

**FROM SCIENCE AND SOCIETY TO SCIENCE IN SOCIETY:
TOWARDS A FRAMEWORK FOR 'CO-OPERATIVE RESEARCH'**

Report of a European Commission Workshop

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Rapporteur

Andy Stirling

SPRU – science and technology policy research, University of Sussex, UK

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Contents

FOREWORD	3
EXECUTIVE SUMMARY	4
1 BACKGROUND – FROM PROJECTS TO PROSPECTS	10
1.1 Science and Governance in Europe	10
1.1.1 Overview	10
1.1.2 From 'Science and Society' to 'Science in Society'	11
1.2 European 'Science and Society' Activities	12
1.2.1 The Diversity of Initiatives	12
1.2.2 Expectations of the 'Gover' Science Seminar	12
1.3 The 'Gover' Science Process	13
1.3.1 The Structure of the Seminar	13
1.3.2 The Aims of this Report	14
2 THE STATUS QUO – STRENGTHS & WEAKNESSES	16
2.1 Shared Understandings	16
2.1.1 A Diversity of Contexts	16
2.1.2 The Participatory Imperative	17
2.2 Key Challenges	18
2.2.1 Resistance to 'Embedding'	18
2.2.2 The Role of 'Framing'	18
2.2.3 Inertia and Realism	19
2.2.4 'Public Education' and Uncertainty	19
2.2.5 'Plural Knowledges'	21
3 THE WAY AHEAD – OPPORTUNITIES AND POSSIBILITIES	23
3.1 Emerging Lessons	23
3.1.1 Prioritising Science Communication	23
3.1.2 The Task of Evaluation	24
3.1.3 Representation and Democracy	25
3.1.4 Questions of Design	26
3.2 Looking Forward	30
3.2.1 Mainstreaming Engagement	30
3.2.2 The Business of Persuasion	31
3.2.3 Towards 'Co-operative Research'	32
3.2.4 Strategies and Research Needs	33
4 CONCLUSIONS – from Science and Society to Science in Society	35
5 ANNEXES ON SEMINAR STRUCTURE	37
Annex A: Introductory Presentation	38
Annex B: Project Websites for Further Information	38
Annex B: Project Websites for Further Information	39
Annex C: Participants	40
Annex D: Detailed Agenda	41
6 ANNEXES ON SEMINAR OUTPUTS	44
Annex E: Thematic Discussion on Biotechnology Projects	45
Annex F: Thematic Discussion on Health Projects	46
Annex G: Thematic Discussion on Environment / Energy Projects	47
Annex H: Thematic Discussion of Industrial Technology Projects	49
Annex I: Thematic Discussion of General Projects	50
Annex J: Plenary Discussion on Risk Research	52
Annex K: Plenary Discussion on Participation Research	54
Annex L: Plenary Discussion on Science Advice Research	57
Annex M: Working Group on Institutional Arrangements for Participation	59
Annex N: Working Group on Representativeness and Participation	61
Annex O: Working Group on the 'Business Case' for Participation	62
Annex P: Working Group on Knowledge	63
Annex Q: Working Group on Participatory Risk Communication Tools	64
Annex R: Working Group on Independence and Pluralism	65
Annex S: Working Group on Collaborative Research	66
Annex T: Working Group on Embedding	67
Annex U: 'Open Space' Topics and Voting	68

FOREWORD

Science and Society activities developed in the 6th Framework programme have the very specific role of questioning mainstream research and research-based policies.

This is indeed a very useful role. It is important to bear in mind, especially when preparing the next Framework Programme, that the European Research Area vision is not only about contributing to European Industry competitiveness; it is not only about fostering coordination of European research; it is not only about underpinning other Community policies in their efforts towards more and better Europe. It is also, and probably more so, about better understanding what science is in today's society and about stimulating a continuous and fruitful societal debate on the big scientific issues ahead of us.

Questioning our own activities, fostering change, adaptation and improvement is a *sine qua non* condition to avoid complacency and self-replicating structures. Such questioning is an essential feature of a renewed research policy at the dawn of this new century.

Considering this "*raison d'être*", it would have been odd to stick to a classical approach while reflecting on new forms of European governance. Acts and words had to be put together, creating a space where people could build their own agenda with their own words and reflect together: this is how Gover'Science was born!

Its aim was twofold. On one hand, to enrich current activities, both in terms of project activities and policy making, and on the other hand, to increase the robustness and efficiency of future strategies on how to articulate the interface between science, policies and society: how to really foster institutional and social change? How to identify future research issues and to revisit strategies in the field of Gover'Science? And, above all, how to translate words into action?

The report does not, at this stage, contain ready-made solutions. Nevertheless, clear messages have emerged, confirming that the shift of the Science AND Society paradigm into one of Science IN Society does require a transformation of the way research and research-based policies are developed.

As evidenced by the seminar, building a truly democratic knowledge-based society requires recognition of the collective right to question the societal choices behind scientific and technological ones: a collective questioning capacity which goes hand-in-hand with a research-friendly environment.

May the story between Science, Governance and Citizens be a happy and unending one!

José Manuel SILVA RODRIGUEZ

Director-General for Research

EXECUTIVE SUMMARY

Introduction

We live in a time of ever-increasing opportunities and challenges associated with new science and technology. As a result, there is growing interest and attention to the relationships between research, innovation and society. Nowhere is this more true, than in the organisation and prioritisation of scientific research and technological innovation themselves and in the use of science as an input to wider policy making.

Real contrasts and tensions emerge between high level policy agendas concerned with the '*knowledge based society*', with the stewardship of '*democratic governance*' and with the pursuit of '*sustainability*' and '*precaution*' in science and technology. These are key areas of interest and responsibility for the European Commission's Directorate General for Research (DG RTD).

This report arises from intensive discussions at an innovative two-day '*Gover'Science*' Seminar organised by the Governance and Scientific Advice Unit of DG RTD in November 2005. The Seminar focused on a variety of complex and hotly contested questions that are central to current efforts to move Europe towards a 'knowledge based society'. *What is the appropriate role for science in the governance of modern society? How should research itself be governed? What is the function of public engagement?* Attention focused on a variety of detailed topical areas: including the communication of risk, the provision of science advice, relations between government, industry and civil society and the best ways to balance involvement by experts, stakeholders and citizens.

As leading figures in the European research community in this area, the 37 participants brought deep specialist expertise and broad practical experience covering a range of relevant disciplines, national contexts and sectoral backgrounds. The event itself took the form of a novel form of 'open space' participatory workshop. This allowed participants to raise and pursue their own interests in discussion and draw their own conclusions. The self-organised process gave a high degree of autonomy from the organiser's own agenda. Although there was no requirement for consensus, there emerged a *clear and coherent central message*, with a series of practical implications.

As the process unfolded, this focused most intensively on the role of '*public engagement*' in the governance of research and in the science advice process. In one sentence, the bottom line recommendation was that *European activities in these areas should be informed by, and should themselves incorporate, more effective forms of symmetrical two-way deliberation, empowering inputs from a wide diversity of social actors. In short, this might be thought of as a move towards a new style of 'co-operative research'.*

The present innovative 'Gover'Science' Seminar itself offers an example of just this kind of process. Drawing on a wide diversity of freely-expressed viewpoints, the present report and executive summary has been produced by an independent Rapporteur, with the aim of highlighting the main lessons that can be drawn from the Seminar discussions for policy making and further research. The main body of the report synthesizes the key themes in the Seminar discussion, in three principal sections.

- **Section One** examines the background to science governance activities in Europe.
- **Section Two** looks at the strengths and weaknesses of emerging developments – including areas of agreement and disagreement in discussion at the Seminar and the identification of key current challenges for policy making.
- **Section Three** looks to the future: drawing lessons, identifying opportunities and pointing towards this new paradigm of '*co-operative research*'.

The whole account is closely cross-referenced to a series of detailed *Annexes*. Using hyperlinks (in the electronic version of this report), these fully document the findings from each session of the seminar and show how each underpins the discussion and conclusions in the main report.

The principal elements in the argument are outlined in the ensuing passages of this executive summary. Both here and in the main body of the report, key points are indicated in bold italicised font. A shorter bullet-point summary is provided in the Conclusion.

Shared Understandings

The governance of European science and the role of science in European governance take an enormous variety of different forms and play out in an even greater diversity of contexts. The baroque institutional environments, widely distributed consequences, strong vested interests and sometimes hotly contested values serve further to compound the complexity. Against this background, it is difficult to make clear generalisations, let alone draw concrete practical conclusions. Despite this, there emerges a clear picture of growing stated commitments on the part of government, industry, civil society and the research community itself, to different forms 'public engagement'.

This rising interest and proliferating activity is understood in contrasting ways under different perspectives. To some, it is about enhancing equity and democracy in the 'knowledge society'. Elsewhere, it is about fostering trust and credibility in order to further competitiveness. For others, it is about informing more 'sustainable' or 'precautionary' decisions and policies. ***Each view holds contrasting implications for the design, implementation and evaluation of public engagement in science.*** What seems clear, however, is a consistent pressure away from minimal 'instrumental' tinkering with established procedures for policy 'consultation' and public reassurance – and towards more 'substantive' commitments to genuine stakeholder involvement and citizen participation.

Although they can take a multitude of equally legitimate forms in different contexts, these more robust forms of public engagement display a number of identifiable qualities:

- They emphasise engaging with a ***wider diversity of social actors*** (rather than just the usual directly affected 'users' or 'customers').
- They involve ***symmetrical two-way dialogue*** (rather than the *pro forma* elicitation of 'responses' to pre-formed proposals).
- They embody ***open in-depth deliberation*** (minimising constraints on the issues or options introduced for consideration or the styles in which they can be discussed).
- They prioritise ***empowerment and agency*** on the part of the participants' themselves (rather than the sponsors – including a say in the design, scope and focus of the engagement process itself).

Examples of the different concrete approaches to public engagement mentioned or implicit at the Seminar include: consensus conferences, participatory modelling, science shops, citizen's panels, stakeholder commissions, transdisciplinary collaboration, focus groups and deliberative polls. Each of these different approaches may variously be applied to different contexts, stages or issues in science governance, including: risk regulation, technology policy, expert advice and science communication. Beyond this, public engagement refers to an over-arching continuous aspect of the governance process, in which these kinds of approaches form elements and inputs.

Seen in this way, increased public engagement holds out the prospect for a series of different benefits. ***It is emphatically not about second-guessing the technical expertise of scientists and engineers.*** Rather, it is about acknowledging the fact that science and innovation are social, cultural and institutional – as well as technical and specialist – activities. As such, ***public engagement offers a way to be more accountable for the particular values and interests, which underpin both the governance of science and the general use of science in governance.*** What are the priorities and purposes, which justify the allocation of resources to different areas of innovation or lines of enquiry? What are the assumptions that inform the interpretation of scientific advice, concerning the behaviour of institutions or technologies in the real world?

In short, public engagement is about the '***framing***' of scientific evidence and technological projects, not about the details of specialist methods or technical analysis. It is about being as rigorous and careful in validating the questions, as science itself is rightly respected for being in approaching the answers. One especially important implication of this emerging shared understanding, is that ***public engagement holds greatest value when it occurs 'upstream' – at the earliest stages in the process of research or science-informed policy making.*** It is at this stage when the 'framing' of the research or policy developments remains relatively flexible and open to influence. If engagement is undertaken too late, then it is more likely to be constrained by commitments that have already been made – being less

about 'deciding what to do' and more about 'deciding how to do it'. The resulting political pressures to either limit or ignore the role of public engagement can be highly corrosive of the credibility of the organisations involved, and of wider public trust.

Key Challenges

Of course, it is at this early stage when the nature of future opportunities and challenges are most uncertain. This is sometimes held to present particular difficulties for public engagement: ***how can such wider involvement be useful when even the experts are unsure of the possibilities?***

The answer to this, is that 'ambiguity', 'uncertainty' and 'ignorance' about the implications of science and technology themselves present compelling incentives for more (not less) social engagement. Individual specialist disciplines (like 'risk assessment') may offer powerful and effective responses to 'risk' in a narrow sense. But these wider and more intractable forms of incertitude demand attention under a more plural array of different forms of knowledge. ***Public engagement is about just this: including a diversity of knowledges and experience in order to inform more robust long term choices.***

Even where we are unsure of the detailed consequences of scientific or technological activities, we may still scrutinise the assumptions, purposes and values that are driving these developments. It is only through public engagement 'upstream', at the earliest stages in science, innovation and policy making that we can ensure that the right questions have been asked, that a full range of interests have been reflected and that society as a whole is effectively learning of the real opportunities and challenges.

Yet the type of discussion that can arise in public engagement may itself pose significant challenges. ***The focus often centres in one way or another on the exercise of political and economic power in the field of science and technology.*** The resulting queries over 'who?' and 'why?' may sometimes be rather uncomfortable for incumbent decision makers and institutions. Who is accredited to engage in discussions of science and technology? Who asks the questions to be researched? Who prioritises the allocation of resources? Who makes the assumptions in interpreting the answers? How and when are results to be communicated and to whom? Which knowledge is held privately and subject to proprietary rights and which is placed in the public domain? What is stated and what left unsaid?

Perhaps partly as a reflection of this, the Seminar identified that ***a significant obstacle to public engagement often lies in the prevailing attitudes of senior figures – and wider cultural perspectives – in the institutions concerned with the governance of science and technology.*** In particular, there is in some such quarters a persistent scepticism over the status of public knowledge and understanding. There are tensions between institutional priorities and more widespread public values and interests. There is a reluctance to commit to open self-reflection and the sharing of power and influence.

Despite the high profile afforded to the language of 'involving stakeholders', 'public participation' and 'social inclusion', such perspectives serve to impede progress in achieving genuine public engagement as a pervasive feature of science governance. Each individual exercise tends to remain isolated and often decoupled from decision making. ***A constant pressure is exerted on those exercises that are undertaken, such that they are forestalled, or become diluted, diverted, constrained, or eventually neglected in the subsequent policy process.***

Lessons and Responsibilities

But contemporary attitudes in high-level policy making are not the only difficulty faced in 'mainstreaming' public engagement in science governance. The Seminar also identified ways in which ***advocates and practitioners may themselves also unintentionally contribute to the current isolated state of genuine public engagement and low level of general uptake.***

For instance, a tendency to over-promise and over-claim may sometimes raise unjustified expectations. ***Just because public engagement offers an effective response to challenges of 'framing' science and technological activities, does not mean it is a panacea for wider difficulties of credibility and trust.*** Inevitable shortfalls in the delivery of overstated promises, can serve to compound scepticism.

Likewise, there can sometimes be ***questions over independence and professionalism*** and a lack of ***commitment to evaluation***. Indeed, there is a general lack of attention to the complexities in the way in which evaluation itself necessarily depends on perspective and context. Engagement processes can sometimes be overly complex. Greater attention might be given to the proportionality achieved in the costs and benefits of engagement. Much could be done to be cautious, self-critical, realistic and pragmatic on these issues.

Beyond this, insufficient consideration is often given to the wider communication of science – both as part of individual exercises and in the wider encompassing processes of public engagement. ***Effective public engagement can take place only against a wider background of successful science communication.*** The role of the media is especially important in this respect, requiring greater attention to the exercise of responsibilities, both in the accurate handling of scientific detail and in the frank and measured treatment of uncertainties. With the development of the Internet, this also presents a series of challenges and opportunities – especially in relation to the 'scaling up' of public engagement to address higher levels in the governance process. In seeking to learn the lessons for developing more generalised two-way dialogue in science communication, much can be learned from the accumulated hard-won experience gained by the 'science shop' movement.

A further crucial series of questions concern the need for systematic reflection and evaluation on the strengths and weaknesses of public engagement, and the nature of the relationship between more direct participatory forms of public engagement, and the wider institutions of representative democracy. Although addressing the practical needs of policy makers for robust methods of appraisal, evaluation presents a series of neglected difficulties. Rather than being a simple question of identifying 'best practice', important aspects of evaluation depend on the context and perspective in question. With respect to the particular issue of the representativeness of participatory process, this also depends on what is meant by 'representation' in the first place. Again, the answer depends on the context and viewpoint. In the end, the conclusion must be that care should be exercised with overly simplistic notions of 'evaluation' or 'representation' and that greater efforts are required to understand the ways in which these might legitimately vary.

In practice, the relationship between representative democracy and participatory methods becomes most clear and complementary, when engagement is approached as a means to 'open up' the range of possible decisions, rather than as a way to close this down. Choice among the options thereby identified then becomes a clearer matter of democratic accountability. In other words, participatory approaches are often better seen as an aid to 'decision making' than as a means of 'decision taking'. In the end, ***the appropriate relationship between participatory process and representative democracy is best treated as an explicit focus of attention in participation itself.***

Against this background, the responsibilities for 'mainstreaming' public engagement in science governance do not lie only with senior decision makers. There is much that researchers, advocates and practitioners may also do to be more effective and persuasive. ***In particular, more could be done to address high-level policy makers in a language that they can readily understand and by reference to their own interests and values.*** This does not necessarily mean adopting these same interests and values in an instrumental fashion. Rather, it is a matter of the effective communication of the wider 'business case' for participation – taking seriously and treating with respect the pressing nature of real institutional priorities and constraints.

Designs and Possibilities

Drawing on this discussion, a number of more specific practical conclusions arise for the design both of general frameworks and individual exercises in public engagement. These can be discussed according to a series of frequently raised questions in discussions over public engagement:

- ***When to engage?*** This can occur at all stages in the governance process, but is particularly important at the earliest steps in 'framing'. Even if outcomes are uncertain, attention can focus on the driving purposes and visions.
- ***At what scale?*** Public engagement is not just about one-off individual exercises, but involves a coherent, continuous, nested, multi-scale process permeating different levels of governance.
- ***What to prioritise?*** Be clear whether the primary purpose is to enhance: (i) the democratic process; (ii) the state of knowledge or protection; or (iii) levels of trust and credibility in particular policies. Either way, social interests and values frame the technical details, not the other way around.
- ***Who does the framing?*** Ensure a high degree of autonomy from initiating or sponsoring bodies. Separate the functions of stakeholder oversight in design and the participatory process itself.
- ***Who to include?*** Be clear and realistic about goals and recruit accordingly. Allow participants to identify gaps. Avoid overblown claims, aspirations or criticisms concerning representativeness.
- ***Which balance to strike?*** Be proportionate in the balancing of costs and benefits of the process itself and apply a 'principle of responsibility' to the consequent recommendations.
- ***What is independence?*** This lies less in efforts at definitive 'objectivity' or 'neutrality' than in the pluralism and diversity of the perspectives involved. Provide participants with freedom to negotiate, but ensure that effective links are retained with the constituencies they represent.
- ***How to convey outcomes?*** Depending on purpose and context, engagement may aim at 'closing down' or 'opening up' the scope of wider policy discussion. In the former, outcomes are presented as prescriptive recommendations. In the latter they are plural, with explicit conditions attached.

Looking Forward

Taken together, these elements of effective design for public engagement address the full range of contexts, stages and scales in the science governance process. In particular, they span distinctions between fields of research policy, science advice and risk regulation with which this Seminar was concerned. However there also emerged in the Seminar discussions a bigger picture concerning the general orientation of scientific research and technological innovation activities.

Here, it is important to recall the newly intensified governance agendas noted at the beginning of this executive summary. Current European policy-making is driving towards a competitive 'knowledge based society', whilst striving to ensure effective stewardship of 'democratic governance' and active efforts to promote 'sustainability' and 'precaution' in science and technology. ***These present a series of powerful imperatives for radical innovation – and require a commitment to change – in the science governance system.***

Some of the principal implications that were discussed at the Seminar, might be summed up as a move towards an emerging paradigm of '*co-operative research*'. ***This is a new form of research process, which involves both researchers and non-researchers in close co-operative engagement.*** It encompasses a full spectrum of approaches, frameworks and methods, from interdisciplinary collaboration through stakeholder negotiation to transdisciplinary deliberation and citizen participation.

In particular, co-operative research requires effective engagement with stakeholders and public constituencies in order to explore the driving aims and purposes, the alternative orientations, and the wider social and environmental implications of scientific research and technological innovation. To these ends, we may identify a series of concrete distinguishing features of co-operative research.

- The process of '*social learning*' enabled in co-operative research is as important as the scientific and technological outcomes that arise.
- The way in which co-operative research is '*framed*' is an *explicit and autonomous* part of the research process itself – and not imposed from outside.
- Co-operative research treats different forms of *knowledge* and *understanding* in a *symmetrical* fashion, and affords equal status to contending social values and interests.
- Co-operative research allows for more *effective integration* of currently artificially separate processes of research *design, implementation* and *dissemination*.
- Co-operative research includes a *wide variety of specific approaches* to inclusive engagement in different contexts and at different stages, levels and scales in science governance.
- Co-operative research *clarifies the essential role of science*: not as a definitive body of knowledge, but as a systematic way to ensure effective communication, transparency and accountability.
- Co-operative research embodies a richer, more positive understanding of the *facilitatory role of social science*, both in framing, as well as in presenting research and appraising the social impacts.
- The development of practices for co-operative research is itself an important *focus for further research*, and offers important arenas for *innovation* and *experimentation* on these very practices.

The report concludes by identifying a series of specific strategic research needs of particular relevance to DG RTD, followed by a bullet point summary of the main elements in the argument.

In the end, the key challenge in realising the full promise of co-operative research for the wider process of science governance, lies in a shift in our basic understanding of the relationship between science and society. This applies as much to social scientists, practitioners and specialist policy makers in this field, as it does to senior decision takers, wider stakeholders and the general public. In short, we need to move away from the somewhat fragmented, introspective and reactive preoccupations of *science and society*, to a more integrated, open and proactive understanding of the inescapable place of *science in society*.

1 BACKGROUND – FROM PROJECTS TO PROSPECTS

1.1 Science and Governance in Europe

1.1.1 Overview

We live in a time of ever-increasing opportunities and challenges associated with new science and technology. As a result, there is growing interest and attention to the relationships between research, innovation and society. Nowhere is this more true, than in discussions over the organisation and prioritisation of the scientific research and technological innovation activities themselves. Charged with the management of a total annual research and technology development budget of nearly € 5 billion¹ (and set to rise significantly²) and with a role in leveraging and catalysing much wider national and private sector investments, the European Commission's Directorate General for Research (DG RTD) is an important focus of discussion in this regard.

Accordingly, over the course of the Sixth Framework Programme since 2002, a large and growing range of activities have been undertaken by DG RTD in the field of 'science and society'³. The aim of this programme of work has been to embed 'science and society' considerations into EU research⁴. The result has been to provide valuable information, generate rich insights and raise many questions. In particular, a series of pressing issues arise in relation to the links between 'science and governance'. This refers both to the role of 'science in governance' of wider European society and to the more specific processes for the 'governance of science' itself.

Both aspects of the relationship between 'science and society' are central to the realisation of primary policy objectives for the European Union. Under the 'Lisbon Strategic Goal'⁵, for instance, the European Union is seeking to establish a 'European Research Area'⁶ as a means to achieving global competitiveness as a 'knowledge-based society'⁷. The governance of science, and the use of science in governance, are both crucial in this regard. Both areas are also subject to wider policy priorities, as set out, for instance, in the European Commission's White Papers on *Governance*⁸ and *Precaution*⁹ – which (among other elements) include imperatives for accountability to, and participation by, all interested parties as part of the scientific research and technological innovation processes.

Taken together, it is clear that the science and society agenda addresses some of the most high profile and demanding of the challenges currently faced in the governance of the European Union. In this light, it is with the purpose of taking stock of what we have learned from activities in the field of 'science and governance' funded under the Sixth Framework Programme (2002-2006), that DG RTD organised a "*Gover'Science Seminar*" for some of the leading figures in the field. ***A particular aim of this initiative was to look forward to the consequent possibilities and implications for the Seventh Framework Programme (2007-2013). The present report presents a summary of the key issues and conclusions that arose.***

¹ http://europa.eu.int/comm/research/fp6/index_en.cfm?p=0 [accessed 29/1/6].

² <http://www.cordis.lu/fp7/> [accessed 29/1/6].

³ http://europa.esn.be/comm/research/science-society/page_en.cfm?id=3195 [accessed: 6/12/5].

⁴ http://europa.esn.be/comm/research/science-society/page_en.cfm?id=3163 [accessed: 6/12/5].

⁵ Presidency Conclusions from the Lisbon European Council, 23-4 March 2000. Available at: http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/00100-r1.en0.htm [accessed: 7/12/5]

⁶ COM(2000)6, June 2000.

⁷ COM (2005) 24, February 2005

⁸ Namely: openness, effectiveness, coherence and (significantly in this context) accountability and participation. COM(2001)428, July 2001.

⁹ Scientific and technological activities are especially affected by the provisions of the *Precautionary Principle*, which – in the EC understanding – compel attention "as early as possible" to "potential benefits and costs" in a fashion that involves "to the extent reasonably possible all interested parties". Para.5. COM(2000)1, January 2000,

1.1.2 From 'Science *and* Society' to 'Science *in* Society'

Amidst the daunting complexity and scale of the issues raised in considering 'science and governance', it is easy to miss the practical substance. Scientific knowledge and technological innovation are produced by people. People's creativity and intelligence is conditioned by their relationships, motivations and values. And people work in institutions, each with their own agendas, priorities and interests. As a result, the direction and emphasis of science and innovation are in important ways driven and shaped by the wider society. The process of 'science and governance', is therefore not just one of linking separate arenas of 'science *and* society'. It is much more one of governing 'science *in* society' – recognising that research and innovation are not autonomous, but are contained within, and subject to wider economic, cultural and political processes.

This does not mean that science and technology are free to take any form, according to subjective social pressures. A prominent feature of science and technology when compared with other fields of human endeavour, is the rigorous grounding in the realities of Nature. It is an important theme in European governance that scientific activity should remain independent and unconstrained¹⁰. But within the bounds imposed by these natural realities and governance principles, there is ample scope for profound social influence on the structure, substance and direction of science. The priorities that are emphasised in research funding, the questions that are asked in science advice and the issues that are identified around technological risk – all are shaped and interpreted by wider social forces. It is here that there arise the principal challenges and opportunities for science and governance in Europe.

These issues are hotly contested. As discussed in the opening session of the "Gover'Science Seminar"¹¹ (see [Annex A](#)), policy debates on these matters experience a persistent tendency to polarisation. Some aspire to reinstate a mythical 'golden age', under which the institutions and disciplines of science are charged entirely with their own governance and are trusted as superior authorities in the wider governance of society. For others, this vision raises animated fears of antidemocratic 'technocracy' and 'scientism', with particular concerns that health and environmental consequences will be subordinated to commercial or political interests. The 'GM debate' provides an example of one particular focus for these kinds of debate. Is recent European experience in this area an indication of failure to harness an opportunity for technology-driven competitiveness? Or is it more a sign of success in the realisation of a 'knowledge-based society', in at least attempting (if not achieving) a deeper, and more precautionary, level of deliberate social reflection over the appropriate directions for science and innovation?

Whatever position is taken on this, a practical starting point lies in recognising the undeniable policy imperatives for greater public engagement in the governance of science and technology¹². Wider social engagement in science and technology is variously argued to help foster public 'trust'; improve the quality of the resulting decisions and enhance democracy itself. There are dangers on all sides of cynical manipulation or romantic exaggeration. Either way, questions arise over the appropriate form, scale, depth and extent of public engagement in different contexts. How to manage the relationships between participatory and representative forms of democracy? What does this mean for the role of 'evidence' in policy making? Which are the best ways to articulate political power, specialist knowledge, stakeholder interests and public values? How can we strike a balance between precaution and anticipation on the one hand, and efficiency, proportionality and competitiveness on the other?

Although the political arguments continue to rage, it is possible to discern a few concrete lessons and some emerging common ground. However it is conceived, it is clear that a shared aim lies in achieving greater *maturity* in our debates over science and governance. We must go beyond polarised notions of unquestioning social acceptance or irrational public obstruction of innovation. ***In the transition to a 'knowledge-based society', the crucial challenge lies in articulating different forms of knowledge. To this end, there is a clear role for a 'third sector', to complement and mediate the creative genius of science and to harness and orient the dynamic drive of industry.*** Although the details remain ambiguous, the common agenda of sustainability helps provide some direction and substance. Precisely what form should be taken by this 'third sector', it was a key purpose of the 'Gover'Science' Seminar – and an aim of this report – to explore.

go to: [Annex on introductory presentation](#)

¹⁰ Article II-73 of the draft Treaty Establishing a Constitution for Europe, 18 June 2004.

¹¹ Stimulated by a presentation by Nicole Dewandre, Head, 'Scientific Advice and Governance' Unit, DG Research.

¹² As amply demonstrated in the key European Commission policy documents referenced in the introduction above.

1.2 European 'Science and Society' Activities

1.2.1 *The Diversity of Initiatives*

In addition to the European Commission itself, the 37 participants in the 'Gover'Science Seminar' were drawn from 27 different projects, involving a total of 148 different organisations and institutes in 24 countries throughout Europe and beyond. This represents a diverse array of initiatives undertaken under the auspices of the 'Science and Society' theme of the Sixth Framework Programme, as well as some independent but associated activities. A list of these projects, together with the websites from which further information can be gained is provided at [Annex B](#).

These projects were at various stages of development, ranging from the early stages of start-up, through peak activity to writing-up and post-completion. Their empirical foci extend across a large part of the waterfront of scientific and technological activities. Some projects dealt at a high level of generalisation with encompassing challenges faced by industry and sustainable development. Others address broad sectoral issues arising in the fields of agriculture, biotechnology, energy, fisheries, health, urban transport, information and nano-technologies. Another group of projects focus on particular risks of biodiversity loss, genetic modification, ozone depletion, eugenics and terrorism. Finally, some initiatives tackle quite specific questions over ageing, brain disease, e-learning, HIV/AIDS, privacy, reproductive therapies, stem cell research and xenotransplantation.

The disciplinary interests and perspectives represented in this portfolio of projects are also highly varied. They include liberal studies of the media and communication as well as political science specialisms in 'multi-level governance' and risk regulation. Representatives of policy analysis fields such as science advice, technology assessment and technology foresight were mixed with social scientists interested in participatory deliberation. Whilst the majority of participants were drawn from academic institutions, some came from government executive agencies, grant-funded educational bodies and museums, private industry, commercial consultancies and civil society organisations.

Taken together, it is clear that participation in the 'Gover'Science Seminar' reflects a broad and deep range of knowledges, perspectives and experience, spanning a large part of the total scope of the field of science and governance.

go to: [Annex on projects](#)

1.2.2 *Expectations of the 'Gover'Science Seminar'*

With such a diversity of backgrounds, it is not surprising that the 37 participants brought contrasting aspirations and expectations to the 'Gover'Science Seminar'. The name and affiliations of these individuals are given at [Annex C](#).

Some participants looked simply for a space in which to reflect and clarify ideas, and in particular to learn more from colleagues and their projects. Others sought in the encounter with like-minded initiatives a strengthening of a sense of community and shared dynamism. There was also a desire to learn not only from the substance of discussion, but also from the innovative process of the 'Gover'Science Seminar' itself. Other quite localised expectations concerned the specific roles of participant's own disciplines (risk communication, policy analysis, science and technology studies and social science) and home institutions in museums, universities and scientific research establishments.

Looking outwards from the community of researchers involved, many highlighted a collection of more ambitious aims concerned with influencing wider processes of science and governance themselves. Attention focused here on a variety of particular contexts and processes, including: tensions between the competitiveness and participation imperatives; conflicts between representative and deliberative forms of democracy; best practice in methods for the direct involvement of citizens; clarification of the roles of different modes for the communication of science and strategies to gain the attention of policy makers to public engagement.

For their part, the staff of DG Research as the organisers made clear right from the outset the nature of their own aspirations and expectations, which informed the design of the meeting. These were to go beyond the exchange of information and experience between different projects. This was partly achieved through the circulation of background documents in advance, and partly addressed as an inevitable corollary of the formal and informal discussions. As was made clear in advance, however, the primary aims for the organisers were to focus on cross-cutting themes that pervade and span the

entire field of activities represented across the portfolio of projects taken as a whole. More demanding still, a particular priority was attached to the transcending of purely analytic or descriptive understandings, in order to address more concrete normative implications for those engaged in policy making and governance on science and technology. What are the particular key opportunities and challenges in learning from the array of work represented at the Seminar? Above all, there was an emphasis on the practical questions of “how to ‘make it happen?’”.

As discussions unfolded at the Seminar, each of these areas of expectation were addressed in some way. However, the self-organised nature of the process, meant that not all could be systematically explored to the same extent. It is against this summary of the participant’s own diverse and ambitious expectations, as well as their own interests, that readers may exercise various judgements over the success of the Seminar itself.

Go to: [Annex on Participants](#)

1.3 The ‘Gover’Science’ Process

1.3.1 The Structure of the Seminar

Under the design and direction of an experienced independent professional facilitator¹³, the two-day ‘Gover’Science’ Seminar was structured around a novel adapted ‘open space’ format. The idea behind this approach was to get away from a formulaic project-by-project structure. Instead, the aim was to create an unconstrained ‘market place’ for the exchange of emerging ideas and deliberation over their implications – enabling participants a good degree of autonomy from project constraints or the organiser’s own agendas. As such, *the Seminar itself represented a significant innovation in the way in which the European Commission engages with stakeholders in science governance – offering one example of the kind of ‘co-operative research’ process advocated in the recommendations.*

The model for this process employed at the Seminar, as described by the Facilitator, was of an ‘expanding triangle’ – successively increasing the scope of discussions as time went on (from initial project findings, through cross-cutting issues to over-arching governance themes). Within the constraints imposed by the timeframe, participant numbers and available architecture, this afforded a relatively high degree of agency to the participants in defining and selecting the eventual priorities for discussion. A detailed annotated agenda is appended at [Annex D](#).

After introductory presentations from staff in the Science and Society Directorate of DG RTD discussing the European Commission context, the meeting moved to an initial exchange of information concerning the governance implications arising from the participant’s own projects. This was addressed in smaller self-facilitated discussion groups, organised according to the respective broad empirical fields (biotechnology, health, environment/energy, industrial technology and ‘general engagement’). The agreed outputs from these sessions are presented in Annexes E to I in this report.

Attention then turned in more formally facilitated plenary session to the emerging cross-cutting issues that arise in broad areas of research concerning risk governance, participatory process and science advice. This was structured with a panel of the most relevant participants responding to questions raised by a ‘shaker’ – and the Seminar as a whole reflecting on the resulting discussion. The Rapporteur’s account of the key outputs from these three sessions are presented in Annexes J to L of this report.

The Seminar then moved on to the most open phases of the deliberations, in which participants themselves each identified a number of issues arising from (or neglected in) the discussion thus far, which they would like to see subjected to further scrutiny in smaller group sessions. These proposals were then collected and collated in a facilitated plenary session under the broad fields of ‘research needs’, ‘social and institutional change’ and ‘science governance strategy’. This yielded a total of more than 50 suggestions, which are displayed as the individual bullet points in the table provided in Annex U. Subject to group discussion, some of these topics were then grouped together for purposes of voting, as also shown in Annex U.

¹³ Namely Jörg Mayer-Ries of the Institut für Organisationskommunikation (IFOK) in Bensheim, Germany. See: <http://www.ifok.de/index.php?id=62> (accessed: 29/1/6)

Participants then voted on those among this combined array of topics that they would like to see made available for smaller group sessions. The pattern of voting is also displayed in the table at Annex U. This identified a series of seven groups of issues or inter-related topics, which received more than five votes each. The final step in this plenary session, was then for participants to choose which among this more restricted series of seven, they would actually like to engage in. Bearing in mind the need for the smaller group sessions to achieve a critical mass of participants in order to enable effective discussion, this yielded a final set of five themes, which are identified by shading in the table in Annex U.

The five broad themes that emerged from this largely self-organised process were as follows: 'institutional arrangements for participation'; 'representativeness and participation'; 'the business case for participation'; 'knowledge'; and 'participatory risk communication tools'. These then formed the basis for self-facilitated small group discussions (with the numbers of participants displayed in each case in the table in Annex U). The agreed outputs from these sessions are presented in Annexes M to Q in this report.

Following a reporting back from each of these five groups, the final stage of the 'Gover'Science' process involved a facilitated plenary discussion on the over-arching issues that cross-cut these themes. After some deliberation, the three over-arching issues arising here concerned: 'independence and pluralism'; 'collaborative research'; and the 'embedding of participation'. These then formed the foci of a final series of three smaller self-facilitated group discussions, the agreed outputs from which are presented in Annexes R, S and T respectively.

In this way, insofar as possible, the 'Gover'Science' Seminar enabled a variety of open, intensive, focussed and self-organised deliberations around issues identified to be of interest by the 37 participants themselves. The content of the discussion emerging from this process forms the basic structure of the annexes and shapes the substance of this report.

Go to: [Annotated Agenda](#)

1.3.2 The Aims of this Report

Having described the expectations and structures underpinning the process of the 'Gover'Science Seminar', it now remains to provide a coherent narrative account of the key themes arising in discussion. As with any exercise of this kind, it was inevitable that discussion would range across a wide variety of issues and perspectives and that these would interlace in complex ways through the various stages of the process. The result is a proliferating array of branching avenues of deliberation, some remaining ambiguous or unresolved and others displaying divergent shades of interpretation. Against this background, the challenge and responsibility for the Rapporteur is to remain faithful to the detailed and highly nuanced way in which these issues and perspectives unfolded and interacted during discussion, whilst at the same time constructing a coherent overall picture of the underlying message.

In attempting to achieve this aim, the present report takes the form of a single cumulative narrative. This is structured according to a series of key cross-cutting issues that emerged inductively to the Rapporteur through a 'bottom-up' review of the materials arising from the seminar discussion. The Rapporteur did not engage in this discussion and has refrained from adding additional points or issues that were not addressed by the participants in the seminar discussion itself. No particular consultations have been conducted with individual participants. The result therefore does not necessarily reflect the Rapporteur's own opinion, nor that of any single perspective. In this, the Rapporteur's task is significantly eased by the fact that the thrust of the discussion at the meeting was so well focused, coherent and convergent.

In order to substantiate the detailed elements in this narrative, the main report is cross-referenced in some detail to a series of Annexes, indexed [A] to [U]. For those reading the electronic version of this report, the reference indices provide a hyperlink to each respective Annex. The hyperlink toolbar can then be used to move forwards and backwards between particular points in the main report and the relevant general discussion in the Annexes.

Each Annex provides in bullet-point form, a more comprehensive account of the discussion at each specific stage in the *Gover'Science* process. These points comprise a complete record of the flip chart sheets and facilitator's presentations from each working group. They are augmented by the present Rapporteur's own notes of those discussions where he was present – including the entirety of the plenary discussions. References to external sources are given only where these were explicitly referred to in discussion. In addition, the Rapporteur has been able to draw on audio recordings of the main plenary discussions. Each bullet point included in the Annexes is referred to at least once in the main narrative report.

Taking the main narrative and the detailed annexes together, it is hoped that this twin structure successfully reconciles a range of conflicting needs.

- *For the general reader, the main report presents a single cumulative narrative, entirely reliant on, and drawn inductively from, the seminar discussions.*
- *For those present at the seminar, or for those who wish to trace the different detailed contributions to the narrative, the Annexes show how the individual elements in this account are authentically grounded in the complexities of the deliberative process undertaken at the seminar.*

2 THE STATUS QUO – STRENGTHS & WEAKNESSES

2.1 Shared Understandings

2.1.1 A Diversity of Contexts

Given the complexity of the national, institutional, disciplinary and sectoral interests represented in the 'Gover'Science' seminar, it not surprising that there exists some variation in detailed understandings of concepts like 'public engagement', 'citizen participation', 'stakeholder deliberation' and 'inclusive process'. Examples of the different concrete approaches mentioned or implicit at the seminar include: consensus conferences, participatory modelling, science shops, citizen's panels, stakeholder commissions, transdisciplinary teamwork, focus groups and deliberative committees and polls. These may variously be applied to a series of different types of issue in science governance, including: risk regulation, technology policy, expert advice and science communication [R]. They may involve a diversity of different social actors and emphasise a variety of forms of communication, deliberation and negotiation [K]. They may be initiated by a range of different interests, including public agencies, private sector firms, scientific institutions, civil society organisations or the science-society research community itself [R]. Although the broad elements of these emerging new processes are relatively clear, detailed definitions of precisely what distinguishes them from conventional practices of policy consultation prove rather more elusive.

It was agreed at the seminar, that the specifics of what constitutes 'participation' depend not just on perspective, but also to a significant extent on the circumstances [Q]. Here, many further particular applications, contexts, forms and degrees of participation were debated in the seminar – including variants and permutations on many of the approaches identified above. In order to gain an overview, one useful and well-established (if slightly simplistic) schematic summary discussed at the seminar, is Arnstein's classic 'ladder of participation' [K]¹⁴. This represents increasing degrees of participation as successive steps running from (at the non-participatory end) (i) 'manipulation' and (ii) 'therapy'; through (conventional practices of) (iii) 'information', (iv) 'consultation' and (v) 'placation' and on to (more truly participatory) (vi) 'partnership'; (vii) 'delegated power' and finally (viii) 'citizen control'. As the genuine empowerment of participants increases, so the scope for rhetorical 'tokenism' on the part of powerful sponsoring interests decreases with each successive step in this sequence.

It is clear that Arnstein's scheme is highly limited as a framework for serious or detailed analysis. Many at the Seminar were concerned that it is somewhat simplistic and ambiguous – lending itself to rhetorical use and raising questions over feasibility [K]. However, the scheme at least holds the value of revealing quite clearly a common understanding at the seminar, that discussions of participatory process in the context of science governance in Europe, imply frameworks, procedures and methods that lie at the 'high empowerment' end of Arnstein's scale. In other words, policy initiatives aimed at fostering organisational reputations, managing public perceptions and alleviating stakeholder concerns – no matter what their other merits and irrespective of how they may be described – are all quite different things to genuine participatory process. Likewise, traditional techniques for the communication of scientific information and conventional modes of science policy consultation all fall well short of the symmetrical two-way dialogue and open, in-depth deliberation implied by these terms.

It is with these particular connotations that this report will therefore follow discussion at the seminar in using the convenient term 'participatory process' to describe a variety of frameworks and procedures. Their detailed designs and contexts may differ, but each hold in common particular qualities. For our purposes, these key qualities comprise an emphasis on inclusive engagement with a diversity of social actors, symmetrical two-way dialogue, open in-depth deliberation, and the prioritising of empowerment and agency on the part of the participants' themselves.

¹⁴ S. Arnstein, 'A ladder of citizen participation in the USA', *J. American Inst. Planners*, Vol 35 (1969), p216-224.

2.1.2 The Participatory Imperative

Looking back over the past two decades, it was a shared understanding at the Seminar that there has been a marked overall trend in the governance of science and technology towards the successively more serious and substantive forms of participatory process alluded to in Arnstein's scheme. This was referred to by one working group as a move towards a 'negotiation paradigm', under which participants are afforded an increasing degree of agency in framing the process itself and in determining the outcomes [Q]. Underpinning this trend, is a growing realisation on the part of researchers, practitioners and wider governance institutions, that – when supported in appropriate ways – nonspecialist citizens can prove highly proficient at understanding the salient complexities in policy making on science and technology and arriving responsibly at meaningful conclusions [J]. This is true in principle equally of people recruited as citizens or as representatives of contending stakeholder interests. Of course, there are some caveats and qualifications that go with this message [J], that are discussed below (see Section 2.2.4). But the bottom line message is that the increasing policy imperative towards participatory process noted in the introduction to this report (Section 2.1 above) is borne out by growing experience of the latent capacity, the emerging benefits and the future potential.

Although the details remain open for discussion, many of the particular benefits of participatory process in science governance were also a matter of general agreement at the seminar. Where scientific research and technological innovation are aimed at delivering socially useful outcomes, then participation fulfils a crucial role in validating these outcomes [Q]. In other words, *participatory process provides an effective and legitimate means to inform policy making concerning the appropriate values to apply in orienting and prioritising the purposes towards which scientific activity is directed. Likewise, where scientific research is aimed at informing decision making on the regulation of technologies with potential environmental or health risks, or wider social impacts, participation offers a way to help prioritise the different dimensions of appraisal and identify important questions that might otherwise remain neglected* [J].

In short, wherever the governance of science addresses political or economic interests or social and cultural values, participatory process offers an effective way to inform policy making of the specific ways in which these values and interests interact with the technical details and possibilities [E]. This recognition of a role for participatory process in the governance of science, need not imply a compromise on the autonomy of science in resolving and addressing its own internal research priorities [G]. Where they are removed from concrete social implications, purely curiosity-driven research and criteria of scientific quality may remain independent of any imperative to participatory process. However, where the funding of scientific research or technological innovation are driven by political or economic purposes, or have a bearing on wider social priorities, then it is difficult to refute the benefits of rigorous procedures for illuminating, exploring and validating these driving interests and values.

Despite these widely acknowledged benefits, it was also a shared understanding at the seminar, that the establishment of participatory processes as a mainstream feature of science governance in the EU faces many obstacles. In particular, there is – despite the rhetoric – a persistent tendency on the part of senior people in powerful government and industry bodies often to see exercises in 'participatory process' simply as an effective means to justify (and so help deliver) what were referred in the seminar as "pre-decided policies" [I].

Likewise, another key driver of official interest in 'participatory process' is the desire to remedy a perceived increase in 'distrust' in the institutions of science governance [K]. This rather narrow instrumental concern for the fostering of trust in particular incumbent institutions is quite distinct from the more open and democratic agenda of empowerment, represented by the later steps in Arnstein's ladder. It also contrasts with the substantive rationale for participation discussed above, in terms of more rigorous approaches to testing and validating the values and interests that inform science.

As a result, as one working group noted, there exists an important tension between some 'top-down' and many 'bottom up' perspectives on the nature and function of participatory process [I]. This underscores the importance of efforts to establish the 'business case' [O] for the 'added value' [E] of participation, both for society as a whole and also for the presently established institutions of science governance. Some practical implications are discussed later in this report in the sections on constructing a 'business case' for the 'mainstreaming' of participation (Sections 4.2.1 and 4.2.2 below).

2.2 Key Challenges

2.2.1 Resistance to 'Embedding'

The discussion thus far has established (i) a strong policy imperative for participatory process in science governance, coupled with (ii) broad recognition of the manifest benefits, capacity and potential. However it has also noted a number of obstacles to progress, including – at high political levels – persistent misunderstanding and misuse of the language of participation, and of participatory approaches themselves. Taken together, this presents a formidable series of challenges that were discussed in some detail at the Seminar.

Perhaps the principal challenge concerns the lack of high-level political backing for the development and implementation of participatory processes in science governance. This was observed most acutely by the working group reviewing recent experience in the field of biotechnology [E], but a similar picture emerged repeatedly in other areas [H]. Despite acknowledging the importance of European Commission support for a number of 'first generation' initiatives, the working group looking at these studies identified a major difficulty in the experience of trying to 'sell' participatory process to policy makers [I]. This applies equally to prospective exercises in the 'upstream' (*ex ante*) appraisal of policy decisions, research commitments or technology choices and 'downstream' initiatives for (*ex post*) evaluation of past decisions, commitments or choices [I]. It compounds with more detailed concerns, the picture of the general obstacles discussed in the previous section (Section 3.1) concerning the pressure to use participatory process simply as a means to justify pre-committed decisions [I] or to foster narrow instrumental objectives concerning institutional credibility and trust [K].

Taken together, it is clear to the experienced researchers and practitioners represented at the Seminar that many senior people in science governance institutions have little knowledge of the real nature and purpose of participatory processes [K]. There is also a fear on the part of some such senior people that the close scrutiny necessarily associated with participatory process – far from promoting trust – may actually risk a loss of control (or even a negative impact) over their own organisational reputations or public image [F]. This is especially so, if the organisations concerned envisage the likelihood that their own institutional interests may ultimately compel rejection the recommendations arising from a truly independent participatory process (see Section 3.2.1). Compounding this, the intrinsically interdisciplinary character of public engagement activities can also sit uncomfortably with what is often the much narrower disciplinary remit of individual science governance institutions [O]. ***Taken together, this experience raises queries over the willingness of high level policy making institutions to make serious provision for the kind of public self-reflection, let alone self-criticism, which often forms a positive element (and consequence) of public engagement [I].***

2.2.2 The Role of 'Framing'

The overall challenge that arises from this picture, returned to repeatedly in discussion at the Seminar, is one of 'embedding' participatory process as an essential element in 'upstream' policy appraisal in the high level governance of science and technology [H]. ***By 'upstream engagement', what is meant is the use of participatory process at the earliest stages in the formulation of policy, at a time when the form of such policy is still realistically open to influence. In other words, participation is as relevant to decisions over the 'framing' of a policy issue as it is to the particular features of the decisions that eventually arise [E]. Participation is about 'deciding what to do' as well as 'deciding how to do it'.***

Through the repeated emphasis on the importance of participation in 'upstream framing', discussants at the seminar were referring to basic questions over the 'who?', 'where?', 'when?', 'what?' and 'how?' of the policy formulation process [H]. This involves issues such as the way in which a policy problem is defined and the particular questions that are posed for science to answer [E]. It includes factors like the kind of information and perspectives that are deemed relevant to policy making, the boundaries that are placed around the type of issue to be included [Q] and the assumptions that are adopted in seeking to resolve these questions [G]. Of course, this implies a necessity that the framing of participatory process should itself be a matter for participation [K]. In order to avoid this leading to a cumbersome, endlessly recursive process (over how to frame the framing), ***the practical message is simply that 'upstream' participatory processes in the field of science and governance, should be granted a high degree of autonomy [K]/[S]. In other words, the participants should have a role in 'setting the rules' for their own participation, as well as in following these rules [R].***

2.2.3 *Inertia and Realism*

The response to this challenge is returned to in detail in Section 3.2.2 below. For the moment, it is important to emphasise, that the manifest scepticism on the part of many senior figures policy in making institutions is not the only challenge faced in efforts to 'embed' participatory process. A series of further difficulties reside closer to home – in the practices, assumptions and advocacy of the participation community itself. Perhaps most important to acknowledge, is that participatory process can often be more costly and more time consuming than other approaches to policy consultation [G].

The co-ordination of diverse contending interests required by participation is inherently complex and demanding [G]. Although such burdens may often be outweighed by the benefits, the case for participation must be demonstrated and not simply asserted. Yet many of the issues on which participatory processes are most useful tend (for that very reason) to be among the most intractable. This is so, for instance, with the 'dilemma of the commons' in the fisheries case discussed in some detail at the Seminar. The effect here is to render it much more difficult to achieve clear criteria for success [G]. In seeking to resolve this challenge, it is not simply the manifest lack of knowledge on the part of policy making institutions that is problematic, but also a more widespread lack of understanding of the nature and purpose of participatory process among broader stakeholders and the general public [K]. This lack of understanding is often compounded by underlying instrumental attitudes, under which engagement in participatory process is seen as a (often rather inefficient) means to promote the narrow vested interests of the organisations concerned. The concerns on this score include uncertainties over the eventual outcomes and a perceived risk that participation may have a co-opting effect, helping to legitimate any unfavourable outcomes that may arise [F]. Alternatively, stakeholder inertia may simply be due to fatigue, caused especially by the inability of small civil society organisations to resource their own engagement in an increasing frequency and intensity of calls to 'participate' [K].

To set against this discussion, it must be said that the qualities of self-reflection and self-criticism found in discussion by some at the seminar to be lacking in policy makers [I], are also not always prominent among advocates of participation. Here, it is important to recognise – and be open about – the fact that, participation will not always necessarily offer the best means to deal with any given policy challenge. This was held to be especially true by the working group on the theme of 'nanotechnology and ICT', for instance, in cases where the issues in contention are exclusively ideological or acutely controversial in nature or where they are too complex and technical [G]. In the former case, the political polarisation militates against effective deliberation. In the latter case, the difficulties of engaging on detail have a corresponding negative effect. Likewise, advocacy of participation may sometimes display a tendency to romanticise the capabilities or judgement of the nonspecialist citizen, or of the participatory process itself [K]. ***The design of participatory process requires careful balancing of a number of contending pressures, some of which are discussed in succeeding sections (see Sections 4.1.4 and 4.2.3). There is no single definitively robust resolution. It would be wise not to understate these pressures and to maintain a practical level of realism in the goals that are claimed, set or accepted by advocates on the part of participatory process*** [F].

2.2.4 *'Public Education' and Uncertainty*

One further particularly challenging issue concerns the process of informing or 'educating' participants on the technical details of the issue in question. Although the Seminar heard repeatedly of the positive capacities of nonspecialist citizens in assimilating complex issues ([J] and section 3.1 above), this does not mean that the handling of specialist knowledge is necessarily straightforward or unproblematic in participatory process. Effective communication of scientific information – both within and beyond a participatory process – is an important field of expertise in its own right [L]. It requires close attention to the striking of an appropriate balance between specific and general pictures, between the background details and their practical implications and between contending points of view [L]. This in turn raises thorny questions over reconciling divergent but equally well-founded interpretations of 'the facts' [L].

It is at this point that we encounter a further series of neglected issues around the importance of appropriate public communication of uncertainty [H]. These questions apply as much outside, as they do within participatory process. Like the communication of science, expertise on the different forms and degrees of uncertainty is itself an important interdisciplinary field of expertise in its own right [K]. Although often treated merely as risk (under which probabilistic techniques are applicable), there exist many other forms of 'incertitude' to which these techniques are – by definition – not applicable. These include various forms of *complexity*, which require elaborate modelling procedures and methods drawn

from beyond the confines of any single discipline and presenting particular challenges in communication [G]. Beyond this, *uncertainty* in the strict sense of this term applies to situations under which the possible outcomes are well defined, but the probabilities remain unknown [G]. *Ambiguity*, by contrast, describes conditions where it is not the probabilities that are problematic, but the definition of the outcomes themselves [G]. Finally, the state of *ignorance* refers to a situation under which there exists imperfect information both on the probabilities and the outcomes – with consequent exposure to 'surprise'. Each of these states of incertitude apply as much to specialist as to wider public knowledge.

It follows from this, that – whilst expert understandings provide an essential input – it should not be assumed that specialists in particular disciplines will automatically be in the best position to articulate the complexities, uncertainties, ambiguities or ignorance associated with their own disciplinary body of knowledge. Indeed, it is often the case that these wider and more intractable forms of incertitude are systematically understated – and even concealed – in specialist communications with the public, media or policy making bodies [J]. It has already been mentioned in the introduction to this report (Section 1.2) – that much policy-relevant science rests on socially-informed assumptions. This in turn means that many important uncertainties and ambiguities arise not just in the science itself, but also in relation to associated social conditions [H]. The existence of scientific uncertainty typically presents a degree of 'interpretive flexibility', which is then compounded by socio-political ambiguities [J]. In the end, it is clear that the pervasive role played by uncertainty in policy-relevant science, ensures that discussions in this area retain an irreducibly political – as well as scientific – character [J].

One quite distinctive perspective in this regard, emerges among some in the risk communication field. Concerns are sometimes raised here that – far from there being too little public acknowledgement – there is, in fact, too much public and policy attention to uncertainty [J]. Associated with this, is a concern over the existence of serious limits on the capacity of members of the general public properly to comprehend the more demanding applications of probabilistic analysis [J]. However, set against this is the fact that failures properly to understand the formal logic of probability are also well documented amongst many experts [J]. And there is the tendency for specialist disciplines themselves to over-apply probabilistic techniques to complex problems of uncertainty, ambiguity and ignorance under which probabilities are – by definition – simply not valid [G]. Accordingly, signs of public scepticism or resistance to probabilistic reasoning may raise as many questions over the practical applicability and intrinsic value of these methods, as may be raised over public understanding [J]. This relates to the crucial question of framing discussed earlier (Section 3.2) – and the need to be sure of the appropriateness, relevance and applicability of a specific body of science to a particular social or policy issue [J].

Taken together, these issues raise an important strand in well-rehearsed debates around the problems of the 'deficit model'. This refers to the presumption that understandings displayed by the general public are necessarily deficient in relation to specialist expertise [P]. In short, those with experience in wider applications of participatory exercises tend to be more sanguine on these issues than the view from the risk communication field mentioned above [J]. Where research has specifically addressed the issue of public understandings of 'uncertainty', a picture emerges not of confusion, but of considerable subtlety and sophistication [J]. The Seminar heard in particular detail from projects in the field of agricultural biotechnology on this score [J]. Indeed, contrary to the views of some in the field of risk communication, pan-European experience in this field suggests that there exists an important sense among the general public that issues of uncertainty are systematically underplayed and neglected – rather than overstated – in the communication of science and public policy [J].

In emphasising this crucial message, it is important to be clear that rejection of the 'deficit model' does not imply that public understandings of scientific, technological or risk issues are always comprehensive, authoritative or robust. The point is rather that no single body of specialist knowledge can claim such status either, and that diverse public knowledges hold an essential complementary role to formal expertise in achieving truly complete, authoritative and robust overall societal understandings. Accordingly, rejection of the deficit model in no way diminishes the importance of careful attention to public education as part of participatory process. And this in turn raises the serious but often neglected challenge to the effect that it cannot be assumed that participating individuals or organisations – any more than sponsoring institutions discussed earlier (Section 3.2.1) – will automatically display a commitment to the necessary communication and learning. Indeed, the dedication of the necessary time and effort may often be quite welcome or even actively resisted and requires equally careful attention [K].

Even where such efforts are successful, where a participatory process has achieved intensive learning on the part of those involved, questions may then be raised – precisely for this reason – over the

representativeness of the final results as a reflection of external (less well informed) public perspectives [K]. Queries may also emerge over the value added over more direct engagement with the technical specialists themselves [K]. Moreover, intensive study and deliberation provide no guarantee of any increased disposition to qualities of 'good citizenship' such as empathy, altruism and willingness to compromise [G]. Indeed, higher levels of formal education may often be associated with exactly the opposite traits [G]. And there is a perennial concern that the more self-selecting forms of participatory process may serve simply to accentuate existing patterns of privilege already enjoyed by the most confident, educated and outspoken social groups [K]. *Although a necessary and highly effective element in the social response, public engagement in itself offers no panacea to the challenge of social learning under uncertainty, ambiguity and ignorance.*

2.2.5 'Plural Knowledges'

This said, it is important to recognise that an appreciation of the substantive benefits of participatory process is founded on a rather more sophisticated understanding of the role of knowledge in governance, than the simple 'deficit model' suggested by the concept of 'public education' [P]. Under a 'social learning' perspective [N], by contrast, knowledge is seen more as a relational, action-oriented process, than as a static 'off the shelf' commodity that can be transferred to those in 'deficit' [P]. This recognises the fact that some of the most crucial understandings on any given policy question may be forms of 'tacit knowledge' – very different from the codified information deployed by professional experts and specialist disciplines [P]. This tacit knowledge addresses practical questions that arise in science governance, like: "where to look?", "whom to ask?" "how to recognise quality?", "how to reproduce results?", "how to do?" [P]?

For instance, locality-specific knowledge concerning populations of fish and their predators, distributed collectively among sea fishers or bird watchers, has a complementary value to the more systematically organised and explicit bodies of knowledge represented in academic modelling for fish stock management [I]. Although often more authoritative on particular details, specialist disciplines may become blinkered by their own assumptions, and may be insufficiently sensitive to knowledges produced by other specialist disciplines, especially where these are in some tension with their own findings. Participation addresses this by involving a diversity of specialist perspectives – including those of stakeholders. By also including non-specialists in the deliberation, it is often the case that crucial questions are raised and prioritised which might otherwise remain neglected. In short, an understanding of the substantive benefits of participatory process resides in the recognition that forms of knowledge and modes of learning are each plural in nature. As such, the value of engaging different knowledges lies as much in the mutual tensions and challenges as in the potential for coherent integration. In an area as complex as the governance of science and technology, there exist no monopolies on salient knowledge and the domain of what is relevant cannot readily be reduced to a single formally codified scheme [P].

It is important to qualify this picture by acknowledging the dangers of taking the argument too far. Advocacy of participatory methods is sometimes associated (at least implicitly) with rather romantic reversals of the 'deficit model', under which 'citizen knowledges' are approached as being immune to deficiencies – or even in some sense superior to – specialist expertise [K]. The point is not that non-specialists should or can 'second guess' technical expertise. Even with intensive attention to awareness raising, education and training as essential features of effective participatory process [Q], it remains the case that there exist real limits on the capacity of nonspecialists to acquire relevant expertise [K] (see Section 2.2.4).

The point is not therefore that interested stakeholders or randomly recruited members of the public can be better experts than the experts. *The issue is rather one of acknowledging the crucial role played by cultural values, sectional interests and political and economic power in the shaping of knowledge.* Perhaps the best way to illustrate this, is to highlight the role of public engagement in posing the questions posed of science and interpreting the answers. Who asks these questions? Who makes the assumptions? Which research is funded? Who is accredited to perform it? How are results communicated? Who interprets the answers? Who is informed and at what stage? What is stated and what left unsaid? Which knowledge is held privately and subject to proprietary rights and which is placed in the public domain [P]? All such factors are significantly influenced through the exercise of power. Discussion over these issues is therefore intrinsically political in nature – and so more readily understood as a legitimate matter for public engagement.

The unique contribution of scientific method and technical expertise thus remains acknowledged, but is conditioned by recognition that it remains influenced and framed in subtle ways by these broader societal factors. The role of public engagement, then, is to address the precise implications of these broader societal factors. In practice, this means that the practices and methods of science remain at centre stage, but move from being seen as definitive repositories of knowledge towards more nuanced roles as set of disciplines for social learning: ensuring greater rigour and accountability in the governance of science [L].

One further complication in this picture, concerns the role of transparency. The problem here, is the fact that clarity on one dimension typically requires the obscuring of another [P]. Transparency over detailed understandings of pollutant distribution at a particular static point in time, for instance, can conceal the dynamic ways in which this picture changes over time. In general, transparency over the detail of what is known can impede communication of what remains unknown. Likewise, transparency over the detailed nuancing of stakeholder positions, can obscure the 'big picture' basis for common ground and closure. Naïve claims or aspirations to 'full transparency' may ironically (just like simplistic appeals to 'expertise' or 'truth'), actually prove to be obstacles to effective social learning [P].

It is against this background that participatory process can be understood as a natural complement to – rather than a contrast with – conventionally practised science. In the spirit of scientific enquiry itself, participation offers a means to 'open up' the grounding and conditionality associated with different forms of knowledge [P]. It offers a means more rigorously to validate the nature and origins of the values, which underpin the assumptions or interpretations adopted in research [Q]. ***The key challenge is therefore how to integrate specialist expertise and non-specialist knowledges – each conditioned by their associated interests and values – in a fashion that promotes the most effective social learning.***

3 THE WAY AHEAD – OPPORTUNITIES AND POSSIBILITIES

3.1 Emerging Lessons

3.1.1 Prioritising Science Communication

As has been discussed, the central thrust of discussion at the 'Gover'Science' Seminar centred on the topic of public engagement in science governance. However, it was emphasised a number of times at the Seminar, that ***effective public engagement can only take place against a wider background of successful general science communication*** [Q]. It is important not to allow specific interests in participatory methods to undermine appreciation of the importance of clear, accurate, intelligible, balanced communication of relevant prevailing scientific knowledge [J].

This is especially significant with respect to the remits of agencies specifically charged with responsibilities for facilitating public engagement activities [Q]. The importance of effective science communication applies both within the context of individual exercises in public engagement, as well as with regard to encompassing policy discourses. Indeed, somewhat ironically, it applies in equally to the communication to wider audiences of the results of participatory exercises themselves [J]. Here, reporting is often too long-winded [O] and expressed in language that is too technical [K].

With respect to the effective communication of science in wider policy discourses, outside public engagement processes themselves, particular attention must be paid to the role of the media. Broadcast and printed media wield considerable influence on policy makers, if not on public attitudes themselves [L]. Indeed, there is evidence that policy makers often pay more attention to the reporting of science in the media than they do to more formal reporting channels [L]. Although social science research repeatedly shows that the reporting of science in the media does not determine public attitudes in the simple fashion that is often assumed by policy makers [E], the persistence of such perceptions in itself serves unjustifiably to exaggerate the mediating role of the media in wider science policy discourses.

Among some in the risk communication community, there is a concern that media representations of science tend to dwell too much on the negative connotations of technological risk [L]. Under various views, this can present dangers equally of 'warning fatigue' over excessive media discussion of risk and of 'lifestyle coercion' under which spurious pressure militates unreasonably against certain consumption patterns [L]. The specifics of such opinions may vary from case to case, but what is clear, is that the media often have their own very strong agendas. Science communication by particular media outlets is often motivated by overtly political campaigning aims. Even where this is not the case, priority is persistently attached to finding interesting 'storylines', rather than the setting out of a balanced picture [L]. The media are particularly poor at communicating the more complex aspects of uncertainty, ambiguity and ignorance discussed above (Section 2.2.4), often rendering such discussions more polarised on these matters than are the public attitudes themselves [E].

Taken together, the importance of the role of the media in wider processes of science communication underscores the importance of direct efforts more effectively to engage the media themselves. One area of activity in this regard involves the development of codes of responsibility for journalists. Although established career journalists are notoriously immune to influence of this kind, such initiatives are stand better prospects of success where they are targeted at journalism training courses [L]. ***Efforts to inculcate a greater sense of 'responsibility' in media reporting of science, does not necessarily require adoption of a simplistic understanding of 'scientific facts'. It applies as much to the accurate reporting of uncertainties as to particular viewpoints on what constitute the appropriate interpretations.***

A final important area of discussion with respect to science communication concerns the increasingly important role of information and communication technology – especially the Internet. With the increasing 'dematerialisation' of communication [Q], ***the Internet presents an area of attention that may directly help to address some of the challenges presented by the established media formats discussed above. This presents a particularly promising resource in relation to the challenges of 'scaling up' public engagement activities*** (see Section 3.1.4) [I]. The advent of initiatives such as 'Wikipedia' illustrate the creative enabling role of the Internet in the fostering of more effective processes of 'distributed knowledge' [Q]. However, it is important not to under-estimate the difficulties associated with effective use of information technologies in science communication. Experience thus far has as often been negative as positive – for instance in relation to disappointing levels of usage

among initiatives such as the European Commission's 'your voice' portal [I]. There is presently a serious dearth of research on these pressing questions over the potential practical role of internet [M].

One final theme that emerged in the Seminar discussions concerning science communication was the importance of "not reinventing the wheel". *If science communication in the broad sense is to fully assimilate the necessity for two-way dialogue, then it must learn more fully to address the experience of the science shop movement* [L]. This is a field in which researchers have wrestled for decades with the dilemmas of balancing scientific discipline, rigour and clarity with respect for divergent social interests, values and perspectives [L]. Particular discussions within the science shop movement over appropriate quality criteria and incentives may have much to offer to wider consideration of effective science communication [L]. But in order for this to happen, a series of significant challenges need to be overcome. The science shop movement needs to find ways to improve the profile and enhance the 'prestige' attached to its outputs [L]. It needs to find a way to resolve the longstanding question of whether science shop activities are properly part of university curricula or whether they constitute parallel or superordinate activities requiring other forms of support [I]. Greater recognition of the importance of the science shop experience for the establishing of wider social practices of two-way dialogue in science communication, may play a role in assisting with these challenges.

3.1.2 The Task of Evaluation

One theme that arises repeatedly – especially in relation to the challenge of 'embedding' public engagement in mainstream policy making (Section 3.2.1) [F] – concerns the importance of effective provision for the evaluation of participatory processes. Accordingly, it will be argued later that this constitutes an essential element in the development of a persuasive 'business case' for public engagement (Section 4.2.2) [I]. At its best, *evaluation addresses the practical need on the part of practitioners, researchers, potential sponsors and prospective participants for clear, firm information on the strengths and weaknesses of different approaches in different contexts* [M]. It is an important element in ensuring long term continuity and cumulative progress in public engagement, rather than the currently more *ad hoc* fitful process of disparate one-off exercises [F]. Crucially, evaluation requires that public engagement be undertaken with explicit attention to the need for follow-up after the event, as well as provision for reflection and independent engagement as part of the process itself [F].

However, despite the many benefits of more established procedures for evaluation, there are also difficulties. Many of these lie at an operation level. Clear distinctions must be made between long and short term impacts and between direct and indirect results [F]. This difficulty is compounded by the fact that (positive and negative) impacts of public engagement are often complex, indirect, delayed and ambiguous – and so very difficult to measure [I]. Care is required in generalising from specifics: what constitutes effective or successful practice in one context need not necessarily translate to others [F]. The often highly polarised arenas within which participation takes place, renders it especially important to exercise caution over the acceptance of claims made on the part of sponsors or practitioners [H] or criticisms on the part of detractors. Conclusions are hampered at a practical level, by a lack of codified experience from earlier projects [E]. This underscores the need for basic mapping research as a prerequisite to effective evaluation [M] – especially in relation to successful uptake by governance institutions (such as the European Commission's directorates general) [R]. In the absence of this, there is tendency for deliberations over 'best practice' to go around in circles, or even backwards [R].

Unfortunately, however, there are limits in what such operational approaches to evaluation can actually achieve. The deeper problem is, that some of the more simplistic aspirations to basic rules concerning 'best practice' fail to acknowledge that there are some fundamental differences of view over the role of evaluation [K]. *In short, although it is possible to agree on fundamental criteria at a general level – such as legitimacy in recruitment, fairness in dialogue and transparency in process – the form and interpretation of such criteria must to some extent depend on perspective and context* [M]. Under one view, evaluation is just a matter of establishing which approaches 'work' and then communicating and implementing these approaches [K]. Under another perspective, the framing (and thus results) of evaluation must (like participation itself) remain dependent on the purpose or context of the initiatives in question [K]. Perhaps the most important feature of the context that bears on evaluation, is whether an exercise is intended to achieve aims concerned with normative enhancement of democracy, substantive outputs in terms of sustainability or precaution or instrumental motivations over trust or credibility (Section 3.1.4): each of these would yield different evaluative criteria [I]. If this view is accepted, then efforts to establish a single definitive scheme of evaluative criteria appear to be insufficiently reflective and overly instrumental. Indeed, far from promoting consensus, efforts too strongly to assert particular visions of 'best practice' may actually foster further tension and conflict.

3.1.3 Representation and Democracy

One particularly important example of a contextual factor bearing on the interpretation of evaluation, concerns the view that is taken of participatory processes in relation to the established institutions and procedures of representative democracy. Is participation a substitute for other forms of democratic deliberation and accountability, or is it a complement? Aside from the specific connotations for evaluative criteria, this question holds profoundly important implications for the general role of public engagement in the governance of science.

For its part, the Seminar working group on the issue of participation and representation developed a clear agreed 'statement of needs' [N]:

- clarity on the boundaries and expectations for all participants;
- clarity over the working frameworks for participation;
- responsibility to experiment with new forms of learning;
- the embedding of participatory process in mainstream European Commission programmes;
- the undertaking of participation also on the process of implementing participation.

However, for all its value as a pointer to necessary areas for further work, this does not fully resolve the complexities of the question of how participatory process relates to representative democracy.

One reason for the difficulty here, is that *the answer to this question begs in turn the question of precisely what is meant by representative democracy in the first place*. This can sometimes be unclear – there being a number of different views in political discourses in the industrial democracies that make up the EU [F]. Beyond this, *the answer also depends on which of several different views is taken on the role and nature of participation*. Is it about collecting a microcosm of socio-political perspectives? Is it concerned with staging public competition between arguments? Does it involve the mediated balancing of negotiated interests? Or is it a more technical process of 'preference feedback', using settings such as focus groups or citizen panels as social scientific experiments to produce evidence in order to inform wider policy making [G]? Each of these yields significantly different answers to the question of the relationship between participation and representative democracy.

Nowhere are the implications of this question more acute, than with the issue of representativeness itself. Here – as in evaluation more generally – *there are dangers in reifying simplistic notions of representation and taking this to extremes* [G]. It has already been mentioned, for instance (Section 2.2.4), that the process of deliberation itself can reduce representativeness in participation and that participant's acquisition of expertise compounds this [K]. Particular examples arise in the medical field [K]. The question of whether or not a particular process or exercise has been 'representative' depends on subjective and context-specific judgements over what constitutes the appropriate partitioning of relevant perspectives. In any exercise that involves (as must necessarily be the case) fewer viewpoints than are extant in wider political discourse, there must be questions over the weighting or priority attached to those viewpoints that are included.

These difficulties with the representativeness of participatory process are somewhat alleviated, if attention turns to the more practical question of the relationship with decision making itself [E]. Here, there can be little doubt over the frequently constructive value of participatory exercises as a means to build broader-based negotiated resolutions to challenging political problems. One such example arising in discussion at the Seminar, concerned the case of negotiations over land contamination problems in the Italian town of Brescia [J]. Here, there emerges a very positive complementary role for participation in relation to representative democracy, but only if participation is oriented towards the systematic exploration of the detailed implications of different social perspectives for a particular science governance problem, and then explicitly conveys these implications to decision making [E]. In other words, *the tensions with representative democracy are reduced when participation is used not to 'close down' on consensus, but to 'open up' the range of different equally legitimate options for decision making* [G]. In this view, there emerge interesting synergies and complementarities between the role of participatory process in 'opening up' and representative democracy in 'closing down' decision making. *In other words, participatory approaches are better seen as a means to 'inform policy making' than to 'undertake decision taking'* [I].

As emphasised by the Seminar working group on this point, *the only robust response to this problem, lies in making the appropriate relationship between participatory process and representative democracy in any given context an explicit focus of attention in participation itself* [N].

3.1.4 Questions of Design

There are many tensions, contradictions and trade-offs in the design of participatory process. Questions over 'who?', 'when?', 'where?' and 'how?' come especially to the fore [E]. In particular, there is the matter of *who* initiates, frames, designs, organises and interprets processes of engagement in science governance [M]? The reconciliation of these factors will to some extent be a matter of perspective and context. However, some general points relating to detailed issues of design arising in discussion at the Seminar, can be organised around the following specific questions: Who to include? What to prioritise? How much resources to assign? At what scale to engage? When to engage? What is independence? Who does the framing? How to convey outcomes?

Each of these questions will be here taken in turn – with specific attention to the concrete, positive and practical responses that began to emerge in discussion at the Seminar. Interestingly, these responses often involve attention to the neglected prior question over 'why' engagement is of interest in the first place.

Who to include?

The appropriate number of participants to include is a classic example of context dependency. Numbers may range from half a dozen people in a focus group, to the thousands of citizens involved in some exercises organised by the 'America Speaks' initiative [G]. Large numbers may ease questions over representativeness, whilst posing problems of cost and the raising issues concerning the quality of the associated deliberations. There is no final answer to the problem of inclusion [G]. A particularly intractable issue in this regard concerns the appropriate means by which to represent the interests of future generations [G]. In the end, there is no final definitively legitimate answer to the challenge of partitioning and recruiting the relevant perspectives to represent.

Perhaps the best way to handle this involves being clear and realistic right from the outset about the goals for the process and by adopting a pattern of inclusion that is appropriate to this [F]. Particular care should be taken to avoid overblown claims or aspirations – or simplistic criticisms – concerning representativeness. Participants themselves may have a role in this aspect of design. In the end, the demands on the type and degree of representativeness and the quality of deliberation will vary with the nature, complexity and intractability of an issue, the availability of time and resources and the institutional context.

What to Prioritise?

Is there a prior role for participation in the framing of questions for science, or is there a prior role for science in providing the evidence base for participation [E]? This raises issues concerning the relationships between 'sound science', precaution and participation [G]. It also invites questions over whether participation is about the effective communication of science to the public, or about communication of public interests and values to science [E]. This is the subject of much continuing dispute in the risk community [J]. Here, there are particularly important practical implications for the sequencing of expert and participatory inputs [E]. Another dimension of this challenge concerns the relative treatment afforded to different forms of knowledge: systematic, experiential and anecdotal (concerning the 'lifeworld' of participants) [G].

One way to address this, is to be as clear as possible about the primary purpose of the participatory exercise: normative (eg: to enhance democracy), substantive (eg: to enhance knowledge) or instrumental (eg: to enhance trust) [I]. Focusing on principles like equity, inclusion, openness, legitimacy and representativeness, a normative democratic aim highlights the prior role of participatory process with respect to scientific procedure. An instrumental aim, by contrast, is preoccupied with asserting prior framing in terms of the particular pre-ordained aims, reputations or scientific bodies of knowledge in which it is desired to foster trust. Finally, a substantive aim concentrates on eliciting salient knowledges of all kinds, such as to illuminate uncertainties and so inform more robust decisions (like more sustainable, precautionary or protective outcomes in the field of risk governance). In each case, there are clear implications for the framing of the process itself, as well as the relevant 'evidence base'.

How much resources to spend?

The broad tension between the Lisbon agenda on competitiveness and the Governance White Paper agenda on participation noted at the outset of this report [I] underscores the important problem of

proportionality over the time and resources consumed in the science governance process. This applies in relation both to the time and resources expended in supporting the process itself, and in terms of the scale and distribution of burdens for different social actors arising from the recommended policy outcomes, compared with other possible courses of action. For instance, the degree of stringency under which to regulate hazardous chemicals raises questions over the proportionality between the effects on the productivity and competitiveness in certain areas of the chemicals industry on the one hand, and the impacts on human health and the environment on the other.

An outcome of the Seminar in this regard, is that a 'principle of responsibility' can help in striking the appropriate balance [J]. Here, it is recognised that judgements over proportionality are an intrinsic part of the responsibility of all those involved – including those involved in research and innovation. It involves the assertion of more rigorous procedures for social accountability, applying both to the scientific community and to other actors in the governance process. In this sense, participatory process and responsible science are not substitutes, but mutually reinforcing elements. Beyond this, a final arbiter of proportionality lies in general political discourse itself. Here, it is part of the communication process to be open about the key institutional drivers in any given area of science governance – including exercises in public engagement. Accordingly contrasting balances of proportionality may be associated with the framing of initiatives driven by the science community, governance institutions or science-society researchers [R].

At what scale?

What is the appropriate governance level [E] and geographical scale at which to engage in participation: supranational, national, regional, local [G]? Whilst participation is widely regarded as unproblematic at a local level, the 'scaling up' of such processes raises successively more challenging issues of organisational logistics and institutional design. For instance, as the number and diversity of interested parties rises, so it becomes less easy to resolve questions of representativeness and inclusion. Likewise, the typically increasing stakes and complexity and the entrenching of vested interests at higher levels of governance, also serve to compound the challenge. These dilemmas are particularly acute at the supranational level at which the European Commission's governance role is situated. At a practical level – and depending on the country – engaging at a pan-European level can be either an aid or an obstacle to securing motivation by participants (in Italy a European dimension or association is an asset, in the UK less so) [G].

One response to this dilemma of 'scaling up' is to aim for provision for long term continuity in nested multi-scale processes of engagement, rather than one-off individual exercises [F]. The role of the Internet is likely to be especially important in this regard [I]. There should be explicit interlinkage of different processes at different levels of governance and measures to ensure deliberation and reflection over these links as part of the processes themselves.

When to engage?

When is the appropriate stage in the policy cycle to prioritise public engagement? Is it early on in the governance process, when institutional commitments are open to framing but when implications remain unclear? Or is it later on, when the implications are less uncertain, but the potential for real influence is more limited [G]?

This is partly resolved by the injunction above concerning the 'multi-level' nature of engagement – applying at all stages in the governance process [F]. Where participation is addressed at the earliest stages of science governance, and if the implications are thus regarded as prohibitively uncertain, then this can be resolved by framing participation in terms of the driving purposes and visions behind the research or innovation activities in question, rather in terms of some particular or ambiguous viewpoint on uncertain implications [J].

What is independence?

Further issues are raised around the notion of 'independence' as a means to legitimacy and trust in public engagement. Is this best achieved through claims to some kind of institutional neutrality or transcendent objectivity (in which case the emphasis may be on mainstream views)? Or is independence more a matter of pluralistic inclusion of a full range of perspectives? In this latter case, it is clear that the autonomy of participatory exercises to influence their own framing (discussed in Section 3.2.2), becomes an especially important feature. Where notions of independence embody

recognition of the need to counterbalance prevailing patterns of privilege and power, then it may be perfectly legitimate deliberately disproportionately to attend to some of the more marginal or 'excluded' (rather than conventional mainstream) viewpoints [M].

The logic and spirit of public engagement requires that the response here must inevitably involve some shift away from notions of independence and legitimacy embodied in transcendent notions of authority, expertise or objectivity and towards forms of independence and legitimacy conceived in more grounded and plural terms – arising from the engaging of a diversity of real world interests and perspectives. But (as discussed in Section 2.2.3 above) this is qualified by recognising that structured participatory processes are not usually effective at resolving fundamental conflicts of ideology – these are most appropriately (and effectively) resolved by broader political engagement [G]. However, since some element of value-based difference is inevitable in science governance, public engagement is best structured around explicit deliberation over the salient differences and commonalities, rather than in haggling over contending knowledge claims [K].

Where participation does involve strong prior commitments on the part of certain participating interests, it is important to ensure that representatives are allowed sufficient space to deliberate and negotiate with as much freedom as possible from any prior sectoral commitments. However, this also needs to be balanced with care for the maintaining of sufficiently high quality communication with the constituencies represented, such that these are able to be brought along with the process [G].

Who does the framing?

What are the relative functions of structured design and spontaneous emergent order in participation? In particular, what is the appropriate role of stakeholders in the design of the engagement process itself? Perhaps most pertinently, what is the appropriate role of sponsoring governance agencies, such as the European Commission? The more highly structured the process, the more open it is to undue influence by (and strategic behaviour on the part of) vested interests like sponsors, practitioners and researchers. The more spontaneous and open the structure, the less accountable it is to wider political processes and the more open to interests (and strategic behaviour) of those particular participating groups who happen to have been included [M]. This underscores the difficulties associated with injunctions to provide for strong stakeholder [F] – and even policy maker [K] – involvement in the design and framing of participatory process. With too little, the process risks irrelevance or illegitimacy, with too much, it risks capture [K].

It is important to remember here that, in the end, the outcomes of public engagement will always be open to challenge. So even the most perfect design will provide no final defence of legitimacy [K]. This further diminishes any pressures for the overly rigid or complex structuring of processes of engagement [N][O]. As discussed earlier (Section 3.2.2) and above concerning 'independence', one way to address the intrinsically recursive relationship between framing and participation in public engagement is by ensuring a high degree of autonomy from initiating or sponsoring bodies. Within this, there are likely to be benefits from an explicit separation between distinct but interlinked functions of broad stakeholder oversight of design and wider inclusion in the participatory exercise itself [R].

How to convey outcomes?

What should be the form of the outputs from public engagement to the wider policy making process? Should results be presented in a fashion that 'opens up' or 'closes down' subsequent discussion [G]? In other words, is closure around particular policy recommendations best achieved inside – and as part of – a participatory process? Or is the forming of final commitments – the taking of decisions – best conducted in the wider governance discourse, in a fashion that is separately accountable (but informed by) the participatory process [G]? In other words, under what conditions is it preferable for public engagement to 'open up' or 'close down' political discussion?

The answer here must lie – at least in part – in observing that public engagement can properly play a role in both respects. This requires more attention to the explicit distinguishing and sequencing of different engagement processes oriented respectively towards opening up and closing down [G]. This said, it must be observed (following discussion in Section 3.1.3) that there tends in existing science governance to be a rather disproportionate instrumental preoccupation with processes for 'closing down' – for 'taking' rather than informing the 'making' of decisions and policies [O][I]. Here, the

imperative to provide clear links between participation and representative democracy might suggest rather greater attention to the 'opening up' function than has hitherto been the case [P].

3.2 Looking Forward

3.2.1 *Mainstreaming Engagement*

The preceding discussion over the challenges (Section 3.2) and the lessons (Section 4.1) arising in past European 'Science in Society' initiatives highlights the major obstacles to efforts to improve processes of communication, engagement and participation in mainstream institutions of science governance. In looking forward, if current efforts at public engagement are to bear fruit, then the crucial challenge concerns the establishment of public engagement as a 'mainstream' activity in science governance institutions like DG RTD, and not as a minor niche activity of restricted interest to particular communities of stakeholders or researchers. Discussion at the Seminar focused repeatedly and in a variety of different ways on this important issue.

First, a number of substantive principles emerge concerning practical ways to make public engagement initiatives more appealing in their own right to mainstream institutions. Consistent with the discussion in the previous section, it is important, where possible, to prioritise efforts to address issues 'upstream' at their earliest stages [R]. Here, though a premium will necessarily be attached to 'proactive' initiatives, it is important also to retain an ability to work in 'reactive' mode in response to an impetus from other social actors [T]. Either way, practitioners should ensure that sufficient attention is given to developing appropriate contacts and resources concerning the technical substance of the issues in question [R]. They should also be sure to secure appropriate venues for face-to-face engagement, providing the right kind of space to foster neutral, responsible, unconstrained deliberation. In the context of the present seminar, it was suggested that the position of science museums at the science-society interface are especially important in this regard [R].

At a more general level, there is considerable scope for establishing measures for training and competence raising among both practitioners and researchers in the field of public engagement [I]. This should feed into the promotion of active support networks for developing more operational frameworks and practical tools for implementing public participation [I]. Finally, there is the importance, as emphasised in the last section, of recognising the difference between processes for 'taking' and 'making' decisions and policies [I]. Here, a particular role for public engagement lies in 'opening up' as well as in 'closing down' the field of relevant policy possibilities and issues.

Second, there are a series of more overtly strategic considerations, that might productively be borne in mind in framing advocacy efforts by protagonists of greater participation. Advocates should look out for opportunities presented by the emergence of high profile 'crises' associated with complex issues, intractable conflicts of interest or political unrest [T]. More positive opportunities are presented by the episodic rise to influence of visionary individuals in senior positions, or a (likely temporarily) forced state of openness on the part of key agencies, as a response to 'crises' [E]. Such conditions are most favourable when they involve the official recognition of potential threats at an 'upstream' stage [T]. As such, these will tend to require a move beyond narrow notions of risk, and towards the addressing of wider social interests and values over the visions, purposes and priorities to which science and innovation are oriented [I][J].

Somewhat more specifically, this requires that the participation community itself act more pluralistically in seeking key allies. Priority should be placed on engaging with those governance actors displaying a conjunction of positive interests in engagement with high levels of influence [R]. In the end, practitioners should remember that public engagement is a long-term process, with responsibilities extending beyond any individual exercise. In particular, there is a need to develop sufficient momentum to carry the process as a whole across short term political attention cycles [R]. This means being willing to spend the necessary effort and resources to think beyond 'final reports' – for instance by designing more varied follow-up actions like communications campaigns [T]. Finally, there is the importance of moving outside the niche ghetto of 'science and society' research to incorporate elements of public engagement as essential features in the funding cycle for conventional scientific and technological development activities [R]. Some specific suggestions in this regard are addressed below (in Section 4.2.4).

In amongst these normative considerations, there inevitably arise a couple of ambiguities and tensions that were also reflected in discussions at the Seminar and so warrant explicit attention here. One such sensitivity concerns the injunction that protagonists of public engagement make efforts to "promote high level expectations" [T] and "emphasise the benefits" of participation in all communications [T]. Although expedient in the short term as a means to foster support for particular initiatives, the lessons discussed above do suggest that some longer term risks may arise from such strategies. These lessons

highlighted the need for qualities of realism [F], self reflection and self criticism [I] on the part of advocates of engagement, openly recognising the limits [G] and potential shortcomings [K] of participation and the consequent importance of setting boundaries on the expectations entertained by all participants [N] (see Section 3.2.3). As a result, it seems that the best strategy here is to avoid the impulse to over-claim and concentrate on communicating a reflective, measured and realistic picture of the positive role that can be played by public engagement in different areas of science governance.

Another tricky issue concerns the need for care over any alignment on the part of practitioners of engagement with particular sectoral interests. For instance, injunctions were variously expressed at the Seminar to develop particular relationships with private industry [R] and harness any emergent convergences of interest in consort with other social actors [R]. This was illustrated with a rather instrumental metaphor likening public engagement to the priming of a pump, in which a key aim is to 'channel bottom up enthusiasm' [T]. This led to specific recommendations that practitioners be at pains to "know the customers business" and to "customise activities for natural allies" [T]. Though potentially expedient in securing sectoral support for a particular exercise, such practices sit rather less easily with more normative democratic views of the role of public engagement. They raise questions over which interests are doing the 'channelling' and for whose purposes the 'pumps are being primed'?

Overly urgent or instrumental ambitions to 'mainstream' participation can be counterproductive if they prompt 'short cuts' in relation to the intractable design issues discussed above (Section 3.1.2). Taken too far, they can raise particular queries over the necessary independence of public engagement, from the interests of 'customers' or 'natural allies'. There are obvious tensions with the contrasting injunctions that were also emphasised at the Seminar, concerning the need to be sure to engage in a symmetrical fashion with a wide diversity of different interests (including a full range government, academic, commercial industry and civil society organisations) [R]. In the end, there is a need for a healthy level of caution, self-criticism and realism. The short term interests of sponsors and practitioners of particular engagement exercises, should be balanced against the long term normative implications of enhanced participatory processes in governance systems as a whole.

3.2.2 The Business of Persuasion

Following on from this discussion of the underlying substantive basis for 'mainstreaming' public engagement in existing governance institutions, there arise a series of more specific presentational issues concerning the communication of a 'business case' for participation. Despite the message emphasised above concerning the need to avoid any compromise on fundamental structural principles and normative imperatives in public engagement, there is nonetheless considerable scope for the communication of these activities to be more persuasive in the face of what has already been described as the manifestly sceptical perspective of existing mainstream policy making (Section 3.2.1).

Perhaps the most obvious recommendation in this regard, is the need for the public engagement community as a whole to concentrate considerably greater resources than has hitherto been the case on the raising of awareness [O] – especially among senior policy makers [I]. This means getting beyond haphazard interactions with individual decision makers – no matter how influential – and aiming for continuous long term structural engagement with policy making processes as a whole [O]. In order to achieve this, ***high level policy makers need to be addressed in terms of their own interests and values [I]. This does not necessarily mean adopting these same interests and values in an instrumental fashion (as discussed in the last section). Rather, it is a matter of the effective communication of the wider 'business case' for participation – taking seriously and treating with respect the pressing nature of real institutional priorities and constraints [I].***

This raises the thorny question of the appropriate role for senior policy makers in the process of engagement itself. As long as their perspectives are treated alongside other stakeholders in a symmetrical fashion, the involvement of decision makers in deliberation over the design of engagement, as well as in the participation itself, need imply no necessary compromise on the independence or pluralism of public engagement [O]. Here, one way to mitigate any possible adverse reaction to the discovery that participation does not simply involve the imposition of their own institutional agenda, is to emphasise the function of participation in 'opening up' policy debates. This clarifies the role of engagement as a means to inform the 'making' – rather than perform the 'taking' – of decisions [O]. One practical way to achieve this is provided by the techniques of scenario workshops, in which governance recommendations are more nuanced and conditional than in more consensus-based approaches [O].

To this end, there is a major need for more systematic and authoritative procedures for monitoring and evaluating participatory exercises and practitioners [I]. The institutionalisation of such measures would be a considerable aid to the fostering of greater confidence on the part of potential sponsors, in the professionalism and independence of those involved in public engagement. Recognising that notions of 'best practice' are necessarily specific to particular contexts and perspectives (see Section 3.1.2), there is still much that can be done to develop conditional principles for avoiding some of the more obvious pitfalls, such as those discussed in the previous section [O]. At the most practical level, it is important not to underestimate the importance of the style adopted in reporting participatory exercises. There is scope for this to be much more short, accessible and to the point than is often currently achieved [O]. Even if the detailed reporting must at times necessarily (as in the case of the present exercise!) be quite elaborate, there is always a potential for short executive summaries and popular overviews. In this regard, the value of simple process design has already been mentioned (Section 4.1.4) [N], and this bears additional benefits in terms of more straightforward reporting [O]. *In the end, the key challenge in the development of a successful 'business case' for public engagement in science governance, lies in the effective communication of the move – documented in this report – from the somewhat introspective and reactive preoccupations of the science and society community themselves, to more open and proactive understandings of the wider science in society imperative in governance more generally [O].*

3.2.3 Towards 'Co-operative Research'

In a discussion as rich, complex and wide-ranging as that taking place at the 'Gover'Science' Seminar, it is difficult to extract any single definitive 'bottom line' conclusion. The multiple issues for reflection and practical implications that have been discussed thus far, illustrate the diversity of experiences and contexts that were addressed. However, it is possible to encapsulate much of the thrust of the shared momentum in this deliberation by means of a single concept that arose repeatedly in discussion. The Rapporteur will refer to this concept here with the term '**co-operative research**': *a form of research process, which involves both researchers and non-researchers in close co-operative engagement [S].*

Although actually referred to in discussion in the Seminar with terms like 'collaborative research' [S] and 'participatory science' [G], the broad interdisciplinary nature of science governance discourse and the usage of language within the European Commission itself impose a series of unhelpful established connotations to these terms. Accordingly, the concept of 'co-operative research' emerging at the Seminar refers to a range of different procedures, situated at different levels, for engaging divergent social values and interests in the processes of 'science in governance' and the 'governance of science'. Where circumstances do not warrant this, then the notion of co-operative research need not necessarily be taken to imply the extensive grass-roots implications that might be associated (perhaps by reference to Arnsteins' ladder discussed earlier in Section 2.1.1) with 'participatory research'. On the other hand, this concept of 'co-operative research' extends well beyond relatively narrow established notions of 'collaborative research', simply involving multidisciplinary or interdisciplinary teams from specialist institutions. *Co-operative research, by contrast, requires constant attention to 'transdisciplinary' engagement with stakeholders and public constituencies in order to explore the driving aims and purposes, the alternative orientations, and the wider social and environmental implications of research and innovation [S].*

Drawing in particular on the conclusions of the Seminar working group on 'Key Outputs for Collaborative Research' [S] and building especially on the experience gained in the longstanding field of science shops [L], the imperatives for the general adoption of a 'co-operative research' position in wider science governance take a number of forms. They arise from an increasing understanding of mutual co-dependence in society of different interests and value communities. This leads on to an enhanced willingness on the part of all actors in the science governance process to recognise the value of different forms of knowledge held by others. As a consequence, co-operative research encompasses the whole suite of processes through which science governance can achieve a high degree of social integration of the many different salient forms of knowledge. In these terms, co-operative research represents full recognition of the implications discussed earlier in relation to Arnstein's ladder – representing a move away from conventional consultation – through the wide range of currently existing procedures discussed at this Seminar for fostering participation, inclusion, engagement, deliberation and negotiation – and on towards the overall aim of what might be referred to as a more effective general social process for the 'co-building' of knowledge [S].

Despite the diversity of contexts and examples, there arise a series of seven more detailed features, which together help characterise and distinguish this newly emerging process of co-operative research.

- i. ***The process of co-operative research is as important as the outcomes.*** It is through the experience of co-operation – or of seeing authentic co-operation on the part of others – that contending social interests come to develop greater confidence in the governance of the research process as a whole [S].
- ii. ***The 'framing' of co-operative research is autonomous.*** This extends more restrictive notions of the autonomy of the professional science community alone, to include communities of interested and affected social actors. It recognises the important lesson discussed earlier, to the effect that public engagement in science is not just about participation within a pre-ordained structure, but also implies the freedom to re-structure the framing and focus of deliberation (Section 3.2.2) [S]. As such, the extended autonomy of co-operative research allows an 'opening up' of processes of science and innovation to reveal (and allow exploration of) a wider range of social purposes, conditionalities and implications [P].
- iii. ***Co-operative research embodies at its core an intrinsically symmetrical understanding of the relationship between different bodies of knowledge.*** Although knowledges may differ in their salience from case to case and issue to issue, co-operative research avoids generalised or systematic assignments of privilege to one form of knowledge over another [S].
- iv. ***Co-operative research integrates and addresses equally, processes of design, implementation and dissemination.*** As a consequence of this, co-operative research displays an important benefit in relation to more fragmented approaches, in that it provides inherently for the more effective transfer of productive knowledge and outcomes between different social communities. In this way, it helps address the often prohibitive challenge of moving from scientific or social research to technological or organisational innovation [S].
- v. ***Accordingly, co-operative research includes a wide variety of specific approaches to inclusive engagement at different levels in science governance.*** These extend across the full range of procedures discussed at this workshop (such as consensus conferences, participatory modelling, science shops, citizen's panels, stakeholder commissions, transdisciplinary teamwork, focus groups and deliberative committees and polls). The key point here is one of flexibility in configuring the process to the purpose of autonomously-defined 'useful outputs' [S].
- vi. ***Co-operative research highlights and clarifies the essential role of science.*** As part of this more pluralistic process, the role of natural science itself moves from being the single most highly valued output (as a particular body of knowledge) towards recognition as a crucial process. Rather than being invoked prescriptively as a source of definitive 'sound scientific' prescriptions for policy, science is recognised as the set of disciplines through which to ensure rigour, transparency and general responsibility in communicating and substantiating what will inevitably remain multiple, contending and uncertain knowledge claims [G][L].
- vii. ***Co-operative research embodies a richer and more positive understanding of the role of social science.*** Rather than serving as a 'bolt on' activity to examine implications, assess reactions or ensure compliance or acceptance after research has taken place, social science fulfils a more integrated and formative role in co-operative research [G]. Recognising the distinction between 'expertise of', and 'expertise on', social actors, social science also moves – like natural science – from being primarily addressed as a substantive repository of knowledge, towards being engaged as a source of expertise and experience on the kinds of processes through which diverse social knowledges can be elicited and integrated into science governance [K].

Taken together, these common characteristics help to communicate and substantiate the key elements of what is meant by a move mentioned at the beginning of this report (Section 1.2), away from the fragmented, introspective and reactive preoccupation with 'science and society' and towards a more integrated, outgoing and proactive interest in 'science in society'.

3.2.4 Strategies and Research Needs

It is hardly surprising that a Seminar involving so many active members of the European science governance research community should draw from these emerging conclusions a wide range of implications for further research! A series of gaps in existing knowledge were recognised and a number of potentially fruitful avenues for enquiry identified. These might be seen as relevant both to the development of Framework 7 activities in this area [L], as well as forming a possible focus for more short term activities – perhaps under existing initiatives such as the 'NEST' Programme [T]. *Perhaps*

most significantly, co-operative research emerges here not just as an object of research in its own right, but also as the most effective means by which such research is itself best conducted – embodying processes of engagement in the framing as well as in the implementation of the research process [M].

The following comprised the main gaps and associated avenues for enquiry identified at various stages in the discussion:

- i. There is currently relatively little 'baseline mapping' of the kinds of 'co-operative research' practices that already exist. Queries here include: What's happening? What's needed [M]?
- ii. As a prerequisite to direct evaluation of the many different co-operative research practices themselves [M], there are important unanswered prior questions around the differentiation of what constitute the criteria of good and bad practice in different contexts [F]?
- iii. The effective use of the Internet in science communication and public engagement presents a further neglected area of interest in its own right [M].
- iv. Given the intrinsically pluralistic environment within which co-operative research takes place, efforts at 'evaluation' also require more intensive research on the diverse and contested nature of the 'impacts' of participatory engagement on wider science governance [I].
- v. As part of this, there are important gaps in the researching of contrasting subjective encounters with co-operative research activities, as experienced by policy makers, practitioners, third party stakeholders and participants themselves. Questions here concern not just the positive and negative impressions, but reflection on the interplay of interests and divergent notions of 'quality' and 'robustness' in the associated policy decisions and commitments, as well as the wider implications for democratic governance [M].
- vi. In particular, there arises in this latter regard a particularly significant gap in research in this area to date: examining the personal attitudes, discursive and behavioural patterns and any covert strategic practices on the part of high level policy makers with regard to exercises in public engagement in science governance [L]. The associated challenges of 'studying up' form not just part of the problem in this respect, but also part of the problematique for such research.
- vii. Although there exists much high quality research in general fields of science in governance and the governance of science that has already been conducted – not least under the auspices of Framework Programmes 4 – 6 [M], there has been relatively little attention specifically to the role of public engagement in science governance [L]. Likewise, the patterns of attention and relative neglect displayed by science governance research itself, might also be a productive focus for meta-analysis [L].
- viii. More specific and action-oriented lines of enquiry concerns the potential strategic options facing the Science in Society Unit in EC RTD, as a potential champion of wider dissemination, or as custodian of a 'ghetto' of specialist activity [E]. This includes an examination of the actual and potential institutional role of this Unit in promoting experiment activity involving different forms of learning [N].
- ix. Likewise, there is scope for considering more 'consultancy' style research concerning the different possible strategic functions for this particular Unit within the structure of the European Commission as a whole. This might focus on the potential modalities by which this Unit might help fulfil needs for monitoring European practice in this field, addressing issues of: inclusion, representation, timing and compliance in public engagement in science governance [M].
- x. Finally, and even more instrumentally, there were a series of suggestions concerning the role of the Governance and Scientific Advice Unit in mediating relationships between other European science governance institutions: listening, digesting, communicating, feedback with engagement community [M]. Queries here concern the wider perceptions of this Unit in sister departments of the European Commission concerning the possible role for this Unit in enabling co-operative research processes under the auspices of other departments [O]. This would involve deliberate attention to the informing the development of networks of high level allies [O].

4 CONCLUSIONS – from Science and Society to Science in Society

This report began by describing the powerful conflicting imperatives now bearing both on the governance of science and the role of science in governance in Europe. Major policy initiatives on the part of member states and the European Union as a whole are seeking to reconcile the competitive drive to build a '*knowledge based society*' in global markets, with agendas of '*democratic governance*' and high level policy objectives concerned with '*sustainability*' and '*precaution*' in the governance of science and technology.

Drawing on intensive deliberations among 37 leading figures in the European 'science and society' community, the innovative '*Gover'Science*' *Seminar* explored a rich array of ensuing issues. In particular, attention focused on experience and concrete lessons arising from activities in the field of risk communication, science advice, and public engagement in research and innovation.

Despite many differences of emphasis and detail, the Seminar revealed a number of broadly shared understandings of the current status of the role of science in governance and the governance of science.

One concerns the importance of recognising key qualities in effective processes of public engagement. These allow a distinction to be made between different *reasons for an interest in public engagement*:

- *normative democratic aims* involving criteria including equity and legitimacy;
- *substantive* objectives concerning *sustainability*, *precaution* and the *robustness* of decisions;
- *instrumental* interests over *public trust* and the *credibility* of existing policies and institutions.

In a fashion that is detailed in the main report and outlined in the Executive Summary, the resulting qualities were identified as *distinguishing features of genuine public engagement*:

- inclusion of a *wide diversity of social actors*;
- facilitation of *symmetrical two-way dialogue*;
- the building of *open in-depth deliberation*;
- the prioritisation of *empowerment and agency* on the part of the participants' themselves;
- the enabling of '*upstream engagement*' at the earliest stages, when the '*framing*' of research and policy-making are still open to real influence.

In seeking to support moves towards these forms of engagement, the Seminar identified a series of *challenges* in the general governance environment:

- misunderstandings embedded in the cultures of high-level science governance institutions concerning the status of *public knowledges* and pervasive *nature of uncertainties* on science and technology;
- a reluctance to accept that decisions over scientific research and technological innovation involve the *interplay of social values and interests*, as well as specialist expertise and analysis;
- a general tendency on the part of existing science governance processes to *forestall*, *dilute*, *divert*, *constrain* and *neglect* the implications of genuine exercises in public engagement.

These challenges are matched by recognition of some corresponding *shortcomings* and *responsibilities* on the part of advocates, practitioners, researchers and policy specialists in public engagement:

- to be *measured* and *realistic* about what can and cannot be achieved by public engagement;
- to strive for greater *independence* and *professionalism* and more serious attention to *evaluation*;
- to pay greater attention to the *effective communication of science* both within and outside the engagement process;
- in particular, to devote greater care to the role of the media and the Internet;
- to be more clear about the relationship between public engagement and representative democracy – and make this an explicit focus of attention in participatory exercises themselves;
- to address policy makers in a clear and persuasive fashion: making a clear '*business case*';

There results from this a series of more detailed conclusions over the ***robust design*** of public engagement processes in science governance, involving aspects such as:

- a focus at the earliest stages of policy on framings of the ***driving interests, purposes and visions***;
- ***continuous nested*** processes of engagement at ***many scales and stages***, not one-off exercises;
- prioritising attention to the ways that social ***interests*** and ***values interact*** with the ***detailed science***;
- securing ***autonomy from sponsors***, allowing participants to ***influence process design***;
- be as inclusive as possible given goals and expectations, ***don't overstate representativeness***;
- be ***proportionate*** in the costs of the process and ***responsible*** about the costs of recommendations;
- seek ***independence in pluralism and diversity***, rather than objectivity and neutrality;
- devote as much attention to the role of engagement in '***opening up***' as well as '***closing down***' the options for decision making.

Taken together, these emerging aspects of public engagement in science governance amount to a new form of research process, which might be termed '***co-operative research***'. This involves both researchers and non-researchers in close co-operative engagement with stakeholders and public constituencies. As such, it spans the spectrum of approaches from interdisciplinary collaboration to citizen participation and embodies the following key features:

- The process of '***social learning***' is as important as the scientific or policy outcomes that arise.
- The '***framing***' is an ***explicit and autonomous*** part of the research process itself.
- Diverse ***knowledges*** and ***values and interests*** are treated in a ***symmetrical*** fashion.
- Processes of ***design, implementation*** and ***dissemination*** are better ***integrated*** in research.
- A ***wide variety of specific methods and approaches*** to inclusive engagement are all included.
- ***Science holds a central role*** as a way to ensure communication, transparency and accountability.
- ***Social science*** is crucial in framing, not just in presenting research and appraising social impacts.
- To these ends, there is a promising role for ***co-operative research on co-operative research***.

In the end, the key challenge in realising the full promise of co-operative research for the wider process of science governance, lies in a shift in our basic understanding of the relationship between science and society. We need to move away from the fragmented, introspective and reactive preoccupations of ***science and society***, towards more integrated, open and proactive understandings of the inescapable place of ***science in society***.

5 ANNEXES ON SEMINAR STRUCTURE

Annex A: Introductory Presentation

Gover' science seminar
Rationale and expectations

« Where do we stand since the white paper on governance? »

Nicole Dewandre
Head of Unit "Scientific advice and governance"
Directorate "Science and society"
DG Research-European Commission.

- a beauty ~~contest~~
- an exchange ~~of~~ information

...but a move toward a framework conducive to a greater maturity of **society** in dealing with **research**.

Through challenging:

- « golden age » references
- symptom-based visions of policy makers.

What I/we have learned.

What I wonder.

Guess.

Lesson 1:
Avoid the deficit model, involve the citizen.

Lesson 2:
Need for independence of scientific advice.

Lesson 3:
Avoid repetition of GMO story.

Lesson 1
What I /we have learned:
Avoid the deficit model, involve the citizen.

What I wonder:
How to avoid the « exotic » view of the citizen?

Guess:
Interactions between different forms of knowledge.

Lesson 2
What I /we have learned:
Need for independence of scientific advice.

What I wonder:
How to avoid « overexpectations » from scientific knowledge?

Guess:
Judicialisation.

Lesson 3
What I /we have learned:
Avoid repetition of GMO story.

What I wonder:
Limits of precaution and anticipation.

Guess:
???





operative fictions
(citizen, independent advice, precaution)

↓

operational modes of governance
(scientists, industry, third sector).

Annex B: Project Websites for Further Information

BIONET	http://www.bionetonline.org/
CIPAST	http://www.cipast.org/
CONNEX	http://www.mzes.uni-mannheim.de/projekte/typo3/site/fileadmin/research%20groups/4/RG4%20Work%20Programme1.pdf
DECIDE	http://homepage.mac.com/bandelli/CV/articles/Portfolio-governance-DECIDE.pdf
DOTIK	http://ica.cordis.lu/search/?fuseaction=proj.simpdocument&PJ_RCN=7640405
ECD-MOM	http://www.meetingmindseurope.org/europe_default_site.aspx?SGREF=14
EUROPTA	http://www.eptanetwork.org/EPTA/documents/europta.php3
INTERACTS	http://members.chello.at/wilawien/interacts/main.html
ISSNET	http://www.scienceshops.org/new%20web-content/content/about-ISSNET.html
LEARNING	http://www.inra.fr/learning/
MESSENGER	http://www.messenger-europe.org/
NANODIALOGUE	http://www.nanodialogue.org/
PABE	http://www.lancs.ac.uk/depts/ieppp/pabe/
PARADYS	http://www.uni-bielefeld.de/iwt/paradys/German_start.html
PARCEL	http://parcel.uni-sofia.bg
PATH	http://www.macaulay.ac.uk/serp/research/path/index.html
PEG	http://technology.open.ac.uk/cts/peg/index.htm
RAISE	http://europa.eu.int/comm/research/environment/newsanddoc/article_2381_en.htm
RISK NETWORK	http://ica.cordis.lu/search/index.cfm?fuseaction=proj.simpdocument&PJ_RCN=7640421&CFID=4455764&CFTOKEN=95396161
SACRIMM	http://ica.cordis.lu/search/?fuseaction=proj.simpdocument&PJ_RCN=7494697
SAFMAMS	http://europa.eu.int/comm/research/science-society/pdf/portfolio/governance-safmams_en.pdf
STAGE	http://www.stage-research.net/STAGE/
STARC	http://ica.cordis.lu/search/?fuseaction=proj.simpdocument&PJ_RCN=7640396
TAMI	http://www.ta-swiss.ch/www-remain/projects_archive/methods/TAMI_e.htm
TRAMS	http://www.scienceshops.org/new%20web-content/content/about-TRAMS.html
TRUSTNET-IN-ACTION	http://www.trustnetinaction.com/

[Back to contents page](#)

Annex C: Participants*EC funded project partners*

L. Amodio	Citta della Scienza, Italy	amodio@cittadellascienza.it
A. Bandelli	Free University of Amsterdam	andrea@bandelli.com
T. Bandle	HSE, UK	tony.bandle@hse.gsi.gov.uk
H. Banthien	IFOK, Germany	henning.banthien@ifok.de
S. Bradley	SIRC, UK	simon@sirc.org
C. Carter	Macaulay Institute, UK	c.carter@macaulay.ac.uk
M. Decker	ITAS, Germany	michael.decker@itas.fzk.de
Y. Dien	EDF, France	yves.dien@edf.fr
D. Ducoulombier	Cite-Sciences, France	d.ducoulombier@cite-sciences.fr
P. Healey	Oxford University, UK	peter.healey@martinstitute.net
B. Hubert	INRA, France	hubert@avignon.inra.fr
P-B. Joly	INRA, France	joly@ivry.inra.fr
W. Kenyon	Macaulay Institute, UK	w.kenyon@macaulay.ac.uk
F. Larat	University of Mannheim, Germany	fabrice.larat@mzes.uni-mannheim.de
C. Marris	INRA, France	marris@ivry.inra.fr
P. Marsh	SIRC, UK	peter@sirc.org
P. Rodari	SISSA, Italy	paola@medialab.sissa.it
C. Sessa	ISIS, Italy	mc7920@mcmlink.it
M. Sogaard Jørgensen	Danish Technical University	msj@ipl.dtu.dk
M. Strähle	Wissenschaftsladen Wien, Austria	wilawien@adis.at
T. Vandensande	KBS-FRB, Belgium	vandensande.t@kbs-frb.be
P. Walker	New Economics Foundation, UK	perry.walker@neweconomics.org
V. Wallaert	Mutadis, France	vincent.wallaert@mutadis.fr
D. Wilson	IFM, Denmark	dw@ifm.dk

Organising Team

N. Dewandre	European Commission	Nicole.Dewandre@cec.eu.int
P. Galiay	European Commission	Philippe.Galiay@cec.eu.int
V. Willis-Mazzichi	European Commission	Viviane.Willis-Mazzichi@cec.eu.int

Facilitator

J. Mayer-Ries	IFOK, Germany	joerg.mayer-ries@ifok.de
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Rapporteur

A. Stirling	University of Sussex, UK	a.c.stirling@sussex.ac.uk
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Other Attendees from the European Commission

M. Bonazzi	European Commission	matteo.bonazzi@cec.eu.int
P-D. Caracostas	European Commission	paraskevas-dimit.caracostas@cec.eu.int
H. Lederer	European Commission	harald.lederer@cec.eu.int
M. Menapace	European Commission	monica.menapace@cec.eu.int
A. Pereira	European Commission	angela.pereira@jrc.it
C. Ramjoue	European Commission	celina.ramjoue@cec.eu.int
M. Virdis	European Commission	maria-rosa.virdis@cec.eu.int
J. Voigt	European Commission	jana.voigt@cec.eu.int

[Back to contents page](#)

Annex D: Detailed Agenda**Day 1 – November 24, 2005**

- 9.30 Welcome, Jean-Michel Baer, Director, “Science and Society”, DG RTD-C, European Commission
- 9.40 Participants introduction round: “What do I expect?”, Jörg Mayer-Ries, IFOK
- 10.10 Rationale and expectations of DG Research: “Gover’Science: where do we stand since the White Paper on Governance?”, Ms. Nicole Dewandre, Head of Unit, “Scientific Advice and Governance”, DG RTD-C, European Commission
- 10.45 “The ABC of Gover’Science Seminar”, Jörg Mayer-Ries, IFOK

A WHERE ARE WE NOW?**A1 Focus on thematical aspects: Exploring projects contributions to specific scientific and thematic fields (five parallel thematic workshops)**

- 11.15 Information exchange between projects and with the participation of Commission’s officials along the following grid:
- What is the expected impact of your projects and how to maximise it, in cooperation with the policy-makers in charge of the thematic area?
 - What, in your projects, is specific to the thematic area and what can be generalised beyond the thematic area?
 - What is your perception of the constraints and boundary conditions you are facing?

GC1: Biotechnology¹⁵ / GC2: Health¹⁶ / GC3: Environment/ energy¹⁷

GC4: Industrial technologies and ICTs¹⁸ / GC5: Generalist approaches to Gover’Science¹⁹

- 12.30 Lunch break

A2 Focus on methodological aspects: Shaking concepts of and behind projects, testing their robustness (three plenary question rounds)

- 13.30 “Participation (Inclusive governance), Risk and Scientific advice: Critical analysis of three Governance dimensions across the projects”, Mr. Jörg Mayer-Ries, IFOK
- 13.45 “Participation” panel²⁰ (Inclusive governance), with Ms. Wendy Kenyon (The Macaulay Institute, UK), in the role of the “*shaker*”
- 14.30 “Risk” panel²¹, with Mr. Ortwin Renn (Dialogik, DE) in the role of the “*shaker*”
- 15.15 “Scientific advice” panel²², with Ms. Claire Marris (INRA, FR) in the role of the “*shaker*”
- 16.00 Coffee break

¹⁵ DECIDE, LEARNING, PABE, PEG, TRUSTNET

¹⁶ BIONET, ECD-MOM, MESSENGER, RISK NETWORK

¹⁷ PATH, RAISE, SAFMAMS, TRUSTNET

¹⁸ NANODIALOGUE, NANOLOGUE, PATH, TAMI, PARCEL

¹⁹ CIPAST, CONNEX, DOTIK, INTERACTS, ISSNET, PARADYS, STARC

²⁰ The « Participation » panel will be constituted of representatives from CIPAST, DECIDE, DOTIK, ECD-MOM, NANODIALOGUE, PARADYS and PATH (including “shaker”)

²¹ The « Risk » panel will be constituted of representatives from RISK NETWORK, STARC and TRUSTNET (including “shaker”)

²² The « Scientific Advice » panel will be constituted of representatives from INTERACTS, MESSENGER, PABE, SAFMAMS and TRAMS (including “shaker”)

B WHERE ARE WE HEADING TO?

16.20 Opening "Gover'Science Space" Nr. 1

Plenary round raising ideas for parallel workshops called "Gover'Science Cafés"
From projects to collective issues:

- Identifying common research issues
- Fostering institutional and social change
- Revisiting strategy for Gover'Science

17.00 Start of the first round of "Gover'Science Cafés"

Up to 5 parallel "Gover'Science Cafés" in Rooms 9G (18), 8M (10), 8E (25), 6L (15), 3E (20)

18.00 Short feedback and outlook for Day 2, Facilitator and "Gover'Science Cafés" leaders

18.30 Mingling cocktail:

Day 2 – November 25, 2005

9.00 Welcome and presentation of Day 2 agenda, Mr. Philippe Galiay, DG RTD-C2, European Commission, and Mr. Jörg Mayer-Ries, IFOK

9.15 Start of second round of “Gover’Science Cafés” (continuation of B)

Up to 5 parallel “Gover’Science Cafés” in Rooms 9G (18), 8M (10), 6L (15), 3E (20), 2F (25)

10.15 Coffee break

10.45 Wrap up and next steps: What are the main points achieved/missing?, Facilitator and “Gover’Science Cafés” leaders

C HOW CAN WE MAKE IT HAPPEN?

11.15 Opening “Gover’Science Space” Nr. 2

Plenary round raising ideas for parallel workshops called “Gover’Science Cafés”

Implementing synergies and synthesizing results

- How can conclusions be made operational and synergies realized?
- Which are the implications for our/other projects?
- Which are the implications for DG Research?

9.15 Start of “Gover’Science Cafés”

Up to 7 parallel “Gover’Science Cafés” in Rooms 9G (18), 8M (10), 6L (15), 3E (20), 2F (25)

12.45 Lunch break

13.45 Wrap up of “Gover’Science cafés” outputs, Facilitator and “Gover’Science Cafés” leaders

14.15 Impressions from the Rapporteur, Mr. Andy Stirling, Sussex University, (UK)

15.30 Are we far from the initial expectations?, Mr. Jörg Mayer-Ries, IFOK, (DE)

15.45 Food for thoughts on the way home, Mr. Philippe Galiay, DG RTD-C2, European Commission

15.55 Concluding words, Ms. Nicole Dewandre, Head of Unit, “Scientific Advice and Governance”, DG RTD-C, European Commission

16.00 Closure of the seminar

[Back to contents page](#)

6 ANNEXES ON SEMINAR OUTPUTS

Annex E: Thematic Discussion on Biotechnology Projects

Projects assigned to this group by the organisers for consideration and discussion were 'DECIDE', 'LEARNING', 'PABE', 'PEG' and 'TrustNet' (see Annex B for details). These are the bullet points used by the discussion group to summarise their conclusions:

- An initial query was raised in relation to the introductory discussion as to whether – as exemplified in the biotechnology field – participatory process actually does hold an 'added value' in relation to other governance procedures? This is a contested notion.
 - Responses identified the benefits of participation as a means to inform the 'framing' of decision making and as a way to promote wider 'stakeholding' in policy decisions.
 - Important subordinate queries are raised in relation to "who?", "when?" and "where?" to participate and in considering the appropriate level (local, national or international).
 - A further issue concerns the need for clarity in advance of any exercise over the actual nature of any link between participation and decision making. At the least, participatory processes increase the responsibility of decision makers to explain the rationale behind decisions.
 - Contrary to some assertions, the point was made that participation is not simply about the exchange of opinions, but also about deliberation over interests,
- A point which followed from this concerned the apparent lack of feedback from the many EC-funded research projects in the biotechnology area and the actual development of policy in this field.
 - This was held to display a lack of political backing for participatory governance at both national and EC levels.
 - Such political backing is a major requirement in order for further progress to be made in this area.
 - In this respect, the existence of the 'science in society' unit in DG RTD is a mixed blessing. It can act as a champion, but also as a means of containing this work as an uninfluential ghetto.
- Discussion then moved to the lessons learned in the biotechnology field over the relationship between participation and scientific expertise. Different opinions were expressed over the appropriate sequencing of expert scientific and participatory inputs into policy making.
 - One view sees participation as framing the queries for science.
 - Another sees science as crucial in providing the evidence base for deliberation.
 - A third view concurs with the prior importance of science, viewing participation simply as a means to communication.
- Moving on to the conditions under which participatory process may be more favoured in governance, the biotechnology field suggests that this is when established 'old fashioned' approaches manifestly fail.
 - This may arise in the face of the intractable complexity of an issue like agricultural biotechnology.
 - Or it may emerge from a situation of acute political conflict, as was the case on GM crops.
 - Or a crucial role may be played by 'unusual psychological maturity' on the part of key individual policy makers.

[Back to contents page](#)

Annex F: Thematic Discussion on Health Projects

Projects assigned to this group by the organisers for consideration and discussion were 'BIONET', 'ECD-MOM', MESSENGER', and 'Risk Network' (see Annex B for details). These are the bullet points used by the discussion group to summarise their conclusions:

- With respect to the ***impacts*** of work in this area, a series of lessons have been learned:
 - There is a need to focus on:
 - institutional means to embed participatory processes in existing governance institutions.
 - the consolidation of best practice criteria.
 - ensuring concrete 'follow up' – including the use of participation results in policy making.
 - the involvement of key stakeholders in order to engage and stimulate wider public debate.
 - A distinction must be made between long term and short term impacts
 - Likewise, a distinction should be made between direct and indirect results. This raises important questions over the need for realism over goals in advance of participatory process.
 - There is a strong need for more clear, consensual and operational assessment methods (for deciding on design *ex ante*) and evaluation techniques (for appraising performance *ex post*).
- With respect to more ***general issues***:
 - it is important not to underestimate the implications of the different structures of knowledge held by academia and among the general public.
 - But caution must be exercised in generalising from specific experience, which can be highly particular to individual thematic case areas.
- With respect to the ***constraints*** on participatory process:
 - One such is the unwillingness of different actors to engage in participatory process. This is so both civil society groups and large pharmaceutical companies, with concerns over their image.
 - Another arises from the tensions between the procedures of representative democracy and those of participatory process. This results in serious questions being raised over the 'representativeness' of participatory exercises. This is a highly context-dependent factor.
 - A further challenge is provided by the need to ensure long term continuity in participatory processes, rather than isolated one-off projects and exercises.
 - The crucial role of issue framing in advance of participatory process is a further constraint, in that it can be a source of persistent ambiguity or conflict.

[Back to contents page](#)

Annex G: Thematic Discussion on Environment / Energy Projects

Projects assigned to this group by the organisers for consideration and discussion were 'PATH', 'RAISE', 'SAFMAMS', and 'TrustNet' (see Annex B for details). These are the bullet points used by the discussion group to summarise their conclusions:

Discussion moved from the specific lessons learned in individual projects, through to general challenges and the implications raised for governance.

- One key issue arising from the PATH project concerns representation in participation. The following queries are not resolved:
 - Who is able to participate? Who wants to participate? Who is invited? What of future generations?
 - Large assemblies can address this (like 'America Speaks' with 5,000 people), but raise questions over the quality and cost of deliberation.
 - Distinctions are necessary between different: scales, geographies, timings, issues, classes. Scaling up geographically seems to work: but time is more difficult.
- Other questions from the TrustNet experience concern procedures for inclusion and closure.
 - It cannot be assumed that improved education and learning will of itself enhance citizenship such as to foster closure: the more educated people are, the more strongly do beliefs tend to be held.
 - Realising that education does not hold the answer, participation offers four types of response:
 - Where the process seeks to include a microcosm of all relevant interests (this can help participation act make decisions, but tends to be possible only in homogenous societies).
 - Where the process focuses on the competition between arguments (after Habermas), such as practised in larger states like the UK and Germany. Here the aim is to explore heterogeneity, not push consensus.
 - Where the process aims to strike a balance between different organised interests through mediation. This is a more corporatist model highlighting negotiation and bargaining.
 - Where the process follows a 'feedback model' of preferences, using techniques like focus groups, citizen groups, responsible are programmes in order to inform policy making.
 - Some key lessons that arise from this are as follows:
 - Don't get messed up with the ideological issues, you will not resolve them. This is exemplified by the Trustnet participatory project on a large energy project in Bavaria.
 - Ensure sufficient room for agreements and creative options outside usual ideological camps.
 - Make sure that representatives in the process bring their own home constituencies with them in negotiation. Otherwise, the process may exacerbate rather than alleviate conflict.

- The SAFMAMS project highlights a further series of issues:
 - Conventional models of science are unrealistic for the present crisis in fisheries. There is a need for greater emphasis on teamwork. Scientists themselves want to change the nature of science.
 - In this regard, the crucial role of science is to provide transparency – rendering explicit how different conclusions have been reached.
 - Participation is occurring, but big questions remain over the outcomes? How can we make it more effective and inclusive?
 - In the case of fisheries, the dilemma of the commons makes the issues especially intractable, but the open recognition of the depth of the present crisis provides a strong directive for change.
- Discussion of the RAISE project introduces a final set of questions arising from individual projects:
 - The links between participatory and representative democracy are problematic: there are dangers in seeking forms of democracy that are 'too representative'.
 - A key challenge lies in making science itself more participatory. The complementary role between research and participation is often missed – not just scientific but also social research.
 - Motivation plays an essential role. In his experience, this can be especially strong if the project is associated with a European dimension. But this may vary with national context.
 - A key role for the links between citizen and scientific knowledge lies in exploring the assumptions underlying the latter.
 - Participation can be costly and time-consuming, and is not suited for all issues. For instance, it is less effective on purely ideological, too technical or uncontroversial issues.
- A series of general challenges emerge from this.
 - There is a tension between the aspiration to self-governance on the part of science and the importance of the functional role played by science in society
 - There is contestation and lack of clarity over the relationship between different sources of knowledge: systematic, experiential and anecdotal (lifeworld)
 - There is no final answer to the problem of inclusion: who should be consulted, by what means, on which aspects and to what degree?
 - Likewise, the problem of closure remains unresolved (!): under what circumstances is closure more beneficial than 'opening up'; how best to achieve closure? Under which appropriate rules?
- This raises a series of final risk governance issues.
 - Handling risks always involves intractable issues of complexity, uncertainty and ambiguity, each with different governance requirements.
 - Science, administration, industry, civil society all exercise different roles. The latter group itself comprises a diversity of actors: corporatist players, NGOs, non-organized public and the media.
 - The result is a series of tensions around the roles of 'sound science', precaution and participatory procedures in the framing, assessing, evaluating and managing of risks.

[Back to contents page](#)

Annex H: Thematic Discussion of Industrial Technology Projects

Projects assigned to this group by the organisers for consideration and discussion addressed issues on nanotechnology and information and communications technology and comprised the 'Nanodialogue', 'Nanologue', 'PATH', 'SACRIMM', 'TAMI' and 'PARCEL' (see Annex B for details). These are the bullet points used by the discussion group to summarise their conclusions:

- One of the two fundamental challenges that arise in this field is the understanding and communication of **uncertainty**.
 - This can take many forms: with science, policy making and social behaviours all presenting different areas of uncertainty
 - What is required are meaningful ways to address and integrate these different aspects of uncertainty and articulate these both with novel procedures for public and stakeholder engagement and with existing forms of science governance alike.
- The second fundamental challenge that arises in this field is the question of how to go about the **framing** of science governance problems.
 - Specific questions that arise here concern:
 - When this framing should take place?
 - Who should different aspects be framed by?
 - Which voices should be heard and not heard and what rules govern which are accepted or not accepted?
 - Noting a significant lack of 'upstream engagement', it is clear that there is an important niche for more participatory forms of foresight and/or other ways to include wider considerations of context, issues and relevant values.
 - This raises questions over the best way to embed this back into existing governance structures.
 - In addressing this, information and communication technology fulfil an interesting dual role: in being both a potential object of, and a medium for, scrutiny. Here, there is a need to investigate:
 - The extent to, and conditions under, which ICT can provide an infrastructure for scaling up participatory processes.
 - The positive and negative features of the ways in which ICT can mediate more participatory governance. An example in this latter regard which does not currently seem to be working well is the EC consultation facility the 'your voice portal'.
 - It is important in this area not to be misled by the rhetoric, but to attend always to the practical transformations that are actually successfully achieved.

[Back to contents page](#)

Annex I: Thematic Discussion of General Projects

Projects assigned to this group by the organisers for consideration and discussion were 'CIPAST', 'CONNEX', 'DOTIK', 'EUROPTA', 'INTERACTS', 'ISSNET', 'PARADYS', 'STAGE', 'STARC' and 'TRAMS' (see Annex B for details). These are the bullet points used by the discussion group to summarise their conclusions:

The group began by reviewing in turn, the main features of each project represented in the group. This information is summarised in Annex B. Discussion then moved on to general issues arising from the impacts of these and similar projects.

- The impacts of the projects thus far fall into a range of categories.
 - The Commission itself displays some interest through engagement with, and confidence in, ongoing work and through a commitment (in cases like the TRAMS project) to disseminate results.
 - For projects in the field of science shops there are questions around whether impacts take the form of adoption as part of university curricula, or as a parallel or superordinate element.
 - The ambiguities in answering questions over impacts highlights the need for the study of impacts as a research topic in its own right.
- In considering the question of evaluating outcomes, the question is raised as to the purpose of participatory process in the first place.
 - To some policy makers, participatory process is simply a new way to manage the delivery of pre-decided policy. This is most true where implementation of decision making is seen to be 'blocked'.
 - To others, including practitioners and participants, participatory process is a means to deciding on the policies themselves.
 - Each view is associated with different evaluative criteria for judging impacts. A consequence of this tension is that debates can become highly polarised.
 - There is a particularly acute mismatch between the 'top down' perspective of senior policy makers and the 'bottom up' rhetoric with which initiatives are described and associated expectations on the part of stakeholder communities themselves.
- A major challenge underlying much of this discussion, is the fundamental tension between the Lisbon Agenda on competitiveness and the pressure for more citizen participation.
 - This raises questions over the degree of commitment within the EC institutions as whole to the kind of self reflection and openness to self criticism that is associated with a genuine willingness to engage.
 - This applies not only to 'upstream' engagement with stakeholders and wider civil society at an early stage in the policy making process in science governance, but also to 'downstream' evaluation of policy initiatives after the fact.
 - With regard to this downstream evaluation, it has become clear from a number of projects just how difficult it is to measure impacts – positive or negative. This is due to factors such as:
 - Context specificity
 - Long time lags
 - Ambiguities in the dissemination process due to language and media
 - Despite considerable efforts, for instance, the STAGE project was unable to 'sell' the case for participation at one policy makers workshop. Instead of more prescriptive guidance, the project resorted to producing a set of '10 lessons'.

- This in turn highlights the importance of developing a coherent 'business case', for persuading sceptics (especially senior policy makers) of the value of participatory process, even in terms of their own priorities.
 - This requires the participation community to take more seriously the very real constraints acting on decision makers.
 - It also requires going beyond persuasive resources alone, to develop clear operational frameworks and tools for implementing participation.
 - One feature of this more sensitive engagement by the participation community, requires greater appreciation of the difference between decision/policy taking and decision/policy making.
 - decision/policy making is the broader analytic, deliberative and wider communicative process which conditions and informs eventual commitments to particular decisions or policies.
 - decision/policy taking is the actual point of commitment to the particular decision or policy, often by an indenfitiable and accountable official or politician.
- A series of further reflections are prompted on the practical implications raised by this discussion:
 - The need to concentrate efforts and resources on raising awareness among policy makers.
 - A need for training and competence raising among the community or researchers and practitioners.
 - A need for operational processes to broaden the framing of narrow risks, to address social priorities.
 - A need for practical frameworks for the monitoring and evaluation of the participatory processes and for the analysis of their policy impacts.
 - A need to build 'business cases' for participatory process, such as to be persuasive for all key stakeholders.

[Back to contents page](#)

Annex J: Plenary Discussion on Risk Research

These are the responses to key questions posed to the plenary panel by the discussion 'shaker' [according to notes taken by the Rapporteur]:

- *What are the most interesting findings that emerge from these projects?*
 - The ability of lay people, when engaged with the right information and under appropriate conditions to understand highly complex technical issues.
 - The value of public engagement as a means to pose salient critical questions of a kind that might otherwise be neglected.
 - The paramount need for openness and honesty in the communication of uncertainty.
 - The potential for stakeholder engagement also to help find a basis for negotiated resolutions of intensely contested issues, as in the example of the work of TrustNet Project on a contaminated land problem in Brescia, Italy. Here it was the process of sharing of scientific and community knowledge about contamination, and the spirit of partnership in resolving the issue, that helped lead to voluntary agreements on the part of farmers to withdraw from cultivation of affected land.

- *How is it possible to communicate effectively with lay people on complex risk questions?*
 - There is no one answer to this, and experience, knowledge and ideas of best practice are still developing.
 - The notion that the general public have an unsophisticated understanding of probabilities, is still a problem.
 - It is also possible to under-appreciate the implications of poor communication.
 - An evolutionary perspective was propounded from one individual as a response to this question, under which public anxieties on technological risk are perceived as an expression of a genetically innate predisposition to fear engendered by the lifestyle of 'stone age hunter-gatherers', but now projected irrationally onto other causes, even under situations which are objectively much safer.
 - There was strong disagreement among risk project representatives over the statement that life is objectively safer now than in the past, and whether such a mode of comparison is relevant. In respect of recent trends, currently declining levels of occupational health and safety in many European countries were cited as an example (argued to be even more salient globally).
 - The 'risk amplification' model helps to address the complexities that underlie this question, including situations in which the general public are perceived by expert communities as unduly sanguine, as well as irrationally anxious, about risks.

- *How is it possible to reconcile the contentious dispute between 'sound scientific' (as in the US) and 'precautionary' (as in Europe) responses to uncertainty? How can we ensure proportionality in risk governance under these conditions?*
 - Again – reflecting this dichotomy – there is still much uncertainty within the specialist risk community as to how most rigorously to deal with uncertainty
 - All risk issues involving uncertainty, no matter how technical, are political at root. This precludes a reliance on 'sound science' alone, and requires explicit attention to measures to ensure democratic accountability. The tendency of decision makers to hide behind science is unhelpful.
 - Another feature of scientific uncertainty is the importance of socio-political ambiguity – a plurality of different interests, priorities, understandings, values and visions. This has a tendency to increase the interpretive flexibility of scientific uncertainty and further polarise the ensuing policy discourses.

- The view was expressed by one individual that there is currently much too much discussion about uncertainty. Far from being a novel feature of modern risk debates, it is a perennial feature of everyday life. The conclusion was drawn from this, that the answer therefore lies in paying less attention to it.
- To this latter intervention, there was again very strong disagreement from a number of quarters. Why should the familiarity and pervasiveness of uncertainty suggest a need for less attention. Under this view, the problem lies rather in the insistence by risk governance institutions that uncertainty should be dealt with as if it were mere risk – subject to probabilistic analysis. This is technically invalid, socially naïve and politically unwise. The solution lies rather in much more open and deliberate attention to uncertainty and a willingness on the part of specialists to move away from exclusive reliance in probabilistic approaches to risk assessment. The view was also expressed that there is currently much too much hubris on the part of scientists, and much too little transparency on the part of regulators, on the handling of uncertainty.
- The findings of the PABE project were discussed as an example of this latter point. Here, an in-depth focused group methodology showed that the public are not confused about uncertainty itself, but sceptical about the way in which vested interests can distort understandings and action under uncertainty. There was a feeling of there being not enough, rather than too much, policy discussion.
- With reference to the example of nanotechnology, the point was made that the apparent tensions over the achieving of proportionality under principles of 'sound science' and 'precaution' can be resolved by applying a 'principle of responsibility' – requiring ethical behaviour on the part of the scientists and risk governance institutions themselves.

[Back to contents page](#)

Annex K: Plenary Discussion on Participation Research

The 'shaker' began with a presentation, with the following key points ensuing in discussion [according to notes taken by the Rapporteur]:

- *The 'shaker' focused on the need to get senior policy makers interested in participatory approaches.*
 - A diagram was shown presenting participation as a linear process leading from 'distrust', through stakeholder involvement, to the building of credibility and capacity and a consequent rise in expectations, on finally to the delivery of more effective policy decisions and research outcomes.
 - Against this background, the challenge was presented as an instrumental matter of identifying which forms of participation work in which contexts and then effectively communicating this in policy debates – requiring contributions from academics, practitioners and policymakers alike.
- *Disagreement was expressed with this view on three counts:*
 - It takes for granted that there is a common understanding of the nature, role and purpose of participation, when in fact these are the subject of very different understandings according to different interests.
 - In particular, it highlights an understanding of participation as a means to restore trust and credibility. This is only one view favouring the perspective and interests of policy makers – under which participation is seen as a form of elaborate consultation. Another view is that participation is about making the decisions themselves.
 - Under real world conditions of divergent interests and political conflict, it is in practice highly unlikely that participation can deliver unqualified levels of credibility or trust. This view is therefore in danger of undermining participation, by delivering expectations on the part both of policy makers and the wider public, that simply cannot be met.
- *In response, there was a discussion of Arnstein's 'ladder of participation'.*

[This envisages successive steps in decreasing 'tokenism' and increasing 'citizen power', running from: (non-participatory) 'manipulation' and 'therapy', through 'information', 'consultation' and 'placation' to 'partnership', 'delegated power' and finally 'citizen control'].

 - This was identified as a straightforward and elegant way of distinguishing contexts in which action is undertaken successively 'on', 'for', 'to', 'with' and 'by' the people in question.
 - Under one view, the solution then lies in deciding on the appropriate 'level of participation' to adopt in this sequence.
 - Under another view, the scheme is simplistic and itself open to rhetorical manipulation, prompting a responsibility on the part of social scientists to come up with something that is more clear and challenging.
- *Another strand of discussion focused on the role of knowledge itself as a barrier to uptake of participation.*
 - This was in some ways expressed as a lack of knowledge on the part both of policy makers, stakeholders and the general public about participation. In other ways, however, barriers can arise from a lack of knowledge on the part of potential participants about the issues that are to be the subject of participation, where people are inhibited by their own self-identified (or perceived) lack of knowledge. Either way, this can lead to a reinforcing in existing inherent bias in favour of more educated – or more confident – middle class people.

- There is a danger associated with romantic notions of citizen knowledge, to the effect that anyone can become an expert under the right circumstances. The argument was put that this is a problem for three reasons, because:
 - (i) there are real limits to the degree of expertise that can be achieved;
 - (ii) participants typically do not want to be 'educated' in the necessary ways;
 - (iii) such expertise is in any case unnecessary, because it is already available.

This leads to a conclusion that participation should be framed in terms of the values and interests that are in play, rather than in terms of the knowledge claims.

- *This highlighted the need for more sophisticated understandings of the nature and role of expertise and different kinds of 'expert'.*
 - Expertise on a particular area of science, contrasts, for instance, with expertise on uncertainty, which may be very salient to that same science.
 - Likewise, 'lay' expertise on the contexts, values and interests bearing on a science governance challenge contrasts with formal sociological or policy expertise on the same area.
 - Expertise on appropriate process is likewise fragmented. And there are associated dangers that the communication of participation processes and results can become so highly technical that this itself is a barrier to uptake.
- *There are also some other deep-seated inherent tensions, which are not self-evidently resolved by linear ideas of successive degrees of participation.*
 - A 'Habermasian' position in favour of highly participatory engagement, is subject to processes of random or biased self-selection which may be seen to conflict with ideas of representative democracy.
 - Even where great care is taken with provision for 'representativeness' in recruitment, the process of deliberation itself will in itself make a participatory group unrepresentative. This can raise practical problems of legitimacy.
 - The same process can lead to the development of significant forms of specialist expertise among the participating group, as is often the case with patient's groups in the medical field.
 - Similar intractable challenges lie in other aspects of process legitimacy, beyond representativeness. In the real world of limited time and resources for participation and a wider environment of contending values and interests, unwelcome outcomes of participation can always be challenged on legitimacy grounds. Even where a single conclusion is reached, it is unrealistic to expect this simply to be accepted by everyone.
- *Another strand of discussion focused on the appropriate role of policy makers in relation to the framing, conduct and interpretation of participatory exercises.*
 - One concern was raised that policy makers themselves may often be unduly excluded from participation. If the practitioners or social scientists involved in the design of participation do so without engaging sufficiently with policy makers, then the framing of the exercise might be seen as inappropriate or useless. Likewise, a disinterest on the policy process on the part of the natural scientific community can also act to amplify this danger. More normatively, the view was also put that policy makers have as much right to be involved as anyone else.

- A countervailing danger is that provision for early or strong engagement by powerful policy makers in participation will reduce the ability of others to frame the exercise and outcomes in challenging ways, thus producing a result more at the 'manipulative' end of Arnstein's ladder. In one example of current experience in this regard, strong tensions developed between the 'framing' of the issue favoured by parliamentarians and those of other participants. Policy makers display inherent reluctance to others interfering with their agendas.
- In support of this latter concern, the point was made that there are many examples of how a shift in the framing of an issue away from that favoured by policy makers is one of the principal benefits of participation. Examples include the way that the framing of discussion on animal testing shifted away from questions over the numbers and conditions of animals, towards questioning the need for products like food colourings themselves. Likewise, debates over nuclear power shift from wrangling over levels of risk, to discussions of the need for nuclear power as an energy option.
- *In conclusion, the question arose as to whom, if not policy makers, should condition the framing of issues that are subject to participation.*
 - The greater the importance that is attached to framing as an issue in its own right, the more that this in itself becomes a pressing matter for participation. If this isn't to lead to endlessly recursive process designs, then autonomy of framing must to some extent be an inherent part of the participatory process.
 - Yet, if this is the case, then there are dangers that participation that is held to be structured or focused in inappropriate ways will quite simply be ignored.

[Back to contents page](#)

Annex L: Plenary Discussion on Science Advice Research

These are the responses to key issues raised in discussion with the plenary panel by the 'shaker' [according to notes taken by the Rapporteur]:

- *An initial question raised by the 'shaker' concerned the best way to undertake the challenge of affording 'experience-based knowledge' an appropriate role in decision making, to complement traditional provision for conventional 'specialist knowledge'. With the particular importance of this issue in the fisheries area, this challenge is raised particularly in the case of the SAFMAMS project.*
 - Here, the current intensity of the crisis in the fisheries area has engendered a real sense of urgency and creativity. Although only six months old, this project was described as arising from a real desire, and a deliberate effort, on the part both of the natural science and fisheries communities, to make use of social scientific knowledge and engage with wider stakeholders.
 - In this context, the project embodies a move away from the uniquely privileged status of scientific knowledge as an 'output', but an emphasis on the importance of science as a process – as a means to test knowledge claims and make them more transparent. In this view, scientists become as much facilitators as modellers.
 - This shift in the role of science – from a product to a process – offers one way to address the dangers of romanticising 'lay knowledge' on the part of communities like fishers or birdwatchers.
- *The question of mediating communication of knowledge raises the role of the Media – the object of attention in the MESSENGER project. In this case, a question arises over whether it might be rather idealistic to see the media as principal means for the disinterested communication of scientific information. Is this not in tension with the rather less idealistic way that the Media actually see their own role and with the multiplicity of other sources of public information on risk issues?*
 - To aim simply at conveying an uncritical and unquestioning position on science would be unrealistic. The objective of the MESSENGER project is rather to encourage greater discussion of the wider responsibilities that should influence the conduct of journalists. The line is, that – just as in wider life – the freedom of the press comes with responsibilities.
 - This realism extends into the detail. Appreciating the difficulties reforming the practices of established journalists, the project is focusing attention on the production of guidance and materials for use in educating new cohorts of journalists.
 - Likewise, although the media is only one among many public sources of risk information, the way that they tend to frame these issues can be particularly influential. And this can vary between contexts: as is evident in the distinctively moral and religious tone of current discussion of medical biotechnology in Italy, when compared with other European countries.
 - A counter to concerns over idealism about the authority of science in the media, is idealism over the value of endless media discussion about uncertainty. Here, there are very real dangers that arise from the daily media provision of false information:
 - (i) the development of a 'warning fatigue' that inhibits responses to genuine risks;
 - (ii) a coercive pressure to neurotic anxiety, that promotes particular undesirable lifestyles.
 - (iii) that policy making will pay more attention to media coverage than to real science advice.
 - This raises important issues concerning the ways in which society is to decide under conditions of uncertainty or contested values on what constitutes false information, real science, genuine risk or undesirable lifestyles. These 'difficult questions' are not addressed by the project.

- *This discussion raises a further query over a countervailing danger in the case of science shops, in that there may be a tendency to idealise the role of the ordinary citizen or the NGO, at the expense of mainstream science. What criteria are available to ensure the scientific quality of initiatives in this area?*
 - One safeguard in this respect is that this activity is still subject to principles of scientific discipline. Much of the work is conducted by students, for instance, who must also meet the quality criteria embodied in their established curricula.
 - But another issue is a question over the sufficiency of the established quality criteria themselves. The scenario workshop conducted in Vienna highlighted the need for changes in the incentive systems that condition scientific research. The fact that much of the output of science shops remains under-published or unrewarded in academic terms is not necessarily an indication of quality, but of a different context. Sometimes research findings must remain confidential (as in the case of evaluation studies). In any case, science shops do not concentrate on research alone. Simply measuring science shop output by the number of publications (as in journals listed in the ISI's Science Citation Index) understates important activities, like co-ordination and mediation.
 - This in turn raises questions in some minds over the danger of overly rigid categorisations of people. The scientists and policy makers who currently determine the orientation of much research are themselves also engaged as citizens, stakeholders, consumers, producers and readers on newspapers.
 - The point was made that there may exist here important potential for fruitful interaction between the sort of structured collaborative research undertaken in the fisheries area, and the more general and distributed style of the science shops movement.
- *A final set of questions raised by the 'shaker' address the crucial role of the policy makers themselves, such as the European Commission officials who were not at that stage at the seminar. Why is it that there seems to be so little research on the actual way in which science advice is made use of within the Commission?*
 - One explanation for this apparent dearth of research, is that the institutions involved have only just been established, so until the present moment, there has been little opportunity for this kind of study. Another possibility is that social scientists themselves have little interest to engage on this topic.
 - In some respects, however, it can be argued that this kind of research is undertaken. The Integrated Project on Safe Foods, for instance, is undertaking some work of just this type in the food safety area. The TrustNet project also examined the role of specialist agencies. But the case remains that there exists clear scope for some integrated 'meta analysis' of the findings of this kind of work across different sectors and contexts. Although a topic that has been addressed in political science, it is a field in which social science has a particular contribution to make.
 - The suggestion that this kind of meta analysis might be a particular focus of work under the Framework 7 was greeted positively by some potential researchers, but was the object of scepticism by others from the Commission.

[Back to contents page](#)

Annex M: Working Group on Institutional Arrangements for Participation

These are the issues that were raised in reporting back from the discussion group:

- One fundamental institutional requirement, is a clear understanding of the frameworks and processes that have already been conceived in research or pilot projects, or which are under more routine use in different empirical, sectoral and institutional contexts. This might be seen as a 'mapping phase'.
 - Here, it is a prerequisite to effective process design and justification, that clear information be available in a transparent fashion concerning the strengths and weakness of the available methods and the way in which they articulate with different governance infrastructures.
 - In this regard, initial 'mapping' activities were already undertaken as part of Framework Programmes 4 and 5. However, there remains important scope for updating this work, extending its scope and increasing the sophistication as practices accumulate and their environment becomes more complex.
 - Key questions in this regard include:
 - What's there?
 - What's needed?
 - What are the factors favouring good and bad practice?
- A further requirement is for improved understandings of experiences of the social actors who have engaged in various ways in the diverse array of participatory activities thus far.
 - This ranges from policymakers charged with interpreting and digesting the outcomes, through stakeholders who either engage in the process or process design or to observe from the wings, to specialists both in the processes themselves and in the evidence and analysis which they employ and to the citizens who have been recruited to such exercises. Questions that arise in this regard include:
 - the positive or negative nature of the experience at a personal level
 - the degree to which particular interests or values have been enhanced or diminished by such processes;
 - the extent to which they can be seen to contribute to an improved quality of decisions, and
 - the impact on parallel procedures of representative democracy and the willingness of wider civil society to engage in further such exercises.
 - Institutional provision for the development of such understanding, is itself a form of participatory process, in which the capacity and motivation of civil society actors to engage is itself a matter for survey.
- Related to this, there is a need for more rigorous and extensive monitoring.
 - This might focus on the auditing of a series of accepted quality criteria, such as:
 - the nature of involvement
 - the degree of representativeness
 - the timing of engagement in relation to the policy cycle for the issue in question; and
 - the way in which the outcomes have been received in wider policy discourses and decision making.
 - The question of compliance with existing regulations.

- Of particular interest are the motivations and capacities of existing institutions to:
 - Listen to stakeholders
 - Digest the outcomes of participatory process
 - Communicate in effective ways
 - Provide for feedback mechanisms with stakeholders
- Following on from this first 'mapping' phase, the question needs to be addressed as to why we need participatory processes in the first place. Questions that arise here include:
 - Who should organise the design and implementation of participatory processes, including
 - The structure of the process
 - The framing of the subject
 - This raises questions over:
 - Independence
 - Neutrality
 - Trust
 - Legitimacy
- Many more general questions are raised in considering the nature, form and rationale for further more formalised and elaborate institutionalisation.
 - How does increasing articulation with existing governance institutions relate to principles of independence and legitimacy?
 - How do emerging evaluative criteria and principles of best practice relate to the complexity of context?
 - What potential is offered by new emerging media, such as the internet?

[Back to contents page](#)

Annex N: Working Group on Representativeness and Participation

The outputs of this discussion group took the form of single agreed statement:

'Preamble':

In a knowledge based society, research fulfils an essential role.

This imposes a crucial need for broad, inclusive forms of participation.

'Operational Articles':

- 1 It is important to set boundaries and expectations for all participants.
- 2 There is a need for clarity over the working frameworks under which participation takes place.
- 3 There is a responsibility to experiment with different forms of institutional learning.
In this respect, there exists an especially important role for the DG RTD Governance and Scientific Advice Unit, both as funding body and as an enabler of activity.
- 4 There is a need to drive the embedding of participation in mainstream European Commission programmes.
- 5 The substance of this broad agenda is itself an issue which requires 'reality checking' with society through the use of participatory process.

[Back to contents page](#)

Annex O: Working Group on the 'Business Case' for Participation***These are the bullet points used by the discussion group to summarise their conclusions:***

- Current debates over participation neglect key questions over delivery and the selling of the case to governance institutions.
 - With the mind-set still very much with science and society', the challenge of 'science in society' remains to be fully addressed.
 - In particular, it needs to be clarified that participation is not about decision making itself but about provision for consultation and qualification of decision making. Civil society in itself will not take the decision.
- This gives rise to a series of different scenarios:
 - ***Business as usual*** (like today). No high impact overall. Activity is confined to isolated units in administrations with poorly managed interfaces.
 - ***Powerful Society***. A highly self-organised process involving civil society and researchers in which civil society and business become sufficiently good at taking decisions on their own, that the role of policy makers is diminished. An example is provided in the TrustNet project 'Invest in Fish'
 - ***Powerful interfaces***. This represents a 'science in society' scenario under which informal processes link well with more open institutional structures.
- Focusing on the latter two scenarios, the group discussion addressed the challenge of how to get from here to there. In this regard, a series of problems can be identified:
 - Impacts are currently reduced by the simple fact that reports are too long
 - It remains haphazard whether the right person is addressed in dissemination
 - Participatory processes are often complex and insufficiently focused on the key point. This can be contrasted with the simplicity of voting – a form of 'rubbish participation' so favoured by decision makers.
 - The trans- and interdisciplinary character of participation doesn't fit well with the structure of existing institutions
- To this, there exists a corresponding series of 'solutions':
 - Take advantage of the positioning of the science in society unit to enable the initiating of processes in other departments
 - Concentrate on finding political allies and establishing networks of support, with particular attention to high-status lobby groups
 - Involve decision makers as early as possible in the process
 - A high priority should be attached to 'awareness building' – addressing issues such as: the benefits to decision makers and reassurance that participatory processes are about producing better-informed policies with improved public acceptance, and not about actually taking decisions.
 - In this, there is a need to established and build on good practical experience.
- In the end, the business case for better participatory processes lies in better communication of the move from 'science and society' to 'science in society'.

[Back to contents page](#)

Annex P: Working Group on Knowledge

These are the bullet points used by the discussion group to summarise their conclusions:

- Knowledge is not an entity available 'off the shelf', nor a commodity "travelling from mind to mind" but is instead much more related to action
 - A crucial role is played by tacit (as opposed to discursive) knowledge
 - Crucial elements include knowing how to recognise, how to reproduce, how to do
 - There is an important distinction between common and private knowledge
- Important limitations and barriers to the role of shared meaning can be found in the operation of different forms of 'transparency', 'truth', 'expertise' and 'power'.
- Consideration of the role played by power raises many issues:
 - Asymmetries in the relations and resources available to different groups
 - The ability to decide who does what?
 - The capacity to change the way people act in institutions
 - Control over forms of representation
 - The practical consequences for the changing role of scientists and researchers
 - The framing of localised environments for 'first level' interactions
 - The provision of practical support for civil society participation
 - The formation of norms under which different forms of expertise are stabilised
 - The exercise of contending interests
 - The framing of different negotiation processes
 - How issues are raised, framed and resolved
 - A pervasive role in scientific research
- Collaborative research address all these issues by opening up the process under which the issues in question are framed and the consequent questions formulated and allowing the application to this process of a more diverse array of different forms of knowledge.

[Back to contents page](#)

Annex Q: Working Group on Participatory Risk Communication Tools***These are the bullet points used by the discussion group to summarise their conclusions:***

- Public participation is a form of knowledge process under which particular attention is paid to the validation of different aspects of knowledge, whilst questions are deferred over their relative quality.
- In this, there emerges an important role for effective communication on and about participation itself. This includes elements of awareness raising, education and training – directed at scientists and stakeholders as well as the general public.
- Any understanding of the role of public participation is very sensitive to context.
- Overall, there is an increasing move towards a “negotiation paradigm”
- Crucial questions that arise include:
 - what is to be discussed?
 - How to frame the issue?
 - What is the context for public participation?
 - What s the necessity and rationale for public participation
 - What is the role of science communication agencies
 - Much depends on whether the product is reassurance or a reliable reference
- A key recurring concept in these discussions is ‘dematerialisation’ – now part of an important new trend in discussion in museums.
- An array of less structured brainstorming points on this theme comprises the following:
 - Trend: record what is happening in research
 - Change in research induces change in museums
 - Missing channel to policy- and decision-makers
 - role of controversies in science: make obvious the lack of information / positive
 - discussions at local level
 - schools / education
 - reinforce communication skills
 - who prepares the context of education
 - passports for autonomous robots
 - wikipedia / distributed knowledge
 - everybody should know the importance of negotiation
 - what is to be discussed? Framing of issue? Context of public participation?
 - Trust
 - Negotiation
 - Interdisciplinarity
 - Technology assessment
 - Media
 - Time scales

[Back to contents page](#)

Annex R: Working Group on Independence and Pluralism

This topic was interpreted in the group report as a practical matter of applying 'pluralism' in finding 'key allies'. These are the bullet points used by the discussion group to summarise their conclusions:

- Strategies to involve allies, such as to normalise the practice of participation.
 - Identify the degree and form of the influence displayed by different actors
 - Recognise that permutations of interests may be surprising. For instance, industry and NGO's are familiar with stakeholder processes and may find communication easier than some actors, such as the medical research community.
- There is a need to be prudent:
 - Take care in scoping and developing relationships with individual companies
 - The first step, is to raise public awareness. Be cautious over selecting topics that are too controversial (because it can be difficult in such cases to secure involvement).
 - Ensure that the process is undertaken early on in the development of the issue
 - Ensure that any exercise has sufficient contacts and resources to provide grounding in the technical substance of the issues under consideration
 - Accessibility of appropriate spaces and institutional platforms is also important, which, together with relevant expertise, are often provided (among other places) by science museums.
- One way to enhance the breadth and depth of understanding in the framing of participatory exercises is to undertake these as combined projects, run jointly between institutions with different sectoral backgrounds (government, academic, industry, civil society).

Here, there is a need to move away from restricting involvement to the 'usual suspects' and towards broadest possible engagement with the general public. This takes time and energy to achieve.

- There is a need for caution over continued deliberation over 'best practice' – in which there lies a danger of going around in circles – or even backwards. Instead there is a need to focus on the mapping of instances in which a 'critical mass' of momentum and success has been achieved – especially in relation to uptake by governance institutions (such as EC directorates general).

In pursuing these issues, activities are proceeding in an inter-related way at a number of levels. Each of these strands of activity display their own strengths and 'missing links':

- Driven by an interest on the part of scientists and scientific institutions to communicate better with the public (exemplified by the recent push from scientists in relation to the bioethics issues raised by the recent referendum in Italy)
- Driven by a need for governance institutions to ensure improved involvement by the public.
- Driven by the science and society community as part of the building of a new research agenda.
- It is important to remember that the process of establishing these new practices is a long term undertaking, spanning a period of at least the order of a decade or two. This raises particular challenges of sustaining funding over shorter political attention cycles.

There is also a certain inertia on the part of scientific institutions in relation to participatory process, under which they are held to be a threat, a challenge, or at least unhelpful'. The participation community has generally yet to make a breakthrough to the very large scale of activity required in order to make a real difference in governance processes.
- A key difficulty in securing interest from scientists at the moment, is the complete decoupling of participation and the funding process. Establishing such a connection would help invest participation with much greater meaning fullness for scientists themselves.
- In undertaking participatory processes, it is important to provide for participation at multiple levels, such that not only the form and substance of deliberation, but also the design of the process as a whole, are subject to a process of stakeholder engagement.

[Back to contents page](#)

Annex S: Working Group on Collaborative Research***These are the bullet points used by the discussion group to summarise their conclusions:***

- Discussions in this group were framed around a shared understanding of the following sequence of levels in the process of participation. Each successive level represents:
 - an increasing understanding of mutual co-dependence in society
 - enhanced willingness to recognise different forms of knowledge held by others
 - a consequently more effective degree of social integration of different knowledges

In the form developed by the group, the sequence runs from (i) consultation, through (ii) participation to (iii) negotiation and (iv) co-building.

- Against this background, the group spent some time discussing a semantic point around the appropriate usage of the term 'collaborative research', which in this context they held to be synonymous with the term 'participatory research' and characterised as follows:

"a research process where researchers and non-researchers are involved"
- Collaborative / participatory research is essentially an entirely new research process – one in which the highlighting of the concept of 'process' is an important distinguishing attribute in itself. It represents a major transformation in the conventional notion of research. It displays the following benefits and implications:
 - The dissemination or 'transfer' issue is automatically addressed
 - Attention is automatically included to the appropriate framing of the issue in question
 - There is a high degree of acknowledgement of the diversity of relevant knowledges
 - The more variable the modalities of inclusion, the more flexible the useful outputs
- In the spirit of 'open space' brainstorming, the following unstructured array of keywords were elicited by the group to characterise key features of the process envisaged:

agora	diversity	institutional	stakeholders	arrangement
mess	process	freedom	facilitated	interest
negotiation	values	power	transformation	resources
structured	flexibility	inclusiveness	knowledge	public good
assimilation	technology	platform	research	innovation

[Back to contents page](#)

Annex T: Working Group on Embedding***These are the bullet points used by the discussion group to summarise their conclusions:***

- There is a need for high level expectations
- But this must be matched by bottom-up enthusiasm for appropriation (“you can lead a horse to water, but you can’t make him drink”)
- Simply to rely on the submission and dissemination of reports, is not the best (or even a good) vehicle for commanding interest and embedding practice.
- Reports should be focused on follow-up action. For instance, this should take the form of the commissioning of a communications campaign. Not just the enunciation of conclusions.
- The degree of receptivity displayed by governance systems is related to the political climate. Factors that can act to favour the embedding of participatory practices include situations where:
 - Traditional approaches have run out of steam
 - There is particularly progressive leadership and vision
 - Special emphasis is placed on openness and transparency
 - A specific crisis or conflict compels radical responses
 - There is a more generalised groundswell of popular unrest
- Serious consideration needs to be given to ‘upstream’ provision for identification of emerging issues, opportunities and threats.
- One way of thinking about this from the point of view of prospective practitioners is in terms of the ‘co-building’ of issues and their responses. This means particular attention to developing understandings of how an issue is framed, who is driving it, and how it might best be anticipated. In other words, to use a commercial analogy, there is a premium on “knowing the customer’s business”.
- It is crucial in all communications to emphasise the benefits of participatory approaches.
- A hydraulic metaphor was used to describe this, under which the community comprised of the EC Governance and Scientific Advice Unit and researchers might be seen as the means to “channel the flow of water”. In this respect, there emerge a series of distinguishable contexts and roles:
 - Where the pump is self-initiated
 - Where the pump requires priming
 - Where this community are the pump
 - Where this community has a continuing role in monitoring and occasionally ‘boosting’ the flow
- A further distinction can be made between working in ‘proactive’ and ‘reactive’ modes.
- Flexibility should be maintained in a willingness to vary the timing of different interventions.
- There is also an important role for maintaining a continued ‘challenge’ function of established institutions.
- A priority should be placed in customising practices in order effectively to be able to work with ‘natural allies (such as ‘friendly and willing’ Directorates General of the European Commission).
- To this end, consideration should be given to establishing an EC Network of Interests, under the NEST Programme, in order to focus on the building of success in this field and the securing of ‘quick wins’

[Back to contents page](#)

Annex U: 'Open Space' Topics and Voting

	<p>The table on the following page displays the full range of topics proposed for 'open space' discussion.</p> <p>Topics are listed in columns in the sequence that they were proposed and voted on.</p> <p>The wording of the description for each topic is that used in the discussion and voting process.</p> <p>Seven topics were elected by vote for discussion, but in the event two failed to be selected by anyone.</p> <p>For those five topics that were selected, working titles are given as bold headings for the shaded cell.</p> <p>Each bullet represents an individual topic suggestion by one participant. Some were grouped by facilitators (as shown) in order to ease the voting process and enable joint discussion in open space groups.</p> <p>(2) Such topics were suggested twice by different individuals.</p> <p>3 votes The number of votes received for adopting this topic as an open space group.</p> <p>3 people The number of people electing to join this topic group.</p> <p>no option If a topic received too few votes, it was not presented as an option for discussion.</p> <p> The threshold number of votes below which the topic was not an option was five.</p> <p> The shaded cells indicate topics that were selected for discussion in a working group.</p>

RESEARCH NEEDS	SOCIAL AND INSTITUTIONAL CHANGE	SCIENCE GOVERNANCE STRATEGY
Knowledge: <ul style="list-style-type: none"> The role of systematic (scientific) experience-based intuitive knowledge? How can we value popular (unstructured) knowledge? Reviewing expertise? How can organisations learn to change? How to put away false good ideas? What is 'relevant' knowledge? How to handle epistemic clashes? Co-production of expertise and innovation 10 votes 5 people	<ul style="list-style-type: none"> More ladders (like Arnstein's) covering: <ul style="list-style-type: none"> what decision makers want from citizens what weight to give citizens views 4 votes no option	Representativeness and participation: <ul style="list-style-type: none"> Exploring links between representative and direct / deliberative democracy Link representation and participatory democracy Defining the boundaries of participation and expectations 14 votes 8 people
Participation & risk communication tools: <ul style="list-style-type: none"> Tools for combining science communication with participation in public Underlying assumptions of 'good' risk communication 9 votes 5 people	<ul style="list-style-type: none"> Quality control and evaluation of participatory processes Examine quality of participatory decision making and gaps: conduct impact analysis 5 votes 0 people	<ul style="list-style-type: none"> Developing new fora to institutionalise participation (eg: European Future Days) Usability of citizen conferences? 4 votes no option
<ul style="list-style-type: none"> How can EU help with diffusion of methods outside EC? 0 votes no option	Business case for participation: <ul style="list-style-type: none"> The business case for 'selling' participatory process to decision makers Political allies for inclusive risk governance 6 votes 3 people	<ul style="list-style-type: none"> How to engage young citizen's and the general public in participation Focus on young people 3 votes no option
<ul style="list-style-type: none"> Relations between participation and different sectors actors / outcomes 1 vote no option	<ul style="list-style-type: none"> Conditions for emergence of a scientific 'third sector' 3 votes no option	<ul style="list-style-type: none"> What needs to change in moving from government to governance 0 votes no option
<ul style="list-style-type: none"> Bottom up or top down in DM in global trade? 0 votes no option	<ul style="list-style-type: none"> Access procedures for scientists to decision-making 1 vote no option	<ul style="list-style-type: none"> Early notification of future controversy? 1 vote no option
<ul style="list-style-type: none"> Setting societal agendas 3 votes no option	<ul style="list-style-type: none"> Internet and engagement – critical questions 4 votes no option	<ul style="list-style-type: none"> Replacing the spheres with the links (refers to interfaces between sectors) 0 votes no option
Institutional arrangements for participation <ul style="list-style-type: none"> Necessary Institutional arrangements for participation? 5 votes 5 people	<ul style="list-style-type: none"> How to reward scientists for stakeholder work? 1 vote no option	<ul style="list-style-type: none"> Gender and the governance of science 1 vote no option
<ul style="list-style-type: none"> ICT role in broad science communication 4 votes no option	<ul style="list-style-type: none"> Create a flexible society for policy makers 0 votes no option	<ul style="list-style-type: none"> From citizen deliberation to policy advice 2 votes no option
<ul style="list-style-type: none"> Co-production of expertise and innovation Ways to frame research: who decides / who is accountable 5 votes 0 people		<ul style="list-style-type: none"> Channels for expressions of social needs and demands 3 votes no option
<ul style="list-style-type: none"> Impact assessment of science governance projects (2) 2 votes no option		<ul style="list-style-type: none"> How to broaden out framing issues? Issue framing / reframing 4 votes no option
<ul style="list-style-type: none"> Measuring adequacy of research consultation 1 vote no option		<ul style="list-style-type: none"> Innovation systems of the future: researchers as facilitators 1 vote no option
<ul style="list-style-type: none"> Public perceptions of public involvement 2 votes no option		<ul style="list-style-type: none"> Sharing basic concepts between citizens and policy makers 2 votes no option
<ul style="list-style-type: none"> When does PP increase / decrease trust 1 vote no option		<ul style="list-style-type: none"> 'Acceptance' of public opinion? 0 votes no option
<ul style="list-style-type: none"> The 'why' of participatory process is crucial to the 'how' 3 votes no option		