways can you as a funding body influence this?
- Experiment, explore and learn ways to increase and enhance researchers' participation in SiS relations. There should be inclusiveness across sciences and research groups; it should not be mandatory for every individual researcher but it is imperative that the dialogue is not confined to just a few selected researchers and research groups.
- Identify gaps in SiS activities, capacities and expertise where extra funding or support, initiated through the funding scheme, could improve things; for example through training and workshops.

4.2.2 Key recommendations for Research Performing Organisations (RPOs)

RPOs are often large organisations with tens, hundreds or thousands of researchers. This type of organisation, therefore, has the capacity to heavily influence the decisions and motivations of researchers when they consider involvement in SiS activities. Thus RPOs should ensure that there are sufficient resources allocated for SiS activities. RPOs also have the potential to include SiS as a consideration in promotions and pay rises. They will also have the power and the facilities to coordinate, organ-

25. CNRS, LaboCité survey, 2008-2009.

ise or simply participate in training and workshops around SiS.

- Start by surveying current practices of society/public interaction. Identify what activities go on now, the audience reached, the impact, the quality, the cost (in terms of time and money). Do they fit with the mission statement?
- Define and compare their qualities, publics, efficiency, etc. Select which seem to be more efficient and describe them in their context. Identify areas of strength and of weakness.
- Survey funding available to research groups for dissemination of research results (e.g. budgets provided for the EU-funded projects). Could the funds be used more efficiently provided that RPOs offer professional support to researchers both in performing SiS activities and in drafting new projects?
- Identify ways to increase and enhance scientists' participation in SiS. There should be inclusiveness across sciences and research groups; it should not be mandatory for every individual researcher but it is imperative that the dialogue is not confined to just a few selected researchers and research groups.
- Identify gaps in funding, capacity and expertise and make plans to provide the necessary funding, training and support by professional staff for researchers and research groups.
- Integrate the scientific education of researchers with skills for science communication and dissemination.
- Raise awareness of stakeholders and decision makers, as well as of public groups of different kinds.
- Set up or participate in infrastructures for public engagement activities and communication arenas of all kinds: forums, dialogues, training, competences, etc.

4.3 Learning and improving: Principles and instruments for better policies and practices

4.3.1 Principles

The survey and the deliberations of the Forum clearly show that beyond diversity of SiS actions, common views about dialogue and SiS relations are gradually emerging in Europe.

To speed up the processes and achieve quicker success it is imperative that different actors within a country and within Europe learn from each other and join forces to improve their operations. Sharing of experiences, exchange of best practices, joint activities and so on will significantly improve and accelerate the processes outlined in the previous section. The objective must be to learn from each other and to share best practices and join capacities to develop common needs of issues such as indicators or means of evaluation, impact assessment, qualifications assessment, and so forth. The instruments are not the key issue – the objectives should be the major focus. But different tools can be considered and tried for different purposes in different contexts. This MO Forum recommends the following further actions to be considered by RFOs and RPOs, bearing in mind at the same time the different political cultures across Europe.

4.3.2 Instruments

There are several possible instruments. We propose considering (a) common agreement(s), (b) network(s) for exchange of experiences and best practices, (c) initiating common research on SiS and (d) network(s) for joint development of systems of indicators and measurements.

(a) Developing a Common Agreement signed by RFOs and RPOs on a national or European basis can be a helpful instrument in setting out the overall policy with regard to how to embed SiS within research policy. It should be implemented on a voluntary basis and could outline the goals, policies and actions expected from the involved RFO or RPO and their responsibility in delivering them. As a reference, such an initiative has been introduced in the UK by Research Councils UK (RCUK) under the name of 'UK Concordat for Engaging the Public with Research', which has been signed by public and private RFOs and RPOs. A comparison with other ESF Fora, such as 'Integrity of Research', or 'Infrastructures of Research' is evidence for the feasibility of such an initiative. However, the Forum also warns that there is a risk that such a process can consume too much time and effort and merely result in rhetoric. It is imperative to focus on the objectives.

Some of the potential key principles for such a Common Agreement on SiS are:

- RFOs and RPOs have an explicit strategic commitment to SiS
- Researchers are recognised and valued for their involvement with SiS activities
- Researchers are enabled through appropriate training, support and opportunities
- The signatories and supporters of the Common Agreement will undertake regular analysis of measures and reviews of their and the wider research sector's progress in fostering SiS within their own country and across Europe.

(b) A European network for regular exchange of experiences and best practice may improve capac-

ity[26] building. Appropriate methods for enabling this need can include specific networking events throughout the year, joint training events across RFOs and/or RPOs and the opportunity to develop SiS activities at an international scale. It should include training for communication in a broad context, which is often presented as a need for researchers.

SiS champions are essential in fostering SiS. Representatives from MOs should encourage the establishment of such a network or group to take up SIS issues of national and international importance. This Forum wishes to support these kinds of initiatives, but does not want to propose exactly what kind of form should be adopted. This must be subject to further discussions between the respective actors involved.

(c) SiS activities need to be analysed by research! The embedding of SiS in diverse cultures is a fruitful field for research. There are many researchers from several disciplines who are attempting to depict the SiS landscape and trying to propose concepts for a deeper understanding of SiS. In the last thirty years many case studies have been produced. Some national calls have been launched and platforms of joint disciplines have been built.

A common European view on SiS and SiS practices needs to be elaborated with simultaneous consideration of the diversity of local and national contexts and situations. It would also mean the animation of a network of researchers. The definition and design of European science policy cannot be divided and managed only through thematic societal challenges and disciplinary actions. There is a need for an exchange of practices as well as theories from an academic point of view at European level, and this might be one of the places where exchange could be developed across the world.

Our recommendation is to enhance the ambition to realise research on SiS, its importance and impact. A starting point may be to draw upon the on-going exercise by ESF to produce a Science Policy Briefing on "The Future of Science in Society", as a synthesis of different "school thinkings" in the SiS field. ESF and, further ahead, Science Europe could be the place to launch a proposal to members to initiate common SiS research programmes in cooperation with the European Commission so that the field becomes fruitful.

(d) The importance of SiS will only be an essential ingredient in the culture of the research community if such perspectives and activities are fully appreciated, valued, rewarded, encouraged and supported as a fundamental aspect of research. This requires commonly developed and agreed criteria and assessment methods.

RFOs and RPOs should initiate discussion on the impact of SiS activities. They should jointly develop systems for measuring, evaluating and assessing SiS activities. Evaluation of SiS should not be included in the classical quality of research evaluations, but the same kind of methods – i.e. peer review – could be applied, nota bene with peers from the field of SiS. The quality of each discipline or aspect of research must be assessed in relation to the special conditions of the respective area. To decide the level of quality or the value on a scale, there is an obvious need for clear criteria and objective measures or indicators. A greater desire to experiment both in activities and assessment would be welcome.

4.4 Introducing indicators

The general objectives and ambitions of enhancing the dialogue between science and society must be translated into actions and numbers or qualitative indicators. This is necessary in order to encourage and reward good performance. This in turn requires agreed criteria on what and how SiS action should be measured, be it in terms of cooperation, processes, results or impact.

This MO Forum recommends that RFOs and RPOs introduce a system of indicators to measure the involvement of researchers, research groups and institutions in SiS[27]. The MO Forum acknowledges that this step will take time, commitment and some fundamental organisational changes.

Measuring SiS with indicators is a complex matter. MOs have made considerable efforts to identify indicators currently in use, have considered the development of a set of indicators, and have consulted with members of the ESF "evaluation MO Forum". A report published in July 2011 by VA Sweden[28] gives a comprehensive summary of the current situation and highlights where such indicators are already being used. The report, commissioned by the Swedish Ministry for Education and Research,

26. Capacity is the potential within an organisation to address challenges; it relies on human capacity, organised competencies, know how and experience; it may be mobilised through a learning process.

27. See indicators in the UK such as the CROS survey which asks UK researchers if they have or would like to carry out public engagement activities. HEFCE's HEBCI survey also has a new question to monitor embedding of public engagement within RPOs.
28. Vetenskap & Allmänhet (2011)

also includes detailed recommendations for indicators. In the table below (Table 1) the indicators for SiS or public engagement ('Samverkan' in Swedish) proposed for Sweden are summarised, including an analysis of their strengths and weaknesses.

Although several countries have investigated indicators, none have yet introduced them to measure SiS activities in their national research systems. Denmark and Norway have had intensive discussions about including SiS indicators in funding allocation within the research system but the proposed indicators were rejected for different reasons. The UK[29] is currently working on a new approach to measure excellence in research, and SiS will be part of the assessment. A recent study supported by the Royal Society UK on the culture of science[30], proposes a single indicator for SiS, based on a combination of cultural indicators and of a science production indicator.

The introduction of indicators is a complicated topic. There are many different types of activities on several different levels. What is appropriate and possible will vary amongst MOs. Thus the advice is to introduce three distinct types of indicator measuring different aspects of SiS:

- Activities – these indicators can also be designed to measure the amount of time spent on SiS and therefore reflect the value of SiS from an individual researcher's point of view.
- Resources – this will reflect the budget and level of human resources put into SiS and therefore give an indication of how much value and effort a department or organisation gives to SiS. This type of indicator will also include the level of training and capacity building. It can also comprise a measure of "support" indicators for communication specialists who provide support but without taking on responsibility for SiS activities.
- Income – this will measure how much money is earned by the organisation from SiS. This can be, for example, from commissioned research and teaching, licensing or charging for services. It reflects certain aspects of a successful interaction with wider society.

This MO Forum also recommends that a two-level system of indicators is strongly considered. Such a system will allow weighting according to the level of interaction. Level 1 activities will include those activities that involve essentially one-way communication, where the researcher is the main actor. This can include for example popular science articles, lectures, TV or radio appearances. Level 2 activities will include those activities involving an interaction with society. For example, SiS collaborative projects with a third party, visits and exchanges to external organisations, participation in consensus conferences or ethical debates, faculty positions held by individuals from external organisations. The Forum considers that both types of activity are valuable and important. However the survey shows clearly that there are currently very few Level 2 activities. Consequently there is a great need for improvement in developing two-way dialogue. Level 2 activities could therefore initially be weighted more heavily than Level 1 activities, and thus offer greater rewards. Such a weighting would give a clear message that developing interactions at this moment should be given priority.

4.5 Looking for impact

At an EU and national level, impact is being increasingly considered as an important part of evaluating research and innovation projects. The societal and economic impact of research projects is being considered alongside traditional measurements of research excellence such as publications and citations. There are a number of avenues that can be explored for addressing impact. A clear problem with a system of indicators is that it focuses primarily on measuring quantity and not quality. What is needed is a method for showing the impact of SiS actions in research and innovation. Only in this way can a real culture shift be achieved, by showing society and the research community the true benefits of SiS.

Impact can be viewed from several different perspectives. It can be about influencing political or social decisions, about giving rise to new pharmaceuticals or other products, about reputation among companies or societal actors, about improvement of research and education, about maximising benefits of investments, or about spending taxpayers' money more wisely. There are widely varying timescales for assessing impacts within diverse scientific areas: the payback time for public research investment can be anything from a month to several decades.

As a reference, Research Councils UK has developed "Pathways to Impact", a template of the potential range of impacts that can be generated from research in order to support scientists to develop the SiS aspects of their research (see Figure 2). The main idea is to encourage applicants who are applying for research funding to

29. This is HEFCE's Research Excellence Framework (see http://www.hefce.ac.uk/research/ref/)
30. Bauer et al. (2012).

Table 1. Proposed indicators, including their strengths and weaknesses, Vetenskap & Allmänhet (2011)

Indicator	Scale	Strengths	Weaknesses
1. PUBLIC ENGAGEMENT ACTIVITIES			
Activity level 1 (science-public communication)			
No. of popular science **publications** (books, book chapters, articles in magazines)	0-3*	Identifies publications particularly addressed to public, easy to measure	Says less about quality of publication, could be comnewspapers/pensated by media ranking
No. of **lectures** to the public (open lecture at universities, guest lectures by researchers)	0-3	Identifies knowledge transfer to public, shows openness to public, easy to measure	Says less about quality of lecture and audience reached
No. of participations in **TV/radio**	0-3	Widespread knowledge transfer to public, easy to measure	Says less about quality and effort of contribution
No. of **open houses**	0-3	Shows openness to public, easy to measure	Tends to reach the science-interested public
No. of active participations in **science cafés, science festivals, researchers' nights**	0-3	Identifies communication between researchers and public, easy to measure	Says less about quality of event and audience reached
Activity level 2 (science-public collaboration projects)			
No. of **visits** to external organisations***	0-3 (w)**	Identifies contacts with external organisations, easy to measure	Says less about quality and size of visit
No. of invited **guest lecturers** from external organisations	0-3 (w)	Measures external contacts and knowledge flow from external organisations to university	Says less about quality of lecture and audience reached
No. and value of **applied research projects** collaborating with external organisations	0-3 (w)	Measures and rewards the time spent in preparing a collaborative project	Data may not be available, needs to be surveyed
No. and value of **research projects** collaborating with external organisations	0-3 (w)	Identifies longer term collaboration between researchers and societal groups	Data may not be available as contracts may be managed by individual researchers, needs to be surveyed, says little about quality of project
No. of PhD and master **theses** collaborating with external organisations (e.g. industrial PhD)	0-3 (w)	Identifies longer term collaboration between researchers and societal groups, focus on high performing projects	Double counting with previous parameter
No. of faculty members having **a temporary position at external organisation**	0-3 (w)	Identifies longer term collaboration between researchers and societal groups, focus on stable relationships	Double counting with previous parameter
No. of externals holding a temporary position at the university (**adjunct professors**)	0-3 (w)	Identifies longer term collaboration between externals and university, easy to measure	Double counting with previous parameter
No. of **publications** authored with externals****	0-3 (w)	Identifies collaboration with externals, easy to measure	Says less about quality of publication
2. RESOURCES FOR PUBLIC ENGAGEMENT			
– Budget – Human resources	0-3	Identifies the importance and value of PUBLIC ENGAGEMENT at university level	Hard to collect data besides the budget and people in the communication department, press/PR office
3. INCOME FROM PUBLIC ENGAGEMENT			
– Commissioned research ("uppdragsforskning") for external organisations – Commissioned education ("uppdragsutbildning") for external organisations	0-3	Identifies the income from collaboration with external organisations for education or research	Bias to those universities whose intrinsic focus is external relationships (e.g. Business or engineering schools)

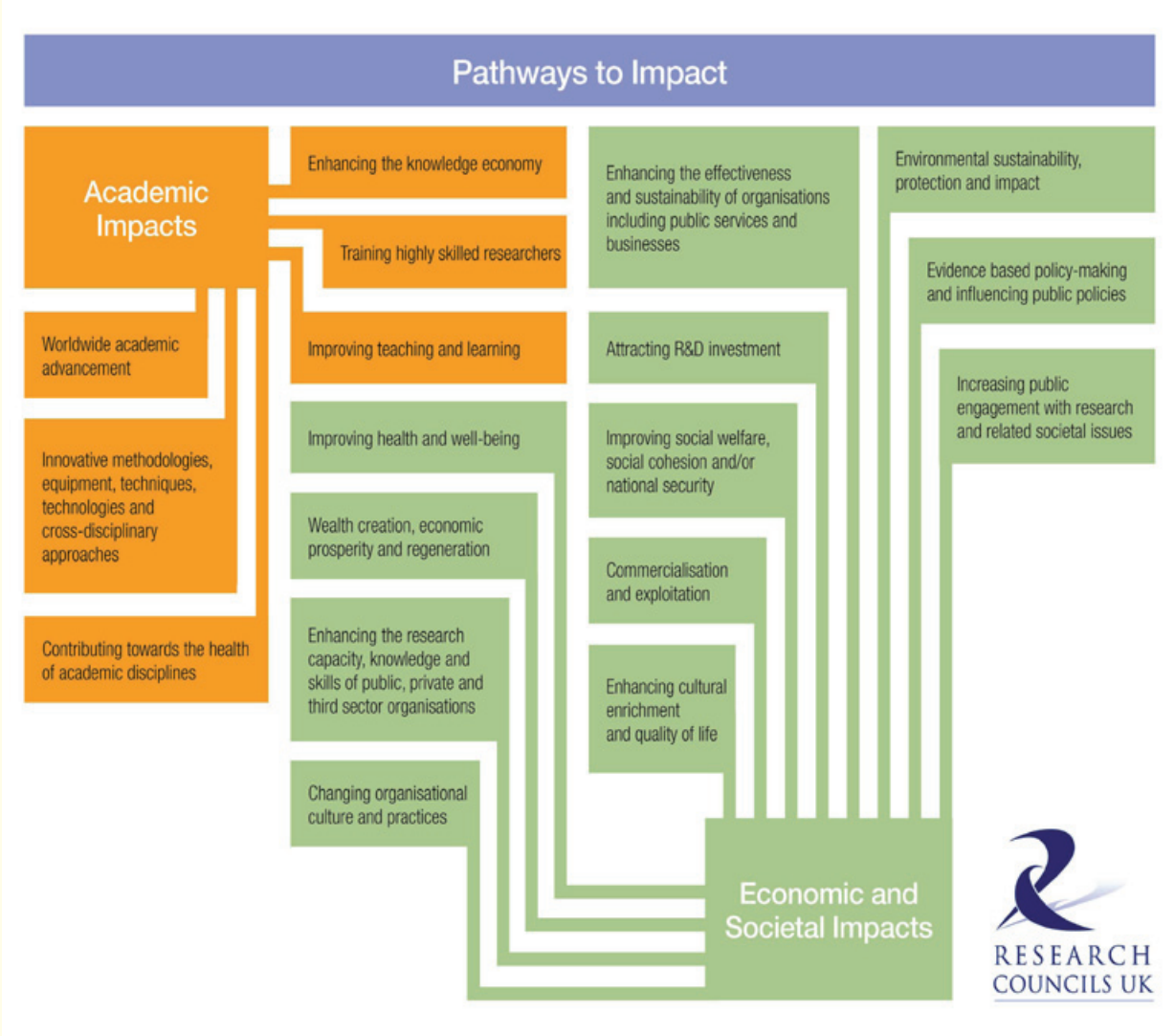

Figure 2. Pathways to impact as designed by RCUK

think about the potential contribution that their research can make to the economy and society from the outset and the resources required to carry out appropriate project-specific knowledge exchange/impact activities. While not all research will have a direct application, it is envisaged that all researchers may see the value of at least exploring ways in which their research may have a potential impact, or how to bring the research findings to the attention of potential intermediary bodies which may be able to make use of the research. In practical terms, RCUK proposes the impact assessment to consider the following questions:

- Who might benefit from this research?
- How might they benefit from this research?
- What will be done to ensure that potential beneficiaries have the opportunity to benefit from this research?
- What is the potential academic impact and pathways towards realising that?

The measurement of impact is a difficult issue. Consideration of concrete impact measurements is beyond the scope of this MO Forum at this moment, bearing in mind that most RFOs and RPOs are only in the early stages of implementing impact assessments of SiS activities. More experiments are recommended.

Thus, as a final recommendation the MO Forum urges RFOs and RPOs to follow and actively engage in the debate on impact, and in particular the moves to include impact as a measurement of research excellence. Not only should MOs be aware of the debate, they must follow it, engage with it and use their influence in making sure that impact measurements become a vital part of measuring excellence not only in research but also in SiS.

4.6 **Make evaluation of SiS part of research funding schemes**

By and large, there is need for change in the culture of scientific organisations. This is a clear conclusion from the work of the MO Forum on SiS relations. SiS activities should not represent an obstacle to researchers' career progress. One effective way for RFOs and RPOs to show that they value SiS is to consider rewarding researchers for their SiS work, particularly by means of funding and merits.

The MO Forum recommends that RFOs and RPOs consider the following measures as a first step towards linking SiS activities with research funding.

(a) Introduce evaluation methods and indicators:

- Activities and time spent
- Resources – budget and human resources
- Income
- Develop impact measurements
- Indicators should be simple, transparent, easy to collect, generally accepted

(b) Make SiS an intrinsic part of funding and merits:

- Introduce SiS requirements at grant application stage – for instance, a plan of SiS activities at the grant application stage in order to prompt researchers to think about SiS issues
- In peer review decisions, use SiS as a differentiator when projects score equally on scientific excellence
- Collect data on SiS and enable researchers to report their SiS activities within current grant monitoring systems (annual, interim, end-of-grant, evaluation reports)
- When awarding grants, allocate a percentage of time to be spent on SiS activities
- Allocate funds for specific SiS-promoting activities

5. Conclusions and Recommendations

History has provided us with periods of more or less intensive research and innovation and periods of more or less scientific thinking in collective behaviour. So SiS relationships is not a new topic. But the growing influence of science on society and the expectations from society about science means that MOs must now consider SiS as a component of their strategy – and not a side communication activity – in order to enhance our societal and common capacity to build our future.

A new environment and policy-making scale has emerged in the last decades, while the number of interfaces, channels, translations and exchanges between science and other actors within our social systems have markedly increased and diversified. What is the nature of this relationship? It is dependent on each social actor, and it builds into a complex system of exchanges between different sets of actors and values. The Forum emphasises the fact that SiS exchanges are embedded in multi-actor systems in which several relationships run simultaneously. This system should not be simplified too much when it comes to defining actions.

The Forum has observed that the relationships are moving from a one-way approach (essentially dissemination) to reciprocal flows confronting different views of a common question to be addressed, and different legitimations and rationalities. This situation may bring positive or negative opportunities for enhanced exchanges.

So we need to experiment more, and simultaneously to understand the landscape better, to be able to take responsibility for our terrain-transforming activities.

Our main conclusions and recommendations are:

- **Much is already being done** in **SiS activities, embedded in cultural and historical conditions,** but this must be **developed** further to meet the new challenges arising in Europe and in the world. Each MO should develop new SiS activities in its own way, depending on its context and remit.

The recommendations of this MO Forum need to be **implemented on a long-term** basis, while following some guidelines:

- **Quality in SiS activities is needed.**
- **Clear commitments to SiS in MOs' science policy and strategy has to be enhanced.**
- **Transparent SiS processes** must be put in place within the organisational structures of MOs, and other research funding and performing bodies. SiS must also be seen as an essential and central part of a researcher's work. A cultural change must be encouraged through staff policies, organisational strategies and education of researchers.
- **Researchers** and research groups must be properly **rewarded** for their work in this area.
- **More experiments** concerning instruments, activities and methods should be encouraged.
- **Sharing** experiences and best practices regularly through networks for exchange within Europe would increase efficiency in SiS.
- Networks to **jointly develop systems** for indicators, evaluations and measurements are needed. There is a need to coordinate efforts for **greater impact**. Organisations need the **instruments** to do this and this involves making sure that SiS activities are formally **evaluated**, which is currently not the case.

It should be also evident that the SiS field needs further evaluation within the next few years. ESF/Science Europe leadership could play an important role in this.

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6.
Annexes

Lead Organisation to "Develop a Programme to Promote Public Engagement between Science and Society".

Mandate of EUROHORCs to the *National Centre for Scientific Research* (CNRS), France.

Background

The central role of science and particularly of research in changing society, ensuring its economic renewal and the wellbeing of its citizens sets an obligation on science institutions (universities, research performing organisations and research funding agencies) to engage in activities beyond their traditional mission of producing new knowledge, thus gaining and maintaining the trust of society in the scientific process.

An effective knowledge-based society requires greater interaction with, and awareness of, research opportunities and initiatives across all sectors of society. There is both a need for a greater general awareness of science and technology within European communities and a greater need for those involved in research and policy setting to recognise the cultural, economic, ethical and political factors that affect the development of science and the adoption of new innovations within society.

Managing the process of knowledge creation requires integration of all its dimensions, building new approaches and models in science policy, ensuring integrity in the practice of research and ethical considerations in its methods and its objectives, assessing both potential progress and risk, and ensuring accountability both for its operation and for its potential impact.

Mandate to the *National Centre for Scientific Research*, France

The General Assembly of EUROHORCs mandates *the National Centre for Scientific Research, France* as the *Lead Organisation* to *"Develop a Programme to Promote Public Engagement between Science and Society"*.

The National Centre for Scientific Research, France is asked to develop and implement a detailed concept and timetable to be presented at the General Assembly meeting in October 2009 and to report regularly to the General Assembly and the Steering Committee of EUROHORCs.

Goals

The concept to be implemented shall serve the following goals:

- Introduce executives of scientific institutions to the multiple managerial dimensions into which they must translate science policy, particularly:
  - Pursuit of excellence of science and its management
  - Necessity of translating scientific knowledge into contributions to society and the economy
  - Responsiveness to the needs of society and humanity in important areas such as energy, health, nutrition, environment, security, fairness of communication systems, etc.
  - Dialogue with societal players including political decision makers on the role of science and scientific institutions
- Establish communication standards with social players to reinforce the trust, the credibility and the image of science in society;
- Better anticipate possible crisis situations, especially towards public opinion.

Items to be addressed

Launch a consultation conference in mid-2009, in conjunction with ESF, to set out the instruments (Member Organisation Forum, Forward Look, etc.) that will map out the needs, the action plan, the resources necessary and the means available. In view of the above goals, this process will help to:

- develop guidelines and facilities for science institutions to encourage their members (laboratories, scientists and executives) to undertake actions for a better dialogue with society concerning scientific issues;
- put in place areas of dialogue with societal players to identify relevant questions and stakeholders, to develop open, equitable and participative methodologies for addressing these questions, and to open channels to decision makers;
- establish observatories to analyse relations among stakeholders in each area, detect possible tensions and anticipate crises by alerting the science community.

A.4.1 Understanding Culture Change within Higher Education from NCCPE (UK)

The National Coordinating Centre for Public Engagement (NCCPE) co-ordinates, captures and shares learning in public engagement across UK universities and research institutes[1].

Early on in the project, we reviewed lessons from other projects aiming to bring about cultural and behavioural change, to inform our approach (see for example the UK Government paper 'Achieving Cultural Change: A Policy Framework', 2007) and invested considerable time to develop a better understanding of the particular challenges of embedding engagement within the university system. This included:

- Desk research: this revealed rich learning from other national contexts, in particular the US where concerted attempts to embed engagement in universities have been made since the 1990s.
- Learning from and with the Beacons for public engagement: The Beacon teams and the NCCPE met regularly throughout the project and used these opportunities to share and build on each other's learning. As each Beacon sought to develop a more engaged culture within their institutions many lessons emerged. This emergent learning was critical in developing the resources to support others.
- Running a national action research project: A national action research process using an action research methodology to develop a systemic inquiry process (Burns, 2007). The findings from this research are summarised in a final report, which identified a number of barriers to change, as well as ways these barriers might be overcome.

Synthesising the learning: a manifesto for public engagement and tools to support change.

As lessons were emerging from these different strands of work, we sought to produce resources to share this learning across the sector. These were developed following a consultation exercise to ensure they were fit for purpose. The resources are:

- Manifesto for Public Engagement: launched in December 2010, the manifesto addressed the need expressed by many staff that critical for embedding engagement was high level strategic support from the vice chancellor and senior team. This included the need for compelling evidence of the benefits that engagement could bring to the university.
- Resources for change

Purpose: clarify your purposes and values. Public engagement can best be understood not as a set of activities, but as an approach to the core purposes of teaching, research and social responsibility. To embed public engagement means to make it an explicit part of the identity and values of a university. Any university seeking to embed support for public engagement needs to clarify the role public engagement can play in helping it achieve its overarching purposes.

Build flexible support structures and processes. Public engagement needs support so developing a range of formal and informal systems to recognise and reward activity is important.

Put people first. People are the key to any change process, and finding effective ways to involve them is crucial. Our website sought to share how others have gone about supporting staff, students and publics to engage better together, and we ran a number of events to build and share effective practice in this area.

These focal points provided the basis for the self-assessment tools and institutional case studies. They have proved an effective basis on which to stimulate discussions about how individual institutions might develop their work in this area.

Scale: NCCPE supports all three types of public engagement (informing, consulting and collaborating).

Web link: www.publicengagement.ac.uk

1. In particular NCCPE works to support these institutions in embedding public engagement into their work. NCCPE was established as part of the Beacons for Public Engagement. This initiative was funded by Research Councils UK, the Higher Education Funding Councils and Wellcome Trust to tackle the barriers to participation in public engagement by university staff and create a culture change across the higher education sector so that public engagement is better valued, recognised and supported. NCCPE is run as a partnership project by the University of Bristol and the University of the West of England. Research Councils UK, the Higher Education Funding Councils and Wellcome Trust are continuing to fund NCCPE until December 2014.

A.4.2 "Rencontres Sciences et Citoyens" from CNRS (France) illustrates how to build useful dialogue between young people and scientists

CNRS created this event in 1989. The event itself consists of workshops, lectures and general assemblies to develop exchange. Most of the time is spent in dialogue between the two main parties – young people and scientists.

These days the event brings together around 500 young people from across Europe and 100 scientists from several disciplines from CNRS and other research centres and universities. Every year ten topics are proposed for discussion with the young people.

One of the main considerations which frame the debates is that speaking time has to be equal between the different categories of participants. In this sense the event is really experimenting with participative dialogue. As an example, discussions between young people and politicians demonstrate the genuine motivation on the part of young people to debate the future of science and their society, and to put forward their own views of citizenship to politicians.

In 2008, during the French Presidency of European Union, a specific meeting was held in Poitiers, attended by young people from all European countries. The final recommendations were transmitted to the European Commission, DG Research and CNDP (Commission nationale pour le débat public, France). The main feeling towards science was "Disinterestedness: NO; Disappointment: YES", which implies that young people welcome science, including in their studies, but would prefer other ways to study and practise scientific knowledge.

Scale: Collaborating. The kinds of activities commonly involved include public meetings and discussion events, panels and user groups, online consultation (the use of modern social media such as Twitter and Facebook are in preparation), deliberation and 'upstream' engagement.

Classification: The event addresses the macro-, meso- and micro-levels.

Web link: http://www.cnrs.fr/sciencesetcitoyens (French language only).

A.4.3 "National Science Quiz" (The Netherlands) is a different way of involving the general public in an entertaining way[2]

The NSQ is a science quiz on national television in which a team of three journalists competes with three scientists. It started in 1994 and has been organised every year. The general public can participate by submitting their questions via the internet. They can win one of three prizes (science combined with leisure time, for example a visit to one of the Dutch Wadden Islands combined with a visit to a Dutch science institute located at one the islands). Fifteen questions have to be answered. There is also a junior version.

Target: The general public.

Scale: It is neither consulting nor collaborating. It is rather somewhat informing. The quiz basically is about public marketing: showing the general public the "fun" side of science.

Classification: Between meso and micro.

Web link: http://www.nwo.nl/nwohome.nsf/pages/NWOP_5VGJ6V

A.4.4 "Flexit – Universities and Businesses" (Riksbankens Jubileumsfond) (Sweden) is a unique way of getting social scientists into business

Riksbankens Jubileumsfond, RJ, is developing new flexible solutions to distribute science and researchers in society outside the universities. A call for applications is announced by RJ once a year (since 2009).

The objectives of the Flexit scheme are:

- Build bridges between research in humanities and social sciences and business
- Facilitate mutual exchange of knowledge and stimulate contacts in order to make other organisations realise and use the competence of PhDs in humanities and social sciences and vice versa
- Influence the academic system of qualifications to value the experiences from businesses and vice versa
- Show alternative careers for researchers from humanities and social sciences

Thus the primary targets are PhDs of humanities and social sciences and companies. The academic and business systems as a whole are also a secondary

2. Supported by NWO communication department together with the VPRO Dutch Television Network.

target. Researchers who hold a PhD from humanities or social sciences are employed in a firm for up to three years. RJ provides 75% of the salary. The company is the employer, pays 25% of the salary and provides all other facilities. The PhD must be obtained less than five years before the appointment.

Life cycle: The ambition is to launch calls once a year until 2013.

Cost: RJ allocates approximately € 700 000 per year for this scheme/programme.

Web link: http://www.rj.se/svenska/1193

A.4.5 MathFitness (Italy) is an original event to engage the public with mathematics

MathFitness is a project of CNR[3], active since April 2006 and based in Genova, in collaboration with Genoa University, the Cultural Foundation Palazzo Ducale and the Genoa Science Festival. Its goal is to bring the public closer to mathematics through entertainment and it operates on a national level by planning and organising recreative, didactic and formative events of creative dissemination of mathematics, collaborating with schools, associations and public boards.

Maths is the base for technological improvement: in a digital world (like ours), we cannot dispense with maths, either in the field of research or in everyday life. Maths is also critical in the students' choice for their formative path. MathFitness proposes a new way of looking at maths: fun, interesting and involving for people of every age (from primary school onwards). With maths we can play and through playing we can learn.

As in a gym we can practise fitness, body building and dancing for increasing our force, resistance and agility, so the mathematics arena is a place where everyone can increase his or her memory, calculation ability, and satisfy curiosity, with mathematical games and activities. MathFitness activities highlight the following aspects of mathematics:

- Playful elements – to reach the solution of a problem, the visitor is invited to play
- Curiosity/wonder – often the solution to a problem is different from our expectations
- Application – most of the objects we use in our everyday life work through mathematics.

The project aims to establish a network of gyms dedicated to the dissemination of mathematics in Italy.

Google Foundation has recently selected MathFitness as the only Italian project 'changing the world' involved in the cause of STEM – Science, technology, engineering and maths education. A US$100,000 grant has been assigned to the project to empower activities in schools and to launch the mathematics arenas network in Italy.

Target audiences: General public, schools and universities, institutions, scientists.

Cost/Funding: The total budget is about 200.000 euro a year. Grant by Google US$100.000 for 2012.

Web link: http://www.matefitness.it

A.4.6 Agora (Switzerland)

Agora is a Swiss example of best practice in SiS relationships. SiS activities need to be part of research activities and researchers' careers. As an RFO, the Swiss National Science Foundation (SNSF) has the task and faces the challenge – in collaboration with RPOs (i.e. Swiss universities) – to embed this approach into its strategies, funding policy and management. SNSF has been implementing a SiS strategy, based on three action lines: 1) recognition of SiS activities of scientists; 2) training and support for activities which strengthen the communication skills of researchers (e.g. media training, guidelines); 3) funding of SiS activities. At present, these actions are partly embedded in funding policies and will be reinforced during the next few years.

Launched in 2011, the funding scheme Agora is part of the third action line. Agora aims to foster SiS activities of researchers funded in a competitive way. Its expected goal is the improvement of SiS activities in Switzerland in quantitative and qualitative terms. Agora awards are granted to researchers for projects involving dialogue with the general public on the subject of scientific research and its relevance for society. The projects must aim at an interactive dialogue between researchers and the targeted segment/subset of the public and must involve the active participation of members of this segment/subset of the public. To this end, the proposed ideas may employ various communication formats, e.g. exhibitions, events, debates, internet platforms, games or artistic productions. Grants of between 5,000 and 200,000 Swiss francs

3. CNR is the largest public research organisation in Italy, covering pluridisciplinary fields.

(4,100/166,000 euros) are awarded for a maximum duration of three years. The projects must be linked to the applicants' current research, which must have been evaluated under a competitive procedure (e.g. peer review).

Of the 77 project proposals submitted in the first call in 2011, the SNSF has approved 17 projects requesting a total amount of 2.1 million Swiss francs (1.75 million Euros). This corresponds to around 21% of the total requested amount. Agora calls will be open for submission once a year. For the Agora call in 2012, the same budget will be allocated as in 2011 (SFR 2 million).

A.4.7 FORFI (Norway)

Enhancing knowledge for research and innovation policy (FORFI) is supported by the Ministry for Education and Research. The activity is implemented by research groups and "users" or stakeholders in the public sector (mainly policy makers in ministries, agencies, higher education and research institutions as well as RCN – Research Council Norway).

FORFI is charged with providing an arena for experimentation, learning and dialogue between researchers and users by organising workshops and conferences which bring users and researchers together, facilitating dialogue between researchers and users in the course of the application process, encouraging dialogue and learning between users and researchers within the funded projects.

FORFI experiments with new forms of interaction that facilitate an open and participative interaction between researchers and users. The goal is to achieve a two-way dialogue between researchers and users as well as common reflexive learning. The FORFI call for proposals in 2011 was an experiment in this respect, with a three-step process for application assessment with dialogue between users and researchers as a vital ingredient.

In addition, FORFI continuously considers national and international experiments with instruments focused on fostering learning and dialogue between researchers and policy makers. The purpose is to identify and develop appropriate measures to facilitate open, inclusive and learning interaction between researchers and users.

FORFI projects are expected to actively draw on and involve users in the research process. It is expected that researchers have a good understanding of relevant user groups at the time of application, and that the projects develop processes and mechanisms to further develop this understanding during the project in order to integrate users' expertise in the research.

The FORFI programme period extends from 2010 to 2015. The total budget for the FORFI programme is approximately 40 million NOK.

A.4.8 Other important actions: Researchers' Night, Science Festivals, Kinder-Uni (Germany)

Within the large diversity of SiS actions, some have now reached maturity. This is the case for Researcher's Night, science festivals and The Kinder-U initiative in Germany.

Researchers' Night has been created to overcome some firm prejudices about science and to reduce the distance between the public and scientists. Every year, such Nights are organised all over Europe, on the last Friday in September. They have been quite successful in recent years: the main objective is to enable people to meet scientists in an informal environment and to spread a serious message, "Research is of vital importance for us."

Many science festivals are organised in Europe and in the US with the same freshness and flair that would be expected from an arts or music festival. Events can be varied, including lectures, exhibitions, workshops, live demonstrations of experiments, guided tours and panel discussions as well as events linking science to the arts or history, through activities such as plays, dramatised readings and musical productions. The core content is of science and technology, but the style comes from the world of the arts.

The Kinder-Uni was created in 2002. On May 18th, the newspaper "Schwäbisches Tagblatt" announced the creation of the first event in Tübingen University by a teacher and a journalist. Since then, the concept has grown and Kinder-Uni has been practised by hundreds of universities, mainly in Germany, Austria and Switzerland. The concept consists of opening universities to young children (aged 8–12) so that they spend one day in the place itself, have access to the best scientists and participate in a conference. Success is based on this close contact which reduces cultural distance and time to be spent in future to reach the university in children's psychology.

A.4.9 The MML initiatives supported by the European Commission (Framework Programme 7)[4]

Following the many actions inspired by FP6 and FP7, The European Commission (DG Research) has since 2009 developed calls supporting a new SiS formula: Mobilisation and Mutual Learning (MML).

This kind of action may be considered as the summit of what has been supported by the EC since FP6. The approach is a synthesis of previous projects, and includes many dimensions already studied (gender, ethics, public engagement, young people, and so on). The aim is to study through a dynamic configuration of actors from at least 10 countries SiS situations from two points of view: first, how groups of actors who are concerned by a science–technology–social questions are built, how they agree on dialogue objectives, and how they can generate common process solutions to potential conflicts. Secondly, MMLs are supposed to study sectoral questions of collaboration/conflict, for example in the fields of science museums, fisheries, post-carbon societies, food security, and so forth, in concrete situations.

As one can see, SiS dialogue may reach different stages of maturity. MML studies should be enhanced in the next Framework Programme currently under definition by the European Commission and the European Parliament. We should collectively learn a lot from those diverse situations in European context, especially about the genesis of conflicts, the variety of configurations to deal with them and confront sets of values, and the specific role of every kind of actor (policy maker, knowledge elaborator, consumer, etc.).

4. http://ec.europa.eu/research/science-society/document_library/pdf_06/mobilisation-mutual-learning-work-programme-2012_en.pdf

Annex A.3 **Additional classification exercise of best practice examples and cases**

Three levels of analysis were proposed[1]: These three levels are the macro-, the meso-, and the micro-level. These categories might be used in self-analysis of practice by MOs evoked in the Recommendations section of this report.

The macro-level aims at SiS-endorsing structures designed to provide general guidance for institutions which either fund research or perform research (or provide a blend of both). On the macro-level three dimensions are proposed to analyse respective SiS-actions:

a. Level of formal commitment
b. Time scale
c. Relevance in practice

Level of formal commitment. Here it should be clarified to what extent the reported measure formally triggers/enhances SiS; for example is it a law that has to executed, is it a memorandum that should provide guidance? In the case of a law, for example, the formal commitment would be deemed high.

Time scale. This would include issues such as when the measure in question was put in place (how long ago was it introduced). In the case of future measures, this would be less than one year, "0".

Relevance in practice. This is a qualitative judgment; a measure with a high level of formal commitment can (nevertheless) be of medium relevance, whereas a comparatively informal commitment can in practice be of high relevance for promoting SiS.

The meso-level aims at SiS-endorsing structures designed to provide a framework for specific SiS-actions involving people directly. Such frameworks could be, for example, funding programmes directed at providing resources for specific SiS actions, or an organisational framework (format) providing structures for specific actions. In some cases the line between the meso- and the micro-level may not appear to be precise or sharp (in the sense of a scientific classification). Nevertheless, it is clear that steps taken on the meso-level endorse activities on the micro-level. On the meso-level three dimensions are proposed to analyse respective SiS-actions:

a. Degree of SiS-integration
b. Time scale
c. Resources available for SiS

Degree of SiS-integration. Here it should be clarified to what extent the reported structure offers SiS enhancement aligned to the traditional structures typically offered by the MO; i.e. is it a completely new structure (parallel) to the existing ones, or is it something that is comparable (uses the same toolbox/methodological frame) to 'conventional' ways forward already practised by the MO. A SiS-programme with a completely new set of quality-assessment criteria might be allocated at the medium level of SiS integration, whereas a "SiS-extension module" incorporated into already existing (funding) mechanisms may score as a "high degree" of SiS-integration.

Time scale. This would include issues such as when the structure in question was put in place (how long ago it was introduced). In case of future measures, this would be less than one year, "0".

Resources available for SiS. This is a qualitative judgment and may include two considerations: (i) how much money in total is available for the structure in question, and (ii) how much is this compared to the overall funds available for the traditional structures already in place at the MO in question.

The micro-level comprises all specific SiS-actions directly involving target groups, stakeholders or lay people participating in a dialogue-oriented (bi-directional) exchange relationship. Their respective footing may be provided by meso-level activity; but it goes without saying that this is not a prerequisite. Micro-level activities are specific, concrete and involve – in contrast to the other two levels – people outside the research systems. Micro-level activities are those where science meets the public and the public meets science.

On the micro-level three dimensions are proposed to analyse respective SiS-actions:

a. Level of participation
b. Distance from knowledge creation/dissemination
c. Resources available for the actions

Level of participation. Here it should be clarified to what extent the reported actions require the participation of target group members in the specific action(s). It is understood that typical SiS activities require a much higher level of participation than, for instance, traditional science communication formats. Activities considered to have a low level of

1. Following the scholarly literature – see for instance Rip and Kemp (1998).

Annex A.3 **Additional classification exercise of best practice examples and cases**

Table 2. SiS activities by MOs

	Scoring items		
Macro	Level of formal commitment	Relevance in practice	Time scale
Meso	Degrees of SiS-Integration	Resources available for SiS	Time scale
Micro	Level of participation	Resources	Distance from knowledge creation/ -dissemination

No.	Name of the specific action	Organisation	Country	Level	Scoring	Scoring	Scoring
14	Concordat for Engaging the Public with Research	RCUK	UK	macro	2,0	2,0	1,5
15	Federal Law on Research Promotion	Republic of Austria	AT	macro	3,0	1,0	2,5
1	Center of Excellence (CoE) program	Danish National Research Foundation	DK	meso	3,0	1,0	3,0
3	National Coordinating Centre for Public Engagement (NCCPE)	RCUK/HEFC/ Wellcome Trust	UK	meso	2,0	1,0	2,5
6	Genoa Science Festival	CNR	IT	meso	3,0	2,0	3,0
9	Annual Danish research communication prize	FI	DK	meso	1,0	0,0	3,0
10	Malaspina Project	CSIC/Spanish Ministry for Science	ES	meso	3,0	2,0	2,0
17	Communicator Preis	DFG	DE	meso	1,0	1,0	3,0
19	Agora	SNF	CH	meso	3,0	2,0	1,5
2	Synthetic Biology Dialogue	BBSRC/EPSRC/ Sciencewise ERC	UK	micro	3,0	2,0	3,0
4	Spinoza Te Paard	NWO	NL	micro	2,0	0,0	2,0
5	National Science Quiz	NWO / VPRO	NL	micro	1,5	2,0	1,5
7	Picture of health report	HRB	IE	micro	2,0	0,0	1,0
8	Recontres Science et Citoyens (RSC)	CNRS	FR	micro	3,0	1,0	1,0
11	Fotciencia	CSIC/FECYT	ES	micro	3,0	1,0	2,0
12	Researchers' Night	FNR	LU	micro	3,0	1,0	2,0
13	Researchers in School	FNR	LU	micro	3,0	1,0	1,0
16	MS Wissenschaft	DFG/FWF	DE/AT	micro	3,0	2,0	1,0
18	Am Puls	FWF	AT	micro	2,0	1,0	2,0
20	Flexit	RJF	SE	micro	3,0	2,0	2,0

participation would include press releases or conventional web pages.

Distance from knowledge creation/dissemination. Issues to be considered here include how distant the target group (including pupils or infants) of a specific SiS action is from people who are typically associated with knowledge creation or knowledge dissemination. The assumption is that the wider the distance from these subsets of society, the more ambitious the actions needed to get these people engaged/involved in SiS activities. If SiS is considered a concept with the fundamental ambition to involve as many people as possible (in the long run), it appears to be logical that the difficulty to access the world of people "remote from educational systems" will increase.

Resources available for the actions. Here it should be indicated if the resources available for a specific action are considered adequate.

In total, 20 actions were reported back to the MO Forum. Table 2 lists the reported activities according to the three levels, including the relevant scorings. The scorings were either proposed by the rapporteurs or – where this wasn't the case – were fixed by comparing the different actions.

Plots of activity on the different levels are shown in Figures 3, 4 and 5.

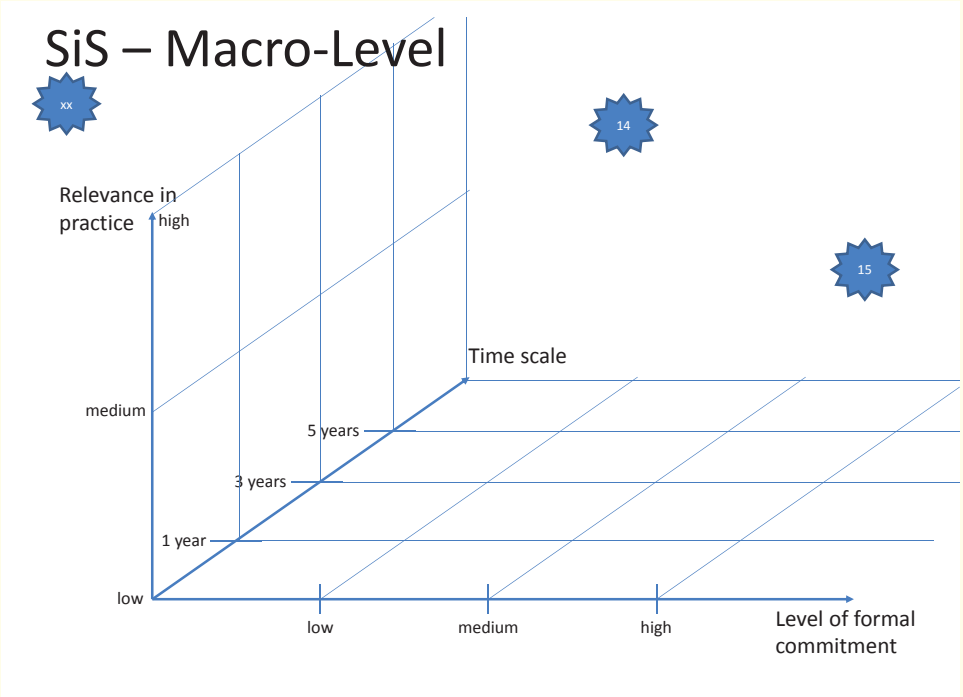


Figure 3. Positioning activities at the macro-level

Annex A.3 **Additional classification exercise of best practice examples and cases**

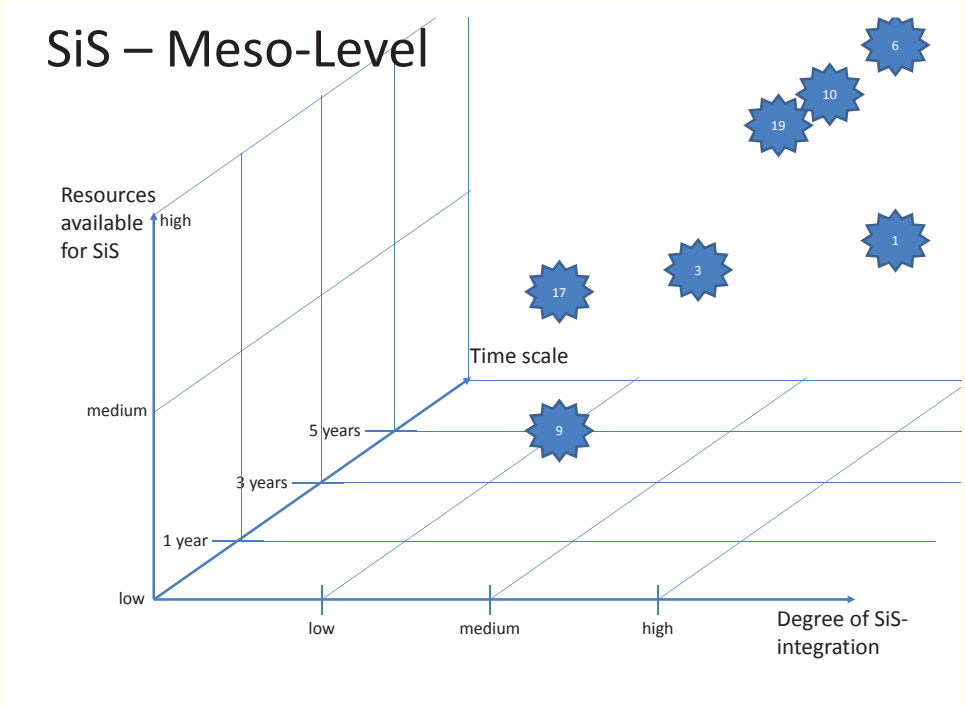


Figure 4. Positioning activities at the meso-level

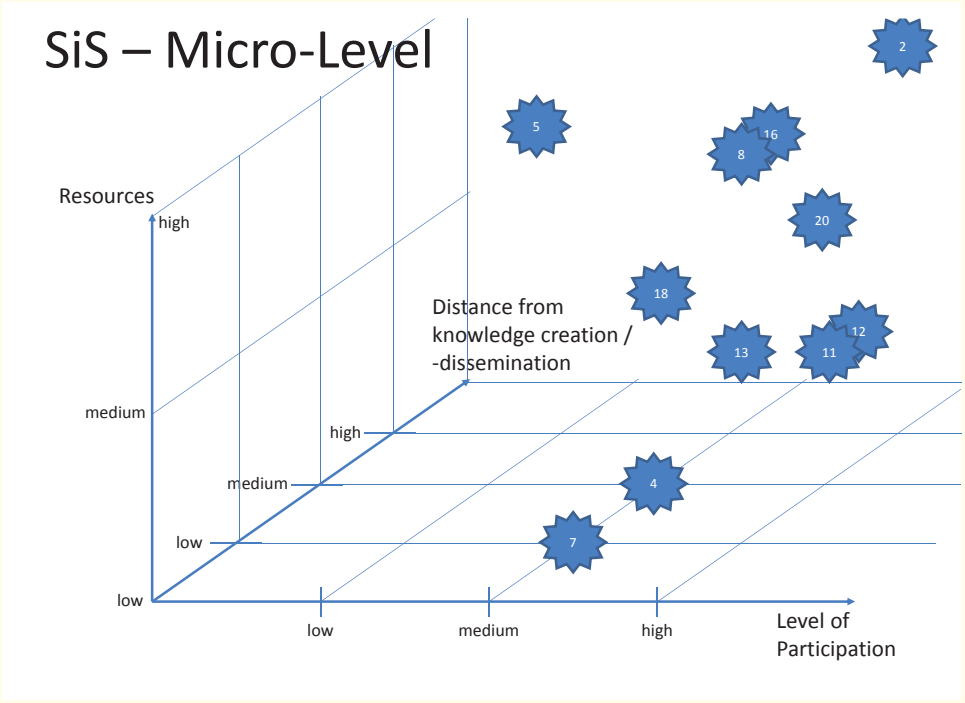


Figure 5. Positioning activities at the micro-level

Annex A.4 **List of MO Forum meetings**

The MO Forum has interacted with the research community as well as conducted some collection of relevant data across its membership. This report is the outcome of these efforts, which have taken shape through a number of ways:

- "Roadmapping" discussion leading to the creation of the MO Forum (CNRS-ESF SCSS Strategic Workshop: 'Roadmapping Science in Society – Impact, Evaluation and Accountability', 30 June – 1 July 2009, CNRS, Paris, France)
- Survey to MOs on practices connected with science–society relationships, June 2010
- A number of workshops and teleconferences
  - 1st Steering Committee Meeting, 5 February 2010, Brussels, hosted by ESF
  - 1st Forum Workshop, 7–8 April 2010, Brussels
  - 2nd Steering Committee, 27 September 2010, Paris, hosted by CNRS
  - 2nd Forum Workshop, 3–4 November 2010, Genoa, hosted by CNR
  - 3rd Steering Committee, 26 January 2011, Brussels, hosted by ESF
  - 3rd Forum Workshop, 12–13 May 2011, Dublin, hosted by SFI and HRB
  - 4th Forum Workshop, 3–4 November 2011, Vienna, hosted by FWF
  - 5th Forum Workshop, 14–15 May 2012, Stockholm, hosted by VR
  - Several Steering Committee teleconferences in 2011 and 2012
- Presentation of national practices and specific case studies
- Presentation of draft recommendations to and consultation with top executives of ESF MOs in order to integrate their feedback in the report

Annex A.5 **List of MO Forum members**

Country	Organisation	Member
Austria	Austrian Science Fund (FWF)	Stefan Bernhardt*
	Austrian Academy of Sciences (ÖAW)	Helmut Denk
Belgium	Research Foundation - Flanders (FWO)	Kim Barbé
	Fund for Scientific Research (FNRS)	Christel Buelens Monique Septon
Czech Republic	Academy of Sciences of the Czech Republic (ASCR)	Klára Plecitá-Vlachová
Denmark	The Danish Council for Independent Research	Søren Harnow Klausen
	The Danish Council for Independent Research – Humanities (FKK)	Jette Kirstein
	Danish National Research Foundation (DG)	Vibeke Schrøder Thomas Sinkjaer
Estonia	Estonian Academy of Sciences	Galina Varlamova
Finland	The Academy of Finland	Pirjo Hiidenmaa*
France	National Centre for Scientific Research (CNRS)	Jean-Pierre Alix**
	National Institute for Development (IRD)	Marie-Noelle Favier
Ireland	Health Research Board Ireland (HRB)	Patricia Clarke
	Irish Research Council for Sciences, Engineering and Technology (IRCSET)	John Denari
	Science Foundation Ireland (SFI)	Jennifer Ralph Stephen Simpson
Italy	National Research Council of Italy (CNR)	Manuela Arata* Chiara Badia
Lithuania	Research Council of Lithuania (LMT)	Giedre Kojelyte
Luxembourg	National Research Fund (FNR)	Anne Schroeder-Van den Bulcke
The Netherlands	Netherlands Organisation for Scientific Research (NWO)	Raymond M. L. Schorno
	NWO- Social Sciences	Marije Wassenaar- Verschuur
Norway	The Research Council of Norway	Elisabeth Gulbrandsen
Slovak Republic	Slovak Research and Development Agency (APVV)	Zuzana Fabiánová
Slovenia	Slovenian Science Foundation (SZF)	Edvard Kobal
Spain	Spanish National Research Council (CSIC)	Laura Ferrando González Rafael Morera Cuesta
Sweden	Swedish Research Council (VR)	Birgitta Myrman Ana Beramendi
	Riksbankens Jubileumsfond	Camilla Modéer*
Switzerland	Swiss Academies of Sciences (SCNAT)	Anne Jacob
	Swiss National Science Foundation (SNF)	Philippe Trinchan
Turkey	The Scientific and Technological Research Council of Turkey (TÜBITAK)	Gülnihal Ergen
United Kingdom	Medical Research Council (MRC)	Hazel Lambert Jude Eades
	Research Councils UK	Kerry Leslie Chloe Sheppard
Observer		
France	International Union of Biochemistry and Molecular Biology (IUBMB)	Jacques-Henry Weil
MO Forum management		
France	European Science Foundation (ESF)	Laura Marin

* Forum Co-Chairs
** Forum Chair

Glossary

In this report the following common definitions of key terms are used:

Common Agreement:
A kind of "contract" or "concordat" (term used in the UK) defining joint intentions, objectives and measures signed by Research Funding Organisations and Research Performing Organisations.

ESF Member Organisations (MOs):
Refers to ESF member organisations which are Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs).

Research:
The activity performed by researchers in all sciences.

Research Council:
The term refers to "Research Funding Organisation" in some countries and "Research Performing Organisation" in other countries.

Research Funding Organisation (RFO):
A governmental agency or private organisation which funds research.

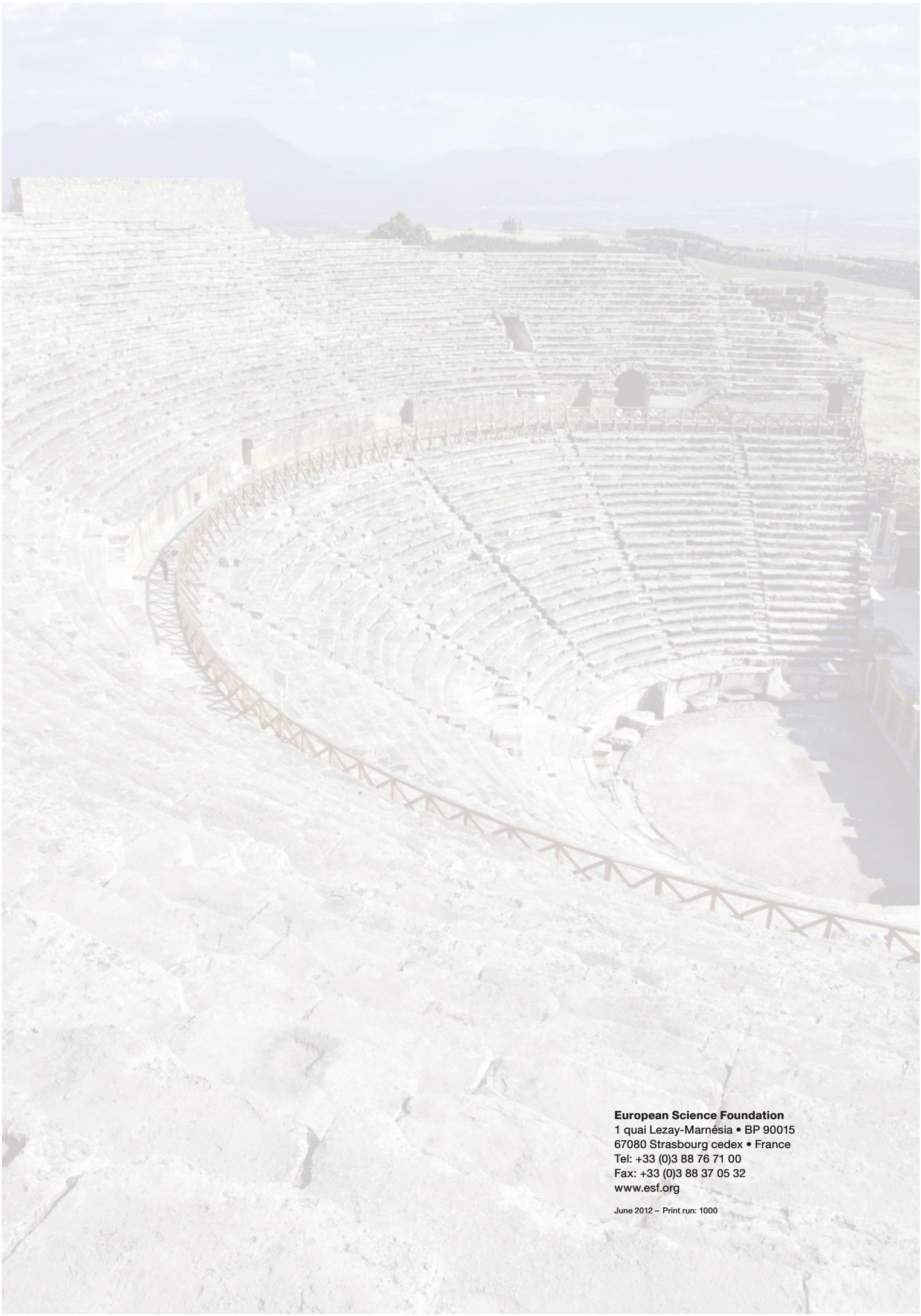
Research Performing Organisation (RPO):
An Institute or other organisation which is itself realising research and employs active researchers.

Science:
Refers to all disciplines, including humanities and social sciences (equivalent to the term 'research').

Science in Society (SiS):
Refers to any activity oriented to order the relationship between science and society, including actions to foster public engagement with science.

Index of figures and tables

ISBN: 978-2-918428-65-7
Printing: Ireg Strasbourg



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June 2012 – Print run: 1000