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The Nanotechnology Engagement Group

Policy Report 1

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Summary

This is the first policy report of the Nanotechnology Engagement Group (NEG). It sets out our framework for comparing public engagement projects, gives an initial analysis of the current range of projects and explores options for improving public engagement on nanotechnologies.

This report compares projects on the basis of:
- Aims and expectations
- Who is being engaged
- Engagement approaches
- Understanding the impact of engagement

Through the NEG's initial analysis of public engagement on nanotechnologies activity a number of key themes have emerged in terms of the knowledge base and current practice. In response to these themes the NEG has identified gaps in the theory underpinning public engagement on nanotechnologies and its practice.

The Knowledge Base
There is a need to place public engagement on nanotechnologies in the wider context of public engagement research, technological or otherwise. In particular we need to understand whether lessons can be extrapolated from other public engagement arenas to understand whether there is anything unique about public engagement on nanotechnologies. For example in the projects we have considered participants are consistently calling for increased regulation. Is this typical for public engagement on science and technology generally, and, if so, are there lessons that can be learnt?

The NEG has identified the following knowledge gaps:
- What are the means by which government and society shape technologies?

- What lessons have been learnt from past public engagement activities and other studies?

- How does the public want to get involved?

- In the light of answers to 1, 2 and 3; what conclusions can be reached about government policy with regards to nanotechnologies?

Practice
Through analysing current practice, the NEG has identified two key challenges for public engagement on nanotechnologies. Firstly, the 'scaling up' of public engagement projects to involve larger numbers of people, and secondly the need to effectively integrate public engagement into institutional Research & Development (R&D) processes, especially in the private sector.

The NEG has identified the following gaps in practice:
- Scaling up Public Engagement

- Public Engagement & the Private Sector

Research Approach
The NEG analysis suggests that there is often a tension between the topics institutions want to engage citizens on and what people want to be engaged on. This mismatch can limit the effectiveness of a public engagement initiative. Consequently we propose undertaking a 360° analysis of each project where the commissioner, practitioner, participant, commentator and others are all 'engaged'.

Table of contents

1   Introduction to this Report

The Nanotechnology Engagement Group (NEG) has been established to help bring about a step change in our thinking and acting on public engagement in the lifecycle of nanotechnologies.

In addition, the NEG will draw more general lessons for policy and decision-making around emerging technologies. The development of nanotechnologies has become an ideal testing ground for the application of public engagement processes to Science and Technology (S&T).

This is the first of four reports the NEG will publish over the next two years, with a final report coming out in September 2007. These reports will be the primary means by which the NEG informs government policy on public engagement and nanotechnologies. This first report sets out a framework for analysing public engagement activities during the two year life cycle of the NEG. The NEG will continue to develop and apply this framework to learn lessons about the wider conditions for public engagement and nanotechnology policy in the UK. Because of this, some sections of this document will be more complete than others.

Most public engagement projects on nanotechnology are just getting started, and the NEG can provide neither a thorough analysis nor definitive conclusions. The NEG aims to give an overview of the learning that has been gathered so far and to focus on the key questions and challenges that are emerging.

Whilst this report goes into some detail on specific processes, we also attempt to capture the wider contexts of public engagement in the UK and internationally, including; institutional contexts and the broader cultural understandings of science, technology and governance that affect how people relate to technologies or public engagement.

This document is divided into two principle sections:
- *Comparison of projects* – here we set out our analytical framework for comparing projects and start that comparative process.
- *Analysis* – this extended section contains the concrete learning the projects have generated thus far.

Our initial research suggests that, like many other public engagement arenas, the S&T field is fragmented. It involves several types of people whose entry points, and understanding of the field, are quite different. For that reason, let us start by explaining the meaning of the key terms we are using.

1.1   What is Public Engagement?

We consider public engagement to be an open system involving numerous individuals and organisations. All engagement processes are affected by the practical realities of how power is held and used by government, politicians, business, scientists and the media. This is in contrast to viewing each process as discrete and unconnected.

We consider traditional one-way forms of engagement, such as traditional science communication and the mass media, as an integral part of the system but not the focus of this work, unless they involve a level of deliberation or interaction.

Instead, the NEG will focus on deliberative processes, such as citizens' juries and processes of individual or group reflection where scientists may spend time with citizens considering the wider social implications of their work. In addition, we wish to consider engagement processes that move beyond merely linking up with a policy process, and instead aims to make people reconsider their assumptions and arguments.

1.2   What are the Mechanics of Public Engagement?

The mechanics of public engagement are the practical activities that go into making public engagement happen. This can involve running and organising events, developing websites, writing press releases and many other activities. In the broadest sense, it is the process through which public perceptions affect how science is done. This can include processes that seek to shape research agendas or help scientists think differently about their work.

1.3   What are Early Stage Technologies?

The relationship between scientific research and technological innovation is not a linear process that can be dipped into and out of at defined times. Technical systems follow complex and often uncertain trajectories, which can change direction dramatically as new and often unforeseen discoveries are made. Nonetheless, over time, technological trajectories tend to become more defined. The further down the road one travels, the fewer opportunities to turn off that road. The earlier one is in the driving seat, or at least in the backseat voicing opinions, the greater the opportunity for shaping technology development. When we refer to early stage technologies, we refer to those with journeys or trajectories society can still significantly influence.

2.   Comparison of Engagement Projects

In order to understand the public engagement activities that are taking place around nanotechnologies, we need to develop a shared basis for comparing and thinking about these activities.

This section seeks to develop this understanding through two steps, the first (Section 2.1) is a discussion of the parameters we will be using for comparison and the second (Section 2.2) is an application of these parameters to the projects being considered so far. It is important to note that this report aims to create a framework for examining and comparing both current and future projects. It has not been shaped solely by the projects that have already been researched; as such a narrow view would prevent any gaps from being identified.

2.1   Discussion of Parameters

In this section we explore the characteristics of the parameters selected as the basis for comparing processes. This is not a complete list, but contains four components that we have identified as being most helpful in understanding different S&T public engagement activities (Sections 2.1.1 – 2.1.4).

2.1.1 Aims & Expectations

The goal of this section is to begin to understand the rationale and motivations held by different people and institutions for undertaking public engagement exercises. In this section we have attempted to unpack both the underlying motivations and values for adopting a particular approach, as well as some of the more explicit practical objectives.

In 1993 Fiorino developed what has become a well known approach to understanding aims and objectives of public engagement:

- *Normative* – the right thing to do
- *Instrumental* – will achieve particular goals
- *Substantive* – will improve the quality of decision-making.

We have included Fiorino's rationales here as they are well established, and can help surface some of the underlying motivations and values for undertaking public engagement for a particular topic or setting. However, it is very rare for any process to seek to deliver just one rationale.

On pages 7, 8 and 9 we discuss six more explicit types of objectives for a public engagement process.

Gathering Social Intelligence – to Improve Decision-making

Much of the recent S&T public engagement initiatives that have taken place in the UK have been premised on an inversion of the Public Understanding of Science deficit model. That is, as opposed to 'educating' the public about science, they have sought to educate decision-makers about the public. Such processes, which are often led by social scientists, use mechanisms that elicit social intelligence from the public, which can then be used to inform and improve decision-making.

Under these terms, the public(s) is often seen as holding valuable knowledge or intelligence, which is accessed by means of various research tools such as focus groups, workshops or questionnaires.

In this report we characterise gathering social intelligence as a substantive engagement technique, as those undertaking this type of work are motivated by a wish to improve decision-making by ensuring that the concerns and preferences of those otherwise excluded from discussions are heard. There is also, however, a normative element, as including those who are otherwise excluded can be considered the right thing to do. Some will go further, arguing that the deliberations that form part of the intelligence gathering process make a democratic contribution in their own right. This, too, supports the normative characterisation. There are also instrumental elements; for instance, some believe that greater involvement increases levels of trust.

For the Public to Influence Decision-making – Sharing of Power

Some processes have an explicit remit to support their participants in influencing decision-making. This is quite different from the 'social intelligence' model of engagement. The critical point here is the emphasis on change. Such processes can have a public agreement with someone in power to take forward the outputs and respond formally to any recommendations. They can have a media partner who will agree to report the participants' views; or they can act as a catalyst for the participants to push for the changes they wish to see happening, to behave as active and empowered citizens.

Such an approach can be characterised by the direct participant / decision-maker interface, where there tend to be fewer third parties (other than the media) mediating or interpreting participants' views.

Arguments for such processes can fall into all three categories. They can be:
- Instrumental – where the processes only take place because it is believed that their outputs will support a particular position or to increase trust in risk producers or risk managers,
- Substantive - because the participants' contribution to the debate will improve it, and
- Normative - as it is a clear attempt at sharing power and influence with an otherwise disempowered group.

We believe it is the latter which defines this approach.

To Inform the Public

A traditional but still dominant rationale for public engagement is education or information provision, whereby a process is run with a view to increasing participants' knowledge and understanding of the subject in question. This is often a secondary aim of many modern processes, including those discussed in this report.

It should be noted that information provision is an essential prerequisite for any public debate, especially in a context of low public knowledge (often the case for science and technology). There is therefore an on-going need for information provision.

To Debate, Discuss and Deliberate

Supporting conversations on S&T issues is an important function of public engagement. Either through traditional adversarial debates or increasingly widespread deliberative inquiries, which foster the sharing of perspectives and development of ideas. Most processes will involve a conversational element, either the formal debate or more informal deliberations. For some,[1] however, the conversation is an end in itself. Indeed, an important element of democratic life is the deliberations that happen between citizens in whatever setting, the conference centre or the dinner table. Emerging technologies present a challenge, as the low profile or uncertainty which often characterise them require careful management in order for constructive conversations to take place.

Such processes tend not to be directly linked to decision making, their real value comes from their contribution to democratic life. For this reason, we have categorised them as normative.

Risk Management

The debate about public engagement and risk is well established; we cannot do justice to it in this section. However, it is necessary to highlight two distinct perspectives on risk, which are closely aligned to dominant motivations for embarking on public engagement: corporate risk management, and social and environmental risk.

Corporate Risk Management: Public engagement is undertaken by some (often large) organisations as a means of planning ahead and managing risk. By interacting with groups who will affect one's current strategies, one can test whether they are solid and start planning to minimise any risks identified. Such risks could include rejection of products or policies by the public, or the development of future social or technological trends that one needs to be aware of. This type of rationale dominates business involvement in public engagement and is instrumental in character.

Environmental & Social Risks: A dominant, if not the dominant, motivation for publics or stakeholders to get involved in S&T engagement processes is a concern over the particular environmental or social impact of that technology. Public engagement can play an

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[1] For example the New Economics Foundation Democs process focuses on delivering deliberative conversations.

important role in risk regulation by framing the questions asked in risk assessment. It can also provide a useful entry point to a public engagement process.

Reflection of Scientists

The importance of promoting the reflective practice of scientists has recently come to the fore through the Cambridge IRC programme and the Demos pamphlet 'The Public Value of Science'. The idea here is that scientists in R&D labs should think beyond the immediate scientific challenge that they are trying to overcome, and consider the wider social implications of their work. Through such practice, a scientist's R&D will start to be affected by the thoughts and visions generated by their reflections.

One key rationale for this practice can be seen as normative: simply that it is right that scientists should consider social implications. Another rationale is instrumental: by not adopting a narrow scientific perspective, wider social goals are more likely to be achieved. Finally, there is the hope of a substantive outcome, if this reflection improves the quality of the R&D process.

2.1.2 Who is being Engaged?

The integrity of any engagement process depends upon clarity about who the participants are or should be, and upon the participants themselves. The selection of participants will depend on the purpose and context of the exercise, which will set the parameters for which methods are used. Individual methods often have a specific approach to participant selection. In general terms, however, there are two ways of selecting whom to engage:

- **Open:** inclusive, anyone that wants to should be able to get involved.

- **Selective:** in that the numbers, types and actual individual people may be chosen as part of the process. The majority of S&T public engagement processes being undertaken for nanotechnologies are selective, i.e. involving particular people (however, this was not the case for GM Nation). Processes on S&T (inc. nanotechnologies) tend to select either on the basis of:

  o **Interest** *[e.g. stakeholders]*; or
  o **Demographics** *[e.g. publics]*,

  both of which are forms of representation.

The type and thoroughness of representation will be informed by the aims and expectations of the project and if and how it will link to decision-makers. For example, certain forms of representation are more highly valued by decision-makers than other approaches – opinion polls are often taken seriously because of their demographically representative sampling and the impression of simplicity that numbers provide. Often a participatory exercise will be criticised for not being 'representative' and the legitimacy of the results will therefore be undermined, even though statistically robust demographic representation was never the intention. For example, the GM Nation debate was criticised on the basis that it attracted

only those who cared deeply about the issue, rather than a representative cross section, despite the explicit recognition of this in GM Nation's terms of reference.

Individuals are often invited to participate on the basis that they represent a particular interest. This form of representation only works when participants make the effort outside of meetings to enter into a dialogue with their respective constituencies. This ensures that they truly represent their constituencies. This dialogue can be hard to achieve in practice thereby undermining the processes' legitimacy.

Among the conditions necessary to make sure that a participatory process can be shown to be legitimate, it is essential to know whether or not the technique being used *requires* a representative cross-section of people, or whether the organisations that participate claim to be (or are expected to be) representative.

2.1.3 How are they Being Engaged?

Methods of engaging the public on S&T have emerged from a variety of fields including among others, conflict resolution, marketing, public relations, social research and international development.

In practice, and unsurprisingly, methods from certain fields tend to produce certain outputs. For example, those from conflict resolution (such as stakeholder dialogue) are good at building relationships and finding common ground, while those from market research, such as focus groups, are good at identifying existing wants and needs. In addition, practitioners originally trained in certain approaches tend to value those outputs above others. For example, a facilitator trained in stakeholder dialogue will run a focus group very differently from a facilitator with a marketing background.

The key point is that the method chosen, and the people who deliver that method, will affect the outputs and outcomes achieved. This in turn will influence whether the original aims and expectations will be met. The method alone will not determine the process, as the participants will also have an impact on its outcome.

Involve has recently published 'People & Participation' which analyses some of the major methods used for public engagement. We will use this analysis for understanding the different methods used by the projects.

2.1.4 Understanding Impact

A common critique of public engagement work generally, not just in the S&T arena, is its failure to influence decision-making. This is especially challenging in new and, as yet, undefined S&T arenas, such as nanotechnologies. Indeed, the specialist knowledge that underpins many science and technology arenas means that it is often conspicuously and perhaps necessarily expert led.

There is often an assumption (from participants and commentators) that participatory processes must be 'hard-wired' to policy, but this is not the case. As ever, it depends upon the aims and objectives of the process in question.

Public engagement processes can have impacts in many different ways. To better understand the impact of a process we are using a typology of impacts developed as part of the TAMI project (Technology Assessment in Europe: Between Method & Impact) that contrasts issues against impacts.

Issue Dimension
The issues are the substance of the particular process. Does the process prioritise issues of a technical social or decision-making (policy) nature? Usually all three issues will be present with one arena prioritised. The majority of projects we have examined prioritise social and policy impacts.

Impact Dimension
As discussed the impact a process may or may not achieve is seen as being key to its success. But impacts are not simply limited to the policy process. They may involve increasing knowledge, social mobilisation, new networks, agenda setting, and so forth. It is useful here to crosscheck the objectives that will be outlined in Section 3.1 with the types of impact, for example:

- raising Knowledge (gather social intelligence, risk management)
- forming Attitudes and Opinions (inform the public, debate, discussion / reflection of scientists).
- initialising Actions (public influence).

In Section 3 we will attempt to position the projects undertaken so far on this typology to get a picture of where nanotechnologies public engagement is happening and if this meets the wider expectations of what is needed.

Table 1: Typology of Impacts[2]

ISSUE DIMENSION	IMPACT DIMENSION		
	I. RAISING KNOWLEDGE	II. FORMING ATTITUDES / OPINIONS	III. INITIALISING ACTIONS
TECHNOLOGICAL / SCIENTIFIC ASPECTS	SCIENTIFIC ASSESSMENT *e.g.* Technical options assessed and made visible. Comprehensive overview of consequences given.	AGENDA SETTING *e.g.* Setting the agenda in the political debate. Stimulating public debate. Introducing visions or scenarios. Inform public.	REFRAMING OF DEBATE *e.g.* New action plan or initiative to further scrutinise the problem decided. New orientation in policies established. Public Influence.
SOCIETAL ASPECTS	SOCIAL MAPPING *e.g.* Structure of conflicts made transparent. Gathering social intelligence. Risk Management.	MEDIATION *e.g.* Self-reflecting among actors. Bridge building.	NEW DECISION MAKING PROCESSES *e.g.* New ways of governance introduced. Initiative to intensify public debate taken. New networks. Public influence.
POLICY ASPECTS	POLICY ANALYSIS *e.g.* Policy objectives explored. Existing policies assessed.	RESTRUCTURING THE POLICY DEBATE *e.g.* Comprehensiveness of policies increased. Policies evaluated through debate. Democratic legitimisation perceived.	DECISION TAKEN *e.g.* Policy alternatives filtered. Innovations implemented. New legislation is passed.

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[2] Adapted from TA Technology Assessment (2004), 'Technology Assessment in Europe; Between Method and Impact Final Report', TA Technology Assessment: Bern

2.2 Application of Parameters

This Section will attempt to start distilling learning from the eight projects being considered. We will do this initially by considering each project in terms of the parameters set in Section 2.1. Later, in Section 3.2, we consider their relative position using the TAMI typology. For details on each of the eight projects discussed please refer to Appendix 1, which includes full descriptions of each project. In the paragraphs below the italicised text are the stated aims of each project.

2.2.1 UK Projects

NanoJury UK

The stated aims of the NanoJury process encompass enabling the public to influence decision-making – '*provide a potential vehicle for people's informed views on nanotechnologies to have an impact on policy*' – enabling participants to debate, discuss and deliberate – '*facilitate a mutually educative dialogue between people with diverse perspectives and interests, including critical and constructive scrutiny of the hopes and aspirations of those working in the nanotechnologies-related sectors, by a wider group of citizens*' – and social intelligence gathering about the *'potential for deliberative processes to broaden discussions about nanotechnologies research policy'*. In the course of the jury, citizens also became informed about nanotechnologies, although this was not a stated aim.

In terms of substance, participants were asked to engage with the social and political implications and the governance of nanotechnologies informing recommendations on its future development. Demographically representative participants were selected and were engaged using the citizens' jury method, a social research technique. The project not only aimed to have some political influence, but also sought to mobilise people to take forward their concerns on the issue.

Smalltalk

Smalltalk's stated aims include debating, discussing and deliberating – '*facilitating dialogue on nanotechnologies*' – social intelligence gathering – '*building a better understanding of the public and scientists' aspirations and concerns about nanotechnologies* and *improving our understanding and use of good practice in engaging with the public on scientific issues*' – as well as aiming to influence decision-making – *'sharing our results with policymakers and the science community'*.

Participants were asked to engage with the social perceptions, the social and political implications and the governance of nanotechnologies in forming recommendations on its future development. Events have been a mix of those open to anyone (e.g. debates) and those to whom people were specifically invited. The events have generally been question and answer sessions and have tended towards traditional science communication, although the intention is for them to be more participative and social research based. The individual events have gathered social intelligence, although the Smalltalk project overall does aim to enable the events to have institutional and political influence.

Nanotechnologies, Risk and Sustainability

This project aimed primarily to gather social intelligence about the ways in which *'expert and public perceptions formed around the social, cultural and environmental implications of nanotechnologies', 'how it is possible to improve dialogue between nano-scientists and the general public in order to integrate public responses into innovation processes'* and *'what methods could be used to integrate public concerns into the development of a socially and environmentally sensitive regulatory framework for nanotechnologies'.*

Scientists were asked to engage with the social and political implications of nanotechnologies and how considerations of that could fit into their work. Participants in the focus groups were also asked to engage with this, as well as with where their voice could fit into the governance of nanotechnologies. The latter was an issue covered in a joint session with some focus group participants and scientists, as well as the social and political implications of nanotechnologies. The focus groups were selected based on demographic groupings and were engaged using a market research technique. In terms of the desired influence, this project is researching issues around and approaches to engagement with emerging technologies. The focus groups were an important part of the research in their own right, rather than the aim being to empower people as a result of them. In the longer term, it is hoped that the outcomes of the research will assist future engagement with emerging technologies to empower people and understand better ways in which they can have political and institutional influence.

Engaging young people

'Debates with a Difference' aim to inform the public through providing students with an awareness of nanotechnology's wider social and ethical implications. They introduce a basic understanding of an issue's scientific concepts, and then debate, discuss and deliberate over the topic. In the process, they also gather social intelligence about students' views and aim to enable the students to influence decision-making. The At-Bristol events aim to have students debate, discuss and deliberate scientific issues whilst enabling them to influence decision-making by providing a *'citizenship angle that encourages students to form views and to do something with them, as a way of being active citizens'.*

Both events require students to engage around the science in question, social perceptions of it, the social and political implications and the governance of it. In terms of whom the processes are open to, they are slightly different from most engagement processes. The participants are involved because their teacher has chosen to take them. However, in theory, the events are open to everyone and do not recruit based on demographics. Students are engaged through social research techniques, such as playing the Democs game and debating with scientists. The science centres which run these events aim to both empower the participants and to enable them to have institutional influence by passing on the results of the events to relevant decision making bodies.

Democs

Democs aims to debate, discuss and deliberate and is a means of gathering social intelligence about people's view on an issue. Although it can be played anywhere and does not require a facilitator, the intelligence will not necessarily be collected.

Playing the Democs game requires participants to engage with the science in question, social perceptions, the social and political implications and, if it comes up, the governance of it. Anyone can play the game, but it could be used in situations where participants have been chosen based on various criteria. Playing the game, and therefore any process which uses it, is open to everyone. It is a social research technique and, in terms of impact, it aims to empower people and gather social intelligence. Depending on the context in which it is played, institutional influence can also be achieved.

Nanodialogues – Experiments in Upstream, Public Engagement

Nanodialogues aims to gather social intelligence – *'generate intellectual and practical resources for enriched public, policy and scientific debate about the social implications of nanotechnologies'* and *'identify wider lessons and insights that can inform the policy and practice of public engagement in science and technology'* – and to influence decision-making – *'ensure that these dialogue experiments are framed in a way that can inform processes of institutional decision-making and priority setting'.*

They will require participants to engage with the science in question, social perceptions of it, the social and political implications of it and the governance of it. Four different events will take place as part of this project and whom they involve will vary. At least two of them, the citizens' jury and the citizens' panel, will select participants based on demographics. These two processes will be conducted using social research techniques, as will the work with the 'poor' in South Africa[3]. The process of working with a company is not yet finalised. The primary aim of these processes is to enable participants to have institutional influence and the projects explore the best ways in which this can be achieved. Participants will also gain information and may become empowered, as a result of their involvement.

2.2.2 USA Projects

Madison, Wisconsin, Consensus Conference on Nanotechnologies

The Madison consensus conference aims to inform the public – *'educate citizens about nanotechnologies'* – and to enable the public to influence decision-making through press coverage of the event and gaining the attention of elected officials. In the course of the conference, participants also discussed and deliberated nanotechnologies, although this was not an explicit aim of the project.

During the consensus conference and the forming of recommendations, participants were required to engage with the science in question, social perceptions of it, the social and political implication of it and the governance of it. The process was open to demographic representatives of the area and they were engaged using a social research technique, a

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[3] A key component of the Nanodialogues project is it's work examining the impact of technology in a developing country (S. Africa) as well as the west.

consensus conference. The project aimed to have political or institutional influence and, in addition, it mobilised participants to act on their concerns.

Informed Public Perceptions of Nanotechnologies and Trust in Government

This project sought to gain social intelligence about the low levels of trust in government to manage nanotechnology's potential risks. Although participants did have to engage with the science itself and its social and political implications, the main focus of their engagement was around the governance of nanotechnologies. Participants were demographically selected and engaged using elements of market research style engagement – questionnaires – and social research techniques, such as discussion groups and interviews. There were no aims to achieve political influence, the project solely aimed for the research institution to gain social intelligence on the issue in question.

3.   Analysis

In this section, we start to think through and reflect upon the overall picture of public engagement on nanotechnologies, with a view to distilling the implications for policy and engagement practice.

3.1   Engagement Project Findings: The Story so Far

Only two engagement projects in the UK have published reports so far; therefore, there is not sufficient material from which to draw conclusions about similarities and differences between project findings. However, if the midterm review from *SmallTalk* and the recommendations from *NanoJuryUK* are taken in the context of other studies, including international comparisons, it is possible to speculate on what an emerging picture might look like. The studies we consider here include the report by the Royal Society and Royal Academy of Engineering *Nanoscience and Nanotechnologies* and two US studies: the *Madison Area Citizen Consensus Conference on Nanotechnologies* and the *Project on Emerging Nanotechnologies* at the Woodrow Wilson International Center. This section should be read for an indication of the analysis that will be possible once more of the projects report their findings.

The five projects considered here have all looked at general questions about nanotechnologies policy and there is notable overlap in the range of issues that emerge. These can be divided into three areas:
1. Governance of science and technology
2. Criteria for evaluating technological options
3. Specific areas for research and regulation

3.1.1   Governance of science and technology

All projects report that publics want a greater role in science and technology policy.

3.1.2   Criteria for evaluating technological options

All five projects report public support for more nanotechnologies research. What also emerges is a discussion of criteria for evaluating technological options such as:
- Will it improve our quality of life and create jobs? (*NanoJuryUK*)
- Will nanotechnologies research policy consider long term problems that may not be addressed by the market? (*NanoJuryUK*)
- Will it make a positive difference for people in developing countries? (*SmallTalk*)

3.1.3   Specific areas for research and regulation

All five reports address the need for research on the health and environmental impacts of nanomaterials. Many also call for a more precautionary approach to regulations (RS/RAE; NanoJuryUK; Madison).

3.1.4   The Main Findings

"Amongst the opinions expressed was concern about risks as yet unknown and also an expectation of unanticipated benefits - the public appears to expect the unexpected! When asked about the moral implications, several respondents expressed concern about the impact of nanotechnologies on developing countries. Participants were generally keen for the UK to be a leader in the field and for research to be well funded. They also believed that decisions on nanotechnologies should involve everyone."

From Small Talk Mid-term Review, November 2005, page 4

NanoJury UK main recommendations:

Governance of science and technology:
- Greater public involvement in nanotechnologies policy making
- Greater openness about public funding of nanotechnologies research

Nanotechnologies research priorities:
- Public funding should focus on long term problems that will not be addressed by business, especially health and environmental issues
- An aim should be to create jobs in the UK and improve people's quality of life

Risk and regulation
- There should be testing and labelling of manufactured nano-particles

From Provisional Recommendations of the NanoJury

Main recommendations of the Madison Consensus Conference on Nanotechnologies:
- Greater government regulation of toxicity of Nanomaterials
- The development of specific health and safety testing processes for Nanomaterials
- Nanotechnologies should not be used to invade privacy or for military purposes
- More publicly accessible information about nanotechnologies research and product development (openness about research) and labelling of nanomaterials
- More research on nanomaterials and more research on health and societal impacts of nanotechnologies.
- Greater public involvement in nanotechnologies policy development

Report of the Madison Area Citizen Consensus Conference on Nanotechnologies, April 2005

Main findings of research on informed public attitudes on trust in government around nanotechnologies carried out by the Wilson Centre:

- Expectation of benefits from nanotechnologies
- High level of concern about unknowns and potential health risks calls for government regulation
- Low public trust in government and industry
- Public want to be more informed and included in decision making about nanotechnologies

Informed Public Perceptions Of Nanotechnologies and Trust in Government, Woodrow Wilson Center
September 2005

3.2   The Range of Projects

This section has been developed to create a picture of what public engagement activity is and is not taking place on nanotechnologies. To do this we are using the TAMI typology of impacts to create a sense of the space we are operating within. We have deliberately chosen to map the projects for their impact, as opposed to the approach adopted.

Table 2 has been developed in order that we might start to get a picture of what activity is taking place and whether there are some important gaps in activity that need to be addressed. Although it would be possible to place projects in many boxes as they often have multiple impacts, we have decided that each project should appear in a maximum of two.

Table 2 suggests that good work is being undertaken in raising knowledge on social and policy aspects, as well as initialising actions on social aspects. There are also clear gaps on raising knowledge on technical scientific aspects, as well as initiating policy actions. Our research does however suggest two clear gaps in current practice: the processes need to be scaled up, and a better understanding of how to integrate public engagement with institutional R&D processes is required.

Table 2: A Map of UK Projects

ISSUE DIMENSION	IMPACT DIMENSION		
	I. RAISING KNOWLEDGE	II. FORMING ATTITUDES / OPINIONS	III. INITIALISING ACTIONS
TECHNOLOGICAL / SCIENTIFIC ASPECTS	[NRS]	[DCs] [YP]	
SOCIETAL ASPECTS	[DCs] [NRS]	[See Note*1]	[NDs] [NJ] [ST]
POLICY ASPECTS	[ST] [NJ]	[NDs]	[See Note*2]

DC – Democs, ND – Nanodialogues, NJ – NanoJury UK, NRS – Nanotechnologies, Risk and Sustainability, ST – SmallTalk, YP – Engaging Young People.
Note:
It should be noted that this is very much a provisional map and only covers those projects we have considered so far. For example, the Cambridge IRC programme would fit well into box [*1] and this initiative the NEG may well fit into box [*2].

Scaling Up

At present very few people are being exposed to the deliberations and outputs of the public engagements projects covered in this document. NanoJury is a notable exception by partnering with The Guardian to ensure significant dissemination of the results.

Of the various goals for S&T public engagement that have been identified, some appear to be contingent on large numbers of people at least being exposed to the project work indirectly, if not being directly being part of the initiatives.

For example:
- to increase public understanding of nanotechnologies issues
- to democratise the S&T innovation process

We would suggest therefore that further work be done on bringing much larger numbers of people along with the deliberations.

Institutional Interactions

Much better understanding of the options for integrating public engagement with institutional (especially the private sector) R&D processes is required. A useful start has been made by the Nanodialogues project, but NEG would support resources allocated to building the partnerships necessary for real time public engagement on actual decisions.

Given that a substantial fraction of nanotechnology R&D is undertaken by the private sector, further exploration of whether public engagement with private sector R&D programmes is realistic if required.

The NEG would support an action research project on private sector public engagement on nanotechnologies. For such a project to be successful will depend crucially on relationship building between both the initiating parties (project managers and the sponsoring government department) and the target private sector organisation.

3.3   Challenges and Questions

This section identifies and discusses key challenges of early stage engagement and observes how different projects have tackled them. The aim of this discussion is to get an overall view of the challenges associated with engaging people at an early stage in the S&T research and development trajectory.

However, not all challenges are equal. Each project has different objectives, the attainment of which will hinge on different factors. For example, to take our first challenge of 'getting people interested', this is critical to a project with a widespread communication component but not to one that may seek to develop social intelligence. It is important; therefore, not to undertake direct comparisons between projects, as the notion of what works depends on what you are trying to achieve. We have spilt this section into methodological and conceptual challenges.

3.3.1   Methodological Challenges

In this section we cover the practical challenges being faced when engaging the public in nanotechnologies issues.

3.3.1.1   Getting People Interested

One of the initial challenges with public engagement around nanotechnology is attracting participants to a process, given that the subject matter is often unfamiliar and not obviously relevant to their lives. The Madison consensus conference identified this as a key challenge and NEF has found institutions to be reluctant to run the Democs game on nanotechnologies. This is despite organisations having been happy to use versions of Democs which focus on other issues such as animal testing or stem cell research that are perhaps more relevant to people's everyday experiences and interests.

Approaches

Two projects approached this by not mentioning nanotechnologies in their recruitment. The Demos-Lancaster project just advertised a discussion of technology and the NanoJury advertised a citizens' jury without mentioning nanotechnologies. The main way in which it was able to attract participants was by offering them an opportunity to select and discuss an issue of importance to them followed by the jury process on nanotechnologies. The

two-way approach of the NanoJury is especially interesting and represents a clear departure from traditional approaches to public dialogue on S&T, which offer much more limited scope for citizens to influence the agenda.

3.3.1.2   Introducing the subject to participants

Informing participants appropriately about the topic is a long-standing challenge of public engagement on S&T issues. This challenge is especially acute when the S&T issue in question is 'emerging', and has a limited profile. In this section we leave aside issues of balance of information provision and stick to methods of participant preparation.

Approaches
The At-Bristol project[4] assumed that students could learn about nanotechnologies as they went along, as they did with other subjects, such as genetic profiling. But they had to restructure their process to explicitly introduce nanotechnologies to ensure that students understood the topic. At-Bristol also noted that the lack of even basic knowledge with which to start a discussion made discussing nanotechnologies more challenging than other topics.

Most other projects have a general introduction to nanotechnologies at some point in their process, through prior reading, speaking to experts, or presentations at the start of a process. These generally set out the definitions of nanotechnologies, some examples and what they see as associated risks and questions.

Some projects are taking an alternative approach. The Demos-Lancaster project first had focus group participants discuss the place of technology in their lives, which provided some context for discussing nanotechnologies. Building on this, the Nanodialogues citizens' jury will also begin with a general discussion of technology before introducing the participants to nanotechnologies.

The NanoJury also used this approach and started with the jurors brainstorming about how technology fits into their lives. The facilitators also acted out the ways in which technology affects our lives through role-play. The later stages of the two projects are quite different, as the Demos-Lancaster project purposefully did not ask participants to express a preference for one of the alternative visions for the development of nanotechnologies, which they presented. The NanoJury, on the other hand, went on to have participants make recommendations about how they would like to see nanotechnologies develop. Even so, the approach to introducing the subject is similar in both cases and seems to have contributed to successful engagement processes.

3.3.1.4   Number of Participants Involved

Most S&T public engagement projects involve a small number of people. This raises important questions as to the form and function of the exercise. Professor Berube, Associate Director of Nanoscience and Technology at the University of South Carolina, notes in his response to the Madison consensus conference that *'the real issue is whether these experiments do anything more than expose a very small, often self-selected and unrepresentative group of people to an issue'*. He argues that *'at 13 people a shot and 4 days each, it would take about 5.6 million of these to cover the current US population'*.[5]

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[4] A project engaging young people and a Smalltalk event
[5] www.nanohype.blogspot.com/2005/05/madison-consensus-conference-april

These statements perhaps reveal more about Berube's understanding of the purpose of public engagement than they illuminate the process in question. They suggest that he believes the consensus conference had a largely educative role or mass democratic role, as opposed to developing social intelligence; the conventional use of consensus conferences and the primary basis for UK based S&T public engagement.

As ever, it all depends on the purpose of the initiative. If there is a mass educative, communicative or democratic role, then a mechanism is required which may enable large numbers of people to be reached. For example, if one hopes to get statistically robust outputs then approaches that have a sufficiently large and demographic sample are required, such as deliberative polling.

Indeed, the very large numbers involved with GM Nation[6] are still small in comparison to the numbers who are affected by the issue or claim to be interested in it, in the country as a whole. And even web-based processes, which often market themselves on the basis of the large disperse groups they can engage with, fall far short of the total numbers projects aspire to involve when holding democratic or communicative goals.

It is rare for the success of a project to hinge on the numbers of participants involved. Much more important is the quality and type of representation achieved.

It may be that the only channels for engaging such large numbers of people are those provided by the mass media outlets, either printed or broadcast. NanoJury is the only process to date which has worked with a national media partner, in this case the Guardian; this resulted in a number of articles on the process being published, and the launch of the findings taking place at the Guardian media centre.

Distinctions therefore need to be made between numbers directly involved in a process; and those exposed to the process through other media. There is a separate and important discussion on how these different engagement techniques are interlinked and relate to one another, in particular the use of mixed methods such as both qualitative and quantitative techniques.

3.3.2   Conceptual

In this section we explore some of the challenges around how people conceive and think about public engagement on nanotechnologies.

3.3.2.1   Technological Control

A shared experience of the public engagement projects so far is the challenge of understanding and talking about ways that societies can make choices about technological trajectories. Many projects have reported that participants often talk of the need for government regulation on the potential health and environmental risks of nanotechnologies. While managing risks is clearly an important area of concern, a focus on it leaves many of the broader societal issues that could be raised by nanotechnologies unaddressed. The repeated concentration on questions of risk may result from the difficulty (shared by participants and project teams alike) of conceptualising other modes of public intervention in technology policy.

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[6] 37,000 people over 675 meetings source: GM Nation Final Report www.gmnation.org.uk

In the Demos-Lancaster focus groups, an alternative approach was taken. Participants were introduced to the subject following a general discussion of technology and they were not asked to form opinions on how they would like to see nanotechnologies develop. Participants expressed a deep sense of unease about the rapid pace of technological development. Even so, when they were asked where they thought they could have most voice in shaping the direction in which businesses may take nanotechnologies, they felt that it was in calling for more regulation and testing.

This suggests that the ubiquitous calls for more regulation are not due to the nature of the process used, but may speak of the deeper lack of control that people feel in regard to the directions which technological development takes their lives. It also reveals the fact that they do not feel that they can have a voice in shaping this direction. Regulations and testing are pragmatic ways of responding to this uncertainty and lack of control, as well as being ways of exerting some degree of control on the direction that nanotechnologies takes.

The ubiquity of calls for more regulation raise questions over:
- publics awareness of other mechanisms of control and influence
- how publics frame abstract ideas such as 'the future' and 'Science & Technology'.

3.3.2.2   Public Engagement and Empowerment

Another challenge is how to support participants once the projects are over. One of NanoJury's main concerns is that at the end of the process, *'the energies of people with such a huge amount to contribute to the regulation of nanotechnologies in the public interest….should be harnessed'*. Rather than seeing their small number as a problem, the question is how to make use of their enthusiasm. Listening to the jurors at the NanoJury launch it was clear that they do not see their involvement with the subject as being at an end.

Even if processes are unable to reach large numbers of people, processes like the consensus conference and the NanoJury are undoubtedly able to significantly raise participants' levels of awareness of nanotechnologies and to empower them as citizens, which some see as valuable aims in themselves. The Madison consensus conference has already had external effects as some of the participants organised Madison's first Science Café, which 40 people attended. In addition, a participant stated in their evaluation that *'I would like to spend time organising on these issues'* and other participants have gone on to form a citizens' group to address nanotechnologies issues in their community over the long-term.[7]

3.3.2.3   Public Engagement & Power

A number of nanotechnologies engagement projects aim to link into relevant policy or decision-making bodies. The UK Government has established the Nanotechnologies Issues Dialogue Group (NIDG) as the body that will receive and respond to public engagement on nanotechnologies. However, the relationship between projects, the NIDG, and wider government policymaking is at an early stage. The extent to which a process aims to

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[7] Powell M. and Kleinman D. (2005) *Building Citizen Capacities for Participation in Technoscientific Decisionmaking: The Democratic Virtues of the Consensus Conference Model* Draft paper pp.6 Madison:University of Wisconsin

influence policy or an institution depends on its aims and objectives. And, as set out in Section 2.1.1, there are different ways in which processes seek to do this.

In the case of the eight projects under discussion, many of them do aim to link into policy but this is a challenge because, as Melanie Smallman, Smalltalk director notes, *'nanotechnologies don't really sit in a clear policy place yet'*.[8]

The NanoJury aimed to *'provide a <u>potential</u> vehicle for people's informed views on nanotechnologies to have an impact on policy'* (emphasis added).[9] Whilst the participants and the organisers are keen for the jurors' recommendations to be passed on and considered, the aim is realistic in acknowledging that this will be a challenge.

The two projects working with young people have had previous success in enabling students' views to inform decision-making on other issues[10] but Alex Garlick, At-Bristol, notes that *'there are no clear, established ways of linking up between government and the public when it comes to nanotechnologies'*[11] so informing nanotechnologies decision-making is proving to be a challenge.

The Madison consensus conference aimed to *'Gain the attention of elected officials'*[12] and it did achieve this, as six elected officials attended the launch of their recommendations. But, Dr Kleinman admits that he does not know whether they will take any action as a result of what they heard.

Projects are therefore being pragmatic when it comes to policy influence and taking a longer-term view of the impacts which engagement processes can have on decision-making. Melanie Smallman argues that, *'it is still possible to pass on relevant social intelligence to people working on the area, who should find it helpful'*.[13] Similarly, Dr Kleinman argues that such processes are valuable for informing politicians about public views on nanotechnologies in the event that the issue comes onto the legislative agenda.[14]

He also feels that *'these conferences and other participatory mechanisms could have important policy outcomes over the long run'* as they build relationships between citizens, scientists, politicians, government authorities and the media. This helps citizens to establish networks and to feel more comfortable communicating with such actors, and increases awareness of what citizen perspectives on issues are.[15]

The NanoJury organisers hope that the process will *' act as a catalyst to further mutually beneficial engagements between those citizens professionally responsible for making discoveries or decisions and those who are more likely to be at the receiving* end'.[16] Prof

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[8] Interview with Melanie Smallman, project director, on August 31st 2005

[9] www.nanojury.org/aims

[10] For example, the results of At-Bristol events have been passed on to the the Committee on Radioactive Waste Management and the Nuffield Council on Bioethics

[11] Interview with Alex Garlick, At-Bristol event organiser on September 14th 2005

[12] Powell M. and Kleinman D. (2005) *Building Citizen Capacities for Participation in Technoscientific Decisionmaking: The Democratic Virtues of the Consensus Conference Model* Draft paper pp.6 Madison:University of Wisconsin

[13] Interview with Melanie Smallman, project director, on August 31st 2005

[14] Interview with Daniel Kleinman, process organiser at the University of Wisconsin on November 8th 2005

[15] Powell M. and Kleinman D. (2005) *Building Citizen Capacities for Participation in Technoscientific Decisionmaking: The Democratic Virtues of the Consensus Conference Model* Draft paper pp.13 Madison: University of Wisconsin

[16] Wakeford T., Singh J., Murtuja B., Bryant P. (2005) *Towards two-way-street engagement: The Theory and Practice of NanoJury UK* pp.7 Newcastle: Peals

Welland, one of the sponsors, has stated that he sees the NanoJury as the first step in a process[17] and Adrian Butt, of the Government's Nanotechnologies Issues Dialogue Group (NIDG), echoed this when saying that he hopes the jury encourages industry and civil society to get engaged in dialogue.[18]

Alex Garlick (At-Bristol), feels that *'it is good to discuss something so current at a point when you can have an effect, so the benefits outweigh the drawbacks'.* In addition, he feels that discussing the subject creates momentum, making the public more likely to request opportunities for influencing decision-making on the subject available.[19]

Moreover, being unable to achieve influence does not automatically undermine a process. The Madison consensus conference organisers found that even though many participants *'stated explicitly in exit interviews that they did not expect the work of the consensus conference to influence policy'* they still had positive feelings about their experience and looked forward to future opportunities to participate.[20] This is a common finding in strategic public engagement work generally.

3.3.2.3 The Role of Experts in a Process

Many S&T public engagement processes involve interaction between traditional experts and lay members of society. This interaction is often critical to the success or failure of that process. Much public engagement is centred on participants learning about an area of science and technology that is new to them. How that information is processed will depend critically on its preparation and introduction to the project. Hence both the style and substance of what the experts say is critical.

The Experts' Place in a Process

In the NanoJury, the expert witnesses were expected both to inform the jurors about the topic and to present their own point of view. This tension in the design of the process led some jurors to express frustration because of the diversity of perspectives presented by the witnesses chosen by the oversight panel. In contrast, for the Demos-Lancaster project this lack of clarity had a positive effect on scientists' interactions with the public. Dr. Kearnes noted that when the members of the public came together with scientists in the fourth stage of their project, the project team were concerned that the scientists would adopt the role of an expert who assumed that they could educate the public. In fact, they found that the scientists and the members of the public shared a sense of confusion about who was controlling the direction of nanotechnologies research, which enabled them to discuss the subject as equals.

The success of involving scientists in engagement activities depends on two considerations. First, understanding of the different kinds of knowledge and contributions that scientists can make to public engagement. This can range from representing the scientific consensus on a particular topic to contributing their perspective as citizens. Second, the need for incentive structures to encourage more scientists to participate.

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[17] Welland M. speech at the NanoJury launch, Guardian Offices, London, September 21st 2005
[18] Butt A. speech at the NanoJury launch, Guardian Offices, London, September 21st 2005
[19] Interview with Alex Garlick, At-Bristol event organiser on September 14th 2005
[20] Powell M. and Kleinman D. (2005) *Building Citizen Capacities for Participation in Technoscientific Decisionmaking: The Democratic Virtues of the Consensus Conference Model* Draft paper pp.11 and 14 Madison: University of Wisconsin

In an ideal process, the expert participants would themselves find the experience rewarding and educative and worth participating in for its own sake. In an open and mutually respectful forum it can be very helpful and stimulating for scientists to formulate their own previously unarticulated assumptions, to be presented with unexpected insights and to find their own preconceptions about the beliefs of lay publics challenged. On the other hand, it is possible to imagine less well-designed processes in which an
excessively adversarial atmosphere leaves scientists defending themselves against stereotypical misrepresentation. Such outcomes would be likely to have a lasting negative effect on our ability to engage experts for future processes.

3.3.2.4   What Institutions Need and People Want

As mentioned above, the two-way approach of the NanoJury was about more than just attracting participants. It is seen as providing a process with greater democratic legitimacy because of the way in which it *'acknowledges that decision-makers need to consult on an issue that is defined as "top-down"'* but also *'values citizens' passion for achieving practical policy change on an issue that they define from the "bottom-up"'.*[21]

This is a difficult balance to strike however. Nanodialogues has already identified this as a challenge in delivering their citizens' jury for the Environment Agency – *'Upstream engagement necessarily involves a tension between openness (public-led, bottom-up) and relevance (to the chosen issue and to the needs of the agency). The success of the process can be judged in large on whether this tension is appreciated and a balance is struck'.*[22]

Managing the tension between what an institutions needs to consult on and what people want to talk about is a challenge, and as more institutions undertake engagement on nanotechnologies (or in other emerging areas of S&T), it is likely to be a significant issue. The NEG will conduct further research on this as projects develop.

3.4   Moving Forward

The role of the NEG is to take a broad perspective on public engagement on nanotechnologies with a view to providing advice on the current state of knowledge and practice.

At this stage of our operation the NEG are unable to come up with recommendations but we are also required to provide advice for government. This is particularly relevant given the potentially rapid rate of nanotechnologies development.

A key question emerging from our work so far is whether there is anything unique about public engagement on nanotechnologies in comparison with other public engagement arenas technological or otherwise. For example, are the calls for greater regulation we have identified symptomatic of particular processes, a good common sense response, an inevitable reaction to uncertainty or something else? Is there a need for new processes that can go beyond discussions of regulation?

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[21] Wakeford T., Singh J., Murtuja B., Bryant P. (2005) *Towards two-way-street engagement: The Theory and Practice of NanoJury UK* pp.4 Newcastle: Peals
[22] Stilgoe J. (2005) *Project Plan: Nanodialogues Phase 2* pp.7 London: Demos

Our findings so far raise questions related both to research and practice. We have therefore divided our proposals for moving forward into gaps in terms of knowledge and practice.

Knowledge gaps

As already noted, an important next step in improving our understanding of public engagement on nanotechnologies is placing it in the context of wider public engagement discourses, technological as well as others such as democratic renewal.

Another emerging theme is the importance of understanding public engagement from a variety of perspectives, in particular, the participant/public as well as the institution. Historically, analysis of technological assessment and control has been largely from the perspectives of institutions. Our research suggests that much closer attention must be paid to public perspectives if public engagement is to achieve its potential.

The NEG has identified the following knowledge gaps:

1. What are the means by which government and society shape technologies?
Suggested response - *a broad analysis of the mechanical and regulatory drivers within the innovation framework – exploring what government's role should be in setting that framework.*

2. What lessons have been learnt from past public engagement activities and other studies on the relationship between science, technologies and society?
Suggested response - *an academic review of the literature on public engagement and new technology.*

3. How do the public want to be involved?
Suggested response - *better understanding of what participants think of the opportunities to be engaged.*

4. In the light of answers to 1, 2 and 3, what are the conclusions that can be reached now about government policy with regard to nanotechnologies?
Suggested response - *a user-friendly summary of the issues that arise from the above piece of work and look at how they may apply to nanotechnologies.*

Gaps in Practice

As referred to in Section 4.2 two principle gaps in practice have emerged. Firstly, the need to 'scale up' public engagement projects to involve larger numbers of people and, secondly, the lack of experience of working with institutional R&D processes especially, in the private sector. The NEG have identified the following gaps in practice:

Scaling up Public Engagement
Suggested response - *an exploration of the potential of exposing much larger audiences to the deliberations that form part of S&T public engagement processes.*

Public Engagement & the Private Sector
Suggested response - *action research working with a private sector company would seek to integrate a public engagement process into their nanotechnologies R&D process.*

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Appendix 1: Project descriptions

1	NanoJury UK
2	Smalltalk
3	Nanotechnologies, risk and sustainability
4	Engaging young people
5	Democs
6	Nanodialogues – experiments in upstream, public engagement
7	Madison, Wisconsin, Consensus Conference on Nanotechnologies
8	Informed Public Perceptions of Nanotechnologies and Trust in Government
9	Projects or initiatives still to cover

The mapping of current or recently completed, in the UK and internationally, will provide a clear picture of engagement work on nanotechnologies and its scope and will be a document that evolves over time.

In the case of all of the projects, the challenges identified are discussed in Section 4.3.

1   NanoJury UK

Organisers: Cambridge University Nanoscience Centre, Greenpeace, The Guardian and the Policy, Ethics and Life Sciences Research Centre at the University of Newcastle (PEALs). Tom Wakeford, from PEALs, acted as the project lead. The backgrounds of the organisers include aceademia (social science and nanotechnologies science), NGOs and the media. Professor Nick Pidgeon and Dr. Tee Rogers-Hayden, University of East Anglia, acted as reflectors on the process.

Purpose: The project aimed to:
- Provide a potential vehicle for people's informed views on nanotechnologies to have an impact on policy
- Facilitate a mutually educative dialogue between people with diverse perspectives and interests, including critical and constructive scrutiny of the hopes and aspirations of those working in the nanotechnologies-related sectors, by a wider group of citizens
- Explore the potential for deliberative processes to broaden discussions about nanotechnologies research policy – both in terms of the range of issues and the diversity of people who are given a say

Approach: The jury was an example of two-way engagement. Citizens were not just asked to discuss nanotechnologies; they also had the opportunity to select and discuss an issue of priority to them. The NanoJury participants discussed young people, exclusion and crime, prior to discussing nanotechnologies.

The jury was made up of twenty-five Halifax residents who were selected through letters sent to people on the electoral register and advertising it with community groups to ensure that those not on the electoral role also had an opportunity to take part.

In addition to the jurors, the process also involved a multi stakeholder oversight panel to oversee balance and fairness in the process. The nanotechnologies half of the jury also involved a science advisory panel to ensure accuracy and balance in the evidence presented. Professor Pidgeon and Dr. Hayden identified the involvement of the multi-stakeholder panel in the NanoJury as being one of its strengths.

The jurors took part in eight evening sessions of two and a half hours each during April and May on the topic they chose. They then discussed nanotechnologies in May and June over ten sessions of two and half hours each. In the nanotechnologies half of the process the jurors were introduced to nanotechnologies and in subsequent sessions they heard evidence from witnesses who were selected by the oversight panel. The jurors themselves could also select or request witnesses. In the last few sessions they wrote recommendations on nanotechnology's future development in the UK and noted the degree of support for each recommendation among the jury. These recommendations were presented at an event in London, which 3 jurors attended.

Professor Nick Pidgeon and Dr. Tee Rogers-Hayden stated in both the brief notes which they have so far produced, as well as in remarks at the NanoJury recommendations launch, that the jury process seems to be a good one for the kind of early engagement with an emerging technology, which nanotechnologies requires. In addition, Dr. Mark Welland, of the Cambridge University Nanoscience Centre, commented at the launch that he sees the jury as a good way for scientists to open up their work.

Findings: The NanoJury recommendations covered openness about public expenditure on nanotechnologies, the need for more consultation at key stages in research development, ensuring money is spent on looking at how the technology can solve longer term health and environmental problems, calls for product labeling of nanotechnologies products and suggestions about managing the use of nanotechnologies in information and communication technology.

Evaluation: Professor Nick Pidgeon and Dr. Tee Rogers-Hayden filled an evaluative role on the project. Their detailed evaluation has yet to be published but they have published some reflections in *Smalltimes UK*, which have informed this report.

Challenges: The NanoJury's challenges will be set out in more detail in the forthcoming project report. Some identified challenges though were:
- The participant – scientist interaction
- How to harness the learning of those involved

Funders: did the funding come from the partners in the project? (Richard or Rob do you know?)
Cost: The total cost of the project is not yet known, but £45,000 had been received by June 2005.
Timescale: The citizen's jury took place from April to September 2005, when the findings were launched a high-profile London event.
Reference: www.nanojury.co.uk

2   Smalltalk

Organisers: Think Lab project manage Smalltalk, in collaboration with The British Association for the Advancement of Science, Ecsite-UK, the Royal Institution, the Cheltenham Science Festival, and Think Lab. All of the organisations involved are from science communication backgrounds.

Purpose: Smalltalk is a UK-based project, whose objectives are:
- Facilitating dialogue on nanotechnologies
- Providing resources and support for organisations preparing such events and activities

- Building a better understanding of the public and scientists' aspirations and concerns about nanotechnologies
- Sharing our results with policymakers and the science community
- Improving our understanding and use of good practice in engaging with the public on scientific issues
- Evaluating the impact of a co-ordinated approach and sharing our findings with the wider science communication community

A wider objective, as expressed by Melanie Smallman, project director, is to see whether science communication organisations can meaningfully contribute to the public engagement agenda.[23]

Approach: Smalltalk provides organisations with suggestions about issues to cover, information about what has worked in other events, evaluation and the opportunity to share an event's results with the wider science community and policymakers.

In addition, Smalltalk provides advice on how to ensure that events are participative and enable attendees to enter into dialogue with scientists and representatives of institutions. To date they have supported organisations in running whatever kind of event they wanted to and most have been lectures with brief question and answer sessions at the end, which Smalltalk does not regard as genuinely participative.

To compensate for participants' lack of opportunity to have their say a postcard was developed with space for participants to write what they would say to scientists or ministers about nanotechnologies and their views on the risks, benefits and moral implications of nanotechnologies. There was a 60% return rate of these cards.

Smalltalk has been frustrated by the similarity of participants' views though and the project's second phase aims to discover whether peoples' lack of knowledge about nanotechnologies prevents them from discussing it in detail or whether the lack of participation in the events has caused similar results. The project will also aims explore whether the low levels of engagement in the Smalltalk events so far is due to a lack of knowledge of what is on offer or an institutional barrier to genuine engagement with the public.

Smalltalk is developing a 'menu' of participative methods to offer organisations for future events and will only work with those who agree to trial one of the methods.

Smalltalk has a lot to offer the NEG's research as it can provide a perspective on what motivates the institutions they work with to conduct public engagement on nanotechnologies, whereas a number of other projects are being conducted on a research basis. Once this information is available it will be fed into this research, as appropriate.

Findings: The opinions expressed at different events have all been very similar and generally cover the desire for more regulation of nanotechnologies, more testing, more consideration of the potential ethical, social and environmental impacts and highlight the potential benefits for health and technology. For a full list of participant views on nanotechnologies, please see the Smalltalk website at www.smalltalk.org.uk

Challenges: The project's change in direction is an attempt to address its key challenges which include:
- Participants finding it difficult to talk about nanotechnologies

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[23] Interview with Melanie Smallman, project director, on August 31st 2005

- Lack of clarity about how peoples' input can influence policy or get passed on
- The fact that the same views keep coming out

Evaluation: Smalltalk is evaluating the whole project and individual events. Event organisers, speakers and experts fill in a questionnaire about how it went, what the strong points of the discussion were, their motivation for organising the event and whether working with Smalltalk helped. Participants fill in a questionnaire about whether they feel that their voice has been heard. There is also an online survey for providing more information. All of the evaluation material will be in the final report.

Funders: The COPUS grant scheme. Individual events are funded by the organisation running them.
Cost: The project has £50,000 of funding.
Timescale: The project began in September 2004 and is due to end in spring 2006
Reference: www.smalltalk.co.uk

3   Nanotechnologies, risk and sustainability
(Referred to as the Demos-Lancaster project throughout this report)

Organisers: Demos, a think tank, and the University of Lancaster. The project also involves input from scientists, industrialists, journalists, academics and the public.

Purpose: The project aims to explore four key questions:
- What can we learn from the development of biotechnology since the 1970s, and associated public debates?
- How are expert and public perceptions formed around the social, cultural and environmental implications of nanotechnologies, including benefits, risks, uncertainties, and opportunities for re-design?
- How is it possible to improve dialogue between nano-scientists and the general public in order to integrate public responses into innovation processes, including industrial R&D?
- What methods could be used to integrate public concerns into the development of a socially and environmentally sensitive regulatory framework for nanotechnologies?

Approach:
The project has five stages:
- Learning from the biotechnology experience through research and interviews with key stakeholders in biotechnology regulation;
- Research with nanotechnologies scientists about the ways in which they see public debate fitting in with their research;
- 6 focus groups, each conducted over 2 meetings, with a range of publics, recruited based on demographic groups;
- An interactive workshop for both the scientists and members of the focus groups to attend (focus groups members were selected on a mix of enthusiasm but also a desire to have two embers of each groups present); and
- The writing up and dissemination of the research.

The focus groups, which constituted the direct public engagement aspects of the project, moved away from the tendency to inform people about nanotechnologies and then to ask them what they think about it, as consensus conferences and citizens' juries tend to do. The project team believes that this is not a very useful exercise because most people

do not know enough about nanotechnologies to make judgements, even after being given information. They therefore tend to just have common sense responses and ask for more regulation and testing.

The project advertised their focus groups as discussions of technology in general. Whilst people may not have an understanding of nanotechnologies, they have a nuanced understanding of the way in which technology fits into their lives and can contextualise discussions of nanotechnologies in this way.

So, the focus groups first discussed the place of technology in their lives and were then presented with concept boards to introduce nanotechnologies. These included definitions of nanotechnologies and potential risks but mainly aimed to present visions of the different futures which nanotechnologies could lead to. The first set out the vision of nanotechnologies as a competitive advantage for the UK leading to wealth creation and investment. The second presented a radical future of nanotechnologies leading to extensive human enhancement and technological development.

The discussion then centred on where the publics thought that they could have a voice in shaping the vision of nanotechnologies that is pursued. This was in contrast to many other events which would have moved on to asking the public questions, such as asking which vision they preferred.

Findings so far: When discussing technology in general the focus group participants expressed their ambivalence about the fact that it is essential yet ties them into a rapid pace of change and many of the participants had a deep sense of unease about the potential direction of nanotechnologies. When they moved on to discuss where they could have a voice in influencing that direction most of the participants felt that their opinions could have most influence in demanding more regulation and testing, as they did not feel that they could have a voice in shaping the direction in which businesses take nanotechnologies. The project's main findings are likely to reflect this.

Challenges: The project's formal findings have not yet been written up, so the challenges will be explored in later drafts of this research. The above does; however,inform Section 4.

Evaluation: The ESRC will formally evaluate the project and the team will also write a report for the ESRC, which will be published on the Demos website.

Funders: The Economic and Social Research Council (ESCR).
Cost: £226,000 from the ESRC.
Timescale: The project is taking place from January 2004 to April 2006.
Reference: www.demos.co.uk/projects/currentprojects/ESRCnanotechnologies/

4   Engaging young people

Two of the Smalltalk supported events have engaged young people with nanotechnologies, so they are looked at separately to draw out their learning.

Organisers: SciZmic, a network supporting science clubs and centres, developed **'Debate with a Difference'.** It was delivered at the Museum of Science and Industry in Manchester. **At-Bristol** science centre organised and ran the other event.

Purpose: Debates with a Difference aim to provide students between 14 and 19 with a basic understanding of an issue's scientific concepts and an awareness of its wider social and ethical implications.

At-Bristol aims to engage young people (6th formers) in discussing and debating scientific issues with a citizenship angle that encourages students to form views and to do something with them, as a way of being active citizens.

Approach: Debates with a Difference help students learn about nanotechnologies through a variety of interactive pair and group tasks. These can include mini-experiments to illustrate a topic, having students write simplified grant applications as part of deciding what research to spend money on or votes on whether statements are fact or fiction. Visiting scientists are involved throughout the debate and there is a section for students to ask the scientists questions. At the end of the debate small groups of students create policy statements about what they have discussed and present any creative material that they have produced.

The At-Bristol nanotechnologies event involved 100 6th form students from 4 schools in a day long session. The day included playing the Democs game (see section 5), a session of two experts presenting their research, followed by questions from student, a vote on what they would fund and a review of four different policies on the degree of regulation that nanotechnologies should have.

Findings: This will be added in once obtained.

Challenges:
- Feeding the results into a relevant policy making body
- Introducing the subject to students, given lack of existing knowledge

Alex Garlick, At-Bristol, also noted that students can be hard to engage because they are not at events by personal choice. On the flip side though, Savita Custead, SciZmic, sees interested students as being more prepared to delve deeply into difficult topics and articulate their opinions than some adults.

SciZmic has also realised how important it is to make links with teachers, as they decide whether to bring students to the events. As a result they now organise teachers' forums and invite them to workshops.

Evaluation: As Smalltalk events, they were evaluated by the Smalltalk team. For details see section 4.

Funders: This will be added in once obtained.
Cost: This will be added in once obtained.
Timescale: Similar events on different topics run as a regular part of a Science museum's activities.
Reference: www.scizmic.net and www.at-bristol.org.uk

5   Democs

Democs (Deliberative meeting of citizens) is a method of engagement rather than a specific project. However, its practitioners at the New Economics Foundation (NEF) have been funded to produce a version on nanotechnologies, among other subjects.

Organisers: The New Economics Foundation.

Purpose: Democs is a game designed to enable groups of people to engage with complex public policy issues.

Approach: Democs includes an opportunity for people to learn about a topic and express their views. The game does not need to be facilitated and can be played anywhere, which can make engaging with an issue more accessible.

Experts on the subject assist with writing the information included in the game and others are consulted on it. Participants are dealt a hand of cards to read and they pick out the ones that they feel are most important for discussion. Participants then make clusters to represent the key themes of their discussion. At the end of the game participants state their preferred policy positions on a subject by choosing from four pre-developed policy positions or developing one of their own.

Findings: This information will be added in.

Challenges: NEF has been finding it difficult to have people play the nanotechnologies version of Democs. They have approached organisations, many of which have publicly stated the importance of public engagement on nanotechnologies, to offer Democs as a tool but, as institutions are offered a choice of subjects they tend to choose topics which they think the public can relate to, such as stem cell research or animal testing. In contrast to the lack of take up of the nanotechnologies version of Democs, organisations such as the Human Genetics Commission have run events using the stem cell version, so the problems seems to lie with the subject.

Another challenge has been how to use peoples' input to influence policy.

Funders: Wellcome Trust
Cost: The development of a game costs from £5,000 - £10,000.
Timescale: The project based on promoting the games on scientific issues is running from November 2003 to January 2006, but NEF will retain the games and continue to supply them when requested.
Reference: www.neweconomics.org/gen/democs.aspx

6   Nanodialogues – experiments in upstream, public engagement

Organisers: Demos, a think tank, and the University of Lancaster. The team will also work with The Environment Agency, a regulator, two Research Councils, EPSRC and BBSRC,[24] ITDG, a development NGO and a company (not yet identified)

Purpose: The project aims to:
- Experiment in a theoretically informed way with new methods of 'upstream' public dialogue in societal debates around nanotechnologies
- Ensure that these dialogue experiments are framed in a way that can inform processes of institutional decision-making and priority setting
- Generate intellectual and practical resources for enriched public, policy and scientific debate about the social implications of nanotechnologies

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[24] The Engineering and Physical Sciences Research Council (EPSRC) and the Biotechnology and Biological Sciences Research Council (BBSRC)

- Identify wider lessons and insights that can inform the policy and practice of public engagement in science and technology

Approach: The project involves practical experiments to explore whether the public can meaningfully inform decision-making processes related to emerging technologies in four different institutional contexts. The project will:
- Run a citizens' jury on the potential use of nanotechnologies in land remediation with the Environment Agency, a regulator – January 2006
- Run a citizens' panel in Swindon to explore and discuss Research Council (EPSRC and BBSRC) decision-making – March 2006
- Use a variety of techniques to engage poor people with nanotechnologies, or a specific application of it e.g. water sanitation, in South Africa – July 2006
- Run a public engagement process of some kind on nanotechnologies with a company – not yet finalised

Findings: None of the processes have taken place yet, so their findings will be discussed in future reports.

Challenge:
- Getting a company involved
- Managing the tension *'between openness (public-led, bottom-up) and relevance (to the chosen issue and the needs of the agency)'.*[25]

Evaluation: The project has an advisory group which is providing ongoing evaluation. A formal independent evaluation of the Environment Agency Citizens' Jury will also take place and similar evaluations may take place for the other three processes.

Funder: The DTI's Sciencewise grant scheme.
Cost: £120,000
Timescale: The project is running from May 2005 to Autumn 2006.
Reference: www.demos.co.uk/projects/currentprojects/nanodialogues/

7   Madison, Wisconsin, Consensus Conference on Nanotechnologies

The key example of a consensus conference on nanotechnologies took place in Madison, Wisconsin, US in April 2005. Other conferences have taken place in the US but they have not been written up yet. Future US conferences are planned and will be covered by the NEG's research. None have taken place in the UK.

Organisers: Staff at the University of Wisconsin's Center on Nanoscale Science and Engineering and the Integrated Liberal Studies Program as part of their joint Initiative on Nanotechnologies. Daniel Kleinman and Maria Powell led the project and were assisted by students Dr. Kleinman's undergraduate course on Democracy and Expertise.

Purpose: The aim of the project was to:
- Educate citizens about nanotechnologies;
- Increase the profile of nanotechnologies and citizen participation through press reports; and to
- Gain the attention of elected officials.

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[25] Stilgoe J. (2005) *Project Plan: Nanodialogues Phase 2* pp.7 London: Demos

The project was based up the twin premises that:
- Citizens have the right to a say on all matters that affect their lives; and
- Lay people are able to understand complex information and may have insights that experts do not consider.

An additional aim of the project was to allow the organisers to experience running a consensus conference, as they wanted an opportunity to trial the method.

Approach: Thirteen demographically diverse Madison area citizens were recruited through press coverage in local papers, tv and radio slots and press releases to major papers. The recruitment took place over 2 months and thirteen participants were selected from eighteen applicants based on the organiser's belief that *'they could best contribute to a well-rounded citizen panel'.*[26]

The conference took place over three Sunday meetings, prior to which participants read background material on nanotechnologies. At the first meeting, participants discussed their reading and developed a list of questions about nanotechnologies. At the second meeting, seven specialists sought to address participants' questions in a public forum. This meeting was open to the public and 30 people attended. At the third meeting participants drafted recommendations on nanotechnologies development.

Findings

The conference's recommendations cover greater health and safety testing of nanotechnologies materials, product labelling, providing mechanisms for citizen involvement in the direction of research, greater media coverage and increased funding for exploring the societal and ethical impacts of nanotechnologies.

In reference to the project's objectives, the organisers feel that citizens did become educated about nanotechnologies. Increasing the profile of nanotechnologies and citizen participation through press coverage was achieved to a degree. However, the press was mainly local and conference participants identified the lack of sufficient media coverage of nanotechnologies as an issue. Six state-elected officials did attend the conference's press event but whether they will take any action is unclear. This uncertainty is discussed in section 4.

Challenges: The main challenges identified by the organisers were:
- Getting people involved due to lack of knowledge about nanotechnologies;
- Getting the press interested.

External commentators raised wider questions which include:
- What is the real value of the opinions expressed?
- Is it worthwhile given the small number of people involved?
- Is it worthwhile given the minor response by government?

Evaluation: The organisers ran exit interviews with participants which informed their paper *'Building Citizen Capacities for Participation in Technoscientific Decisionmaking: The Democratic Virtue of the Consensus Conference Model.*

Funders: The project was funded by the University of Wisconsin.
Cost: Do not yet know.

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[26] Powell M. and Kleinman D. (2005) *Building Citizen Capacities for Participation in Technoscientific Decisionmaking: The Democratic Virtues of the Consensus Conference Model* Draft paper pp.6 Madison: University of Wisconsin

Timescale: The conference took place in April 2005.
Reference: http://www.lafollette.wisc.edu/research/Nano/index.htm

8 Informed Public Perceptions of Nanotechnologies and Trust in Government

Organisers: The Woodrow Wilson International Center for Scholars, as part of their Project on Emerging Technologies, in partnership with the Pew Charitable Trusts. Jane Macoubrie, senior advisor to the centre, led the project and authored the final report.

Purpose: Following two studies in 2004[27], which identified low levels of public trust in government to manage the potential risks associated with nanotechnologies, this study sought to explore why that low level of trust exists.

Approach: Twelve groups of citizens were gathered in three locations around the US. A total of 177 citizens participated and the groups were demographically representative of their area. Participants were provided with background material, which presented a balanced view of known and projected applications of nanotechnologies, as well as information on the roles of six regulatory agencies, Congress and the White House in nanotechnologies oversight. Scientists and regulators reviewed the material for accuracy and ease of comprehension by lay people. The material focussed on conveying known facts and reasoning, rather than just stating opposing positions.

Public perceptions were gathered through questionnaires completed prior to receiving background material. After reading the material individual responses to concerns and anticipated benefits of nanotechnologies were gathered and they then took part in group discussions about concerns, benefits and perceptions of regulatory agencies. Finally, participants completed a post-study questionnaire.

Findings: Participants had a low general awareness of nanotechnologies but a generally positive attitude towards it, feeling that benefits will exceed risks and they showed little support for a nanotechnologies ban. Concerns centred on unknowns, potential health risks, the danger of *'playing God'*, long-term effects, risks of nanotechnologies in food and military applications. Participants called for effective regulation, product labelling and more safety testing and information. The level of trust in US government agencies was initially low but increased when their responsibilities were better understood. However, trust in some bodies decreased after more information, e.g. trust in Congress.

Challenges: This information is not included in the report of the study and the author has not been able to provide it.

Evaluation: This information is not yet available

Funder: The Woodrow Wilson International Center for Scholars and the Pew Charitable Trusts.
Cost: unknown

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[27] Two National Science Foundation funded studies. 1) A survey to explore issue framing, trust in government to manage risks and expectations of benefits versus risks of nanotechnologies, as well as awareness of nanotechnologies, attitudes towards it and the effect of science fiction films and novels. 2) A study to explore the reactions of informed citizens who were provided with background material on nanotechnologies and scenarios of possible futures through experimental issue groups in three cities. Data was collected about attitudes towards nanotechnologies, levels of concern for risk, trust in government and industry to manage risks, individual level reflections and insights and demographic data for the participants.

Timescale: The study took place in May and June 2005
Reference: www.wilsoncenter.org Foresight and Governance Programme

9   Projects or initiatives still to cover

UK:
- Nanologue
- Institute of Nanotechnologies activities
- International Risk Governance Council survey to overview and compare national and international governance approaches to nanotechnologies
- Nanotechnologies trade association activities
- Café Scientifique

EU:
- EU internet based public consultation on 'How to assess the potential risks of Nanotechnologies'

International:
- International Nanotechnologies and Society Network – this includes some reflections on the state of public engagement with nanotechnologies in other countries
- Global Dialogue on Nanotechnologies and the Poor

Appendix 2: NEG Terms of Reference

The purpose of the NEG is twofold, to:

- Support public bodies (e.g. government and its agencies, research councils and the NIDG) through the OST led Nanotechnology Issues Dialogue Group (NIDG), in developing a coherent programme of social and ethical research and public dialogue around nanotechnology; and

- Ensure that the learning from the above is transferred to the policy and decision-making in other science and technology areas.

8.1   Status of NEG

The status of the NEG is:

- Funded by government but an independent body
- A research and dissemination group.

8.2   Primary Objectives

The NEG will have six primary objectives:

1. **Mapping** current public engagement on nanotechnologies in the UK and internationally

2. **Sharing learning** between nanotechnology engagement projects, ensuring consistency and cohesion

3. **Understanding Upstream Engagement**

4. **Informing OST policy** by keeping them up to date with progress and outcomes on nanotechnology-related public engagement projects

5. **Identifying knowledge gaps** for future social and ethical research and public engagement

6. **Making its findings public** through reports on their research.

8.3   Outcomes

This piece of work will produce the following headline outcomes:

- Better and more 'joined-up' nanotechnology engagement projects

- A clear understanding of who is doing what in terms of nanotechnology engagement across the UK

- Better informed government policy on public engagement for science and technology development

- Evidence of what works for integration of upstream engagement into science and technology related policies and decisions.

8.4   Outputs

The following outputs will be produced to support the achievement of the outcomes above:

Reports – we are committed to produce 4 reports over 2 years. The first of these will inform the government's comprehensive autumn programme on nanotechnology engagement. Others may include a map of nanotechnology engagement across the UK; practicalities of upstream engagement; and two others, directed by members of the NEG forum.

The NEG – this will be formed and meet quarterly

A Research Group – working to the NEG, this will produce the reports and undertake research

Improved understanding – through research dissemination to government, members of NEG and other parties, all will gain an improved understanding of the field.

8.5   Delivery Strategy

The NEG intends to be fully operational by Autumn 2005. Through July and August the NEG will be formed and initial mapping work undertaken, with a view to understanding activities and identifying gaps. This work will both inform the Government's programme of public engagement on nanotechnologies, as well as the work of the NEG itself.

8.5.1   Form NEG and the Research Group

This will happen through initial meetings with key stakeholders (e.g. project managers and government officials) during July - September. In the meetings, the scope and role of the groups will be discussed, as part of establishing buy-in to the work.

Due to the immediacy of the current nanotechnology R&D it will be necessary to commence initial scoping research in July, prior to full establishment of the NEG.

8.5.2   Agree Scope/Role of Working Group

1st Meeting – September 05

8.5.3   Work Plan

2nd Meeting – December 05
3rd Meeting –March 05
Report 1 – Provisional Map & Status of Nanotechnology. Engagement in the UK – April 06
4th Meeting – June 06
5th Meeting – September 06
Report 2 – Practicalities of Upstream Engagement – September 06
6th Meeting – December 06

7th Meeting – March 07
Report 3 – subject TBC – March 07
8th Meeting – June 07
Final Report – subject TBC - July 07

Appendix 3: Members of the NEG

Chair, Professor Richard Jones
Professor Mark Welland
Dr James Wilsden
Tom Wakeford, Peals, University of Newcastle
Louisa Block, Channel 4
Gary Kass, OST
Dr Chris Snary, DEFRA
Pippa Hyam, Dialogue by Design
Mulanie Smallman, Think Lab
Professor Nick Pigeon, Cardiff University
Dr Donald Bruce, Society Religion and Technology Project
Hugh Knowles, Forum for the Future
Doug Parr, Greenpeace

Core Group
Robert Doubleday, Cambridge Nanoscience Centre
Faye Scott, Involve
Richard Wilson, Involve

Observer
Darren Bhattachary, Royal Society