



Living Knowledge
The International Science Shop Network



PERARES Milestone M9.1

Formative evaluation of Nano-Dialogues

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How the formative evaluation of Nano-Dialogues will shape the PERARES on-line transnational knowledge debates

This formative evaluation of Nano-Dialogues was based on a review of eight public dialogue projects carried out in five countries and at the EU level. The evaluation made six recommendations that have informed the design of the PERARES online debates:

1. The dialogue should have a clear purpose 'on the table' for debate.
2. Discussion should be grounded in specific cases and concrete issues.
3. Public engagement should be understood as an on going process of learning and reflection, rather than seeking to represent a single 'snap shot' of public attitudes.
4. Web-based dialogues are possible, but require careful and intensive moderation to ensure productive engagement.
5. Web-based dialogue makes it possible to extend engagement over a wide geographical area, however it is important to link 'transnational' dialogue back to local engagement.
6. Participation in web-based dialogues requires considerable time and effort of participants if it is to be successful, it is therefore important to be clear what is offered in return for participation.

These six findings endorsed the PERARES attempt to link a web-based dialogue with an institution-based science shop model of engagement. The findings also shape our particular approach to designing and running the online knowledge debates.

Following findings **1**, **3** and **6**, we will seek to make it clear to participants how the online debate will relate to local science shops. And PERARES partners have made a clear commitment to follow up research questions generated on-line using the science shop model. The outcomes of the on-line debate will also help inform nanotechnology researchers about issues of interest and concern to wider publics.

Following findings **2**, **4** and **5** the PERARES organizers will provide concrete cases by way of stimulus material to initiate the on-line dialogue. These concrete cases will be generated by a preparatory phase of 'local dialogue'. The connections made through local engagement will also be used to encourage a wide range of participants to enter into the dialogue. PERARES partners have committed to intensive and careful moderation during the running of the on-line phase of the dialogue.

The resulting debates can be found on:

<http://www.livingknowledge.org/discussion/debate/>

More information on the PERARES-project can be found on:

<http://www.livingknowledge.org/livingknowledge/perares>

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1: Review of Nano public dialogues to inform the PERARES Nano Transnational Knowledge Debate

Recent official and academic reflections on public engagement with nanotechnology often return to three similar themes. Through examination of recent engagement projects, and set against a backdrop of high-expectation placed upon the possibility of formal public engagement contributing to the responsible development of emerging technologies, the three lessons are commonly drawn:

- a. The importance of connecting the dialogue to concrete policy decisions or sets of practical questions – so that something is ‘on the table’ for debate. The DEEPEN¹ project called this moving from ‘conversation to deliberation’ (Davies et al 2009).
- b. The questions and topics for discussion should be grounded in specific cases, tied to particular research practice – rather than remain at the level of abstract and untestable promise and speculation.
- c. Public engagement projects should move beyond formalized one-off events to be seen as part of the on-going process of governance. This means opening up spaces for a greater diversity of public views across time and space – rather than seeking a single static ‘consensus’ position.

In response to these three often highlighted limitations of past projects promoting public engagement with nanotechnology, a network of Science Shops allows the potential for an exciting experiment in the next generation of dialogues. PERARES can build on its embedded links with current research in universities and institutions across Europe, and its strong and growing relationships with a wide range of Civil Society Organisations.

This report proposes a dialogue process that responds to the broad set of lessons learned from past public engagements, PERARES strengths, and a more detailed review of eight recent public dialogue projects:

1. Debat Public Nanotechnologies, France
2. NanoKommission / Nanodialogue, Germany

¹ DEEPEN was an FP6 funded project studying the role of ethical debate and public deliberation in the responsible development of nanotechnology:
www.geography.dur.ac.uk/projects/deepen/Home/tabid/1871/Default.aspx

3. Nanodialogues: Engaging Research Councils, UK
4. EPSRC Public Engagement Project, UK
5. Nanologue, European Union
6. CSIRO Nanotechnology and Society Project, Australia
7. Consumers Talk Nano Web Dialogue, USA
8. National Citizens' Technology Forum, USA

These eight projects were selected to help draw more detailed lessons with respect to two particular sets of questions:

- a) Scaling up, so that [*the findings/benefits of/knowledge generated from*] PE projects can spread over broader geographical areas rather than being restricted to specific locales.
- b) Integrating PE projects with research policy and practice, so that research directions are in part shaped explicitly by societal values articulated through public dialogue.

We compiled a list of projects that have aimed to engage the public about issues surrounding nanotechnology, expanding and updating the list tabled by Delgado *et al* (2010, pp12-13). From this extensive list (Appendix 1) we selected the eight projects above to examine in detail. These were chosen because they attempted to scale up public engagement with nanotechnology, and/or integrate it with research policy and practice. An additional criterion was that reports of the projects were available for analysis.

1.1 Outline of the PERARES Nano Transnational Knowledge Debate²

Preparation phase (3-4 months; March-June 2011)

1. UCAM, RUG, DTU, DCU (= "NKD team") interview NT researchers on the benefits to society their own NT research or their field of NT research will bring.
2. NKD team interview CSOs on the social needs NT research could help address.

² As discussed at the PERARES Kick-Off Meeting, with particular thanks to Brian Trench for the clear summary.

3. NKD team report questions and claims of researchers to CSOs and vice versa.
4. NKD team members collect most prominent questions and claims from these interactions and produce a selection of questions to be used as stimuli for the transnational knowledge debate. (This set of questions may be edited to focus on several areas of application of NT, e.g. health/medicine, environment, energy.)

Run phase (2-3 months; September-November 2011)

5. The agreed questions are posted to the KD web platform with an invitation to respond over a fixed period and to produce proposals for national and international NT research agendas.
6. Perares partners (all) host local / national interactions with researchers and CSOs to investigate responses to the NKD questions; short reports of these interactions are submitted to the KD web platform.
7. Perares partners (all) encourage researchers, CSOs and other interested groups and individuals to join the debate directly on the KD web platform.
8. One month before the end of the debate period, a reminder is posted of the end-date and debate participants are encouraged to focus contributions on NT research agenda proposals.
9. After debate end-date, NKD team review the proposals and edit them into proposals for various actors, e.g. EC, national research policy-makers, NT research institutes, etc. This document is posted to the KD web platform as representing outcomes of the debate. It is also sent directly to interested parties.

Evaluation of this process will take place at three points:

- End of preparation phase
- End of debate
- 1 year or 2 years after end of debate (to review impacts)

1.2 Lessons from attempts to scale up public engagement projects on nanotechnology

Large-scale dialogues can be done

A number of nation-wide and international public dialogues on nanotechnology have taken place in the past few years, demonstrating that it is possible to scale up public engagement projects by broadening the geographical spread and involving larger numbers of participants. Cases examined here are the National Citizens'

Technology Forum (NCTF) and the Consumers Talk Nano Web Dialogue (CTN) in the USA, the EU Nanologue, Germany's NanoKommission, and the Debat Public Nanotechnologies in France. As well as providing new opportunities, "scaling up" poses new challenges, which are discussed below, but these cases do show that the concept itself is sound.

For example, the NCTF was "the first nationwide consensus conference in the US" (Philbrick and Barandiaran, 2009:335), and it arguably "demonstrated the feasibility of conducting such exercises across three time zones, and illustrated the compatibility of the consensus conference process with American political norms in practice" (Philbrick and Barandiaran, 2009:335).

The Consumers Talk Nano Web Dialogue provided "a venue for the public to discuss information and share their thoughts about the use and potential benefits and risks of consumer products using nanomaterials ... Almost 250 participants across 23 states and 14 countries representing non-governmental, consumer, business, government, research, educational, science, engineering, media, and international organizations registered for the discussion. During the two-day dialogue, over 275 messages were posted in response to the queries and comments about nanotechnology" (Hedman, 2007:1). However, the website of the Dialogue only offers a summary of the process and discussion on both days, without evaluating the project. There does not seem to have been an analysis of participants' experience of the online medium. The dialogue seems to have been for educative purposes rather than as a way to produce outputs that were relevant or directly connected to policy or research.

Dialogues take up people's time

Public engagement projects can place strong demands on citizens, particularly taking up a lot of their time, and this can be a barrier to civic engagement (Kleinman *et al*, 2009).

This is echoed by the NGOs consulted by the Dutch Rathenau Institute – their report details three conditions on NGO participation in government-led participation projects, one of which is "Consultation must not lead to unnecessary bureaucracy which will only serve to prolong the process" (Hanssen *et al*, 2008:57).

If the quality of deliberation is to be maintained when engagement projects are scaled up, organisers will have to consider how to ensure that participants are not subject to greater demands on their time. A larger project may require more communication between larger numbers of participants, or participants having to take in a greater amount of information in order to understand the broader spread of geographical contexts. A possible way of dealing with this issue would be for a scaled-up project to simply be a composite of many smaller-scale projects, connected to form part of a larger matrix.

The internet is a tool that requires wise and careful use

Scaling up could benefit from online tools, because the internet is readily accessible across Europe. However, past experience suggests it is difficult to *deliberate* when participants are not face to face – see the example of NCTF, which is discussed below. So far, the internet has been useful as a communication tool: in the UK's third Nanodialogues exercise, Engaging Research Councils, "[t]he use of the internet to support information provision was a good feature and has potential to be a useful resource in this regard." (Chilvers, 2006:8). The internet is also a valuable space to store resources or share them between groups in different places or at different times. But the conversations, relationship-building and generation of understanding between participants require meeting in person. Online discussions work slightly better when the participants have already met, yet remain a frustrating medium to work through: pre- and post-project questionnaires filled in by participants of NCTF show "changes in preferences from on-line mediated deliberations to face-to-face deliberations" (Hamlett *et al*, 2008:2).

While the project organisers of the NCTF contend that "Online communication allows deliberations involving multiple groups of citizens in multiple geographical locations – a crucial innovation if [the consensus conference process] is to take root across a country that spans a continent and has multiple population centers" (Hamlett *et al*, 2008:4), the analysis by Delborne *et al* (2009:5) points out some problems with this approach. They present "three process criteria for quality deliberation that the online component of NCTF appeared to lack": coherence, autonomy, and degree of engagement.

- It lacked coherence due to technical obstacles with the computer programme, and facilitation decisions that led to inefficient use of time, which led to frustration among participants.
- Panellists had little autonomy: "our data point to the challenges of scaling up deliberation with the Internet, exposing the difficulties of balancing structure and autonomy in an online environment." (ibid, p9). It was "difficult to balance structure and autonomy in an online environment"; being able to criticise and change the rules/format of deliberation creates participant "buy-in" (Mansbridge *et al* 2006:30, quoted in Delborne *et al*, 2009) while facilitator control makes them passive.
- "Madison panelists reported a high degree of disengagement during the K2K sessions, further undermining the quality of deliberation. Two areas of concern emerge: panelists' lack of active participation and their tendency to multitask during the K2K sessions. We suggest that these problems reflect a combination of the technical limitations of Elluminate [the software package

used] (and perhaps any virtual environment for deliberation) and strategic choices regarding facilitation and organization” (ibid, p11)

Delborne *et al* (2009:15) suggest facilitators of consensus conferences should experiment with improved methods and strategies of computer-mediated communication, but emphasise that “rich deliberative democratic practice may always require face-to-face communication”.

Broader geographical spread could reduce the quality of deliberation

Attempts to scale up public engagement projects can preoccupy organisers with a concern for achieving a broad geographical spread, sometimes at the expense of a diversity of participants from different social groups. For example, the German NanoDialogue aimed to contribute to a societal debate across the country, with a federal commission set up to cover all German states (Catenhusen and Grobe, 2009). It has been criticised because it “was established based on the intrinsic motivation to consider social knowledge. However, in its case social knowledge was limited to actor and concerned stakeholder knowledge. The final report did not specify to what extent knowledge outside the NanoCommission’s members was considered” (Kurath, 2009:95).

Translating public engagement to larger scales may also risk ending up with a less meaningful, considered and deliberative debate. The French government’s attempt to conduct a nation-wide, multi-sector debate on nanotechnology covered 17 cities across France and involved more than 3000 participants at public meetings, but was less successful than expected (Deslandes, 2010). Public meetings were the principle arena of debate, yet many were disrupted by protestors who “dispute the legitimacy of the discussions, which they say are one-sided and a whitewash” (Enserink, 2010). This has been attributed to perceptions that public decisions had already been taken by the authorities, rendering public debate pointless; and the government already had a pro-technology stance, which narrowed the terms of debate (Deslandes, 2010). The project had been framed as a national debate on nanotechnologies, yet significant numbers of citizens did not feel this occurred in practice. Neither did the NGO Friends of the Earth, which had actively participated early in the debate, but decided to withdraw on the grounds that the conditions for public debate were not met (Deslandes, 2010). When the disrupted public meetings were replaced by an online dialogue, this was criticised by the press, who claimed it was an attempt to have a public debate without the public (ibid); the internet was not seen to be a valid platform for discussion to take place. People believed the French government’s discourse of participation and dialogue was not realised in the materiality of the debate. A further lesson here is that having a larger-scale project increases the probability that dissenting groups will learn of it and try to disrupt it.

1.3 Lessons from attempts to integrate public engagement projects with research policy and practice

Public engagement projects that take place at an early stage can directly influence research practice

Discussed below are three public dialogues that fed into research practice, to varying extents. These are: the Engineering and Physical Sciences Research Council (EPSRC) public engagement project in the UK; the third exercise of the UK's Nanodialogues project, Engaging Research Councils; and the Nanotechnology and Society Project run by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO).

The Engineering and Physical Sciences Research Council (EPSRC) commissioned a project to identify public priorities in relation to the development of nanotechnology for healthcare, which aimed to inform decisions in the EPSRC call for proposals. A presentation to the Nanotechnology Strategic Advisory Team provided an overview of the findings and informed the focus of the Grand Challenge call, which then "focused on two main areas: nanotechnologies for the targeted delivery of therapeutic agents and nanotechnologies for healthcare diagnostics. Other applications were subsumed into these main themes" (Bhattachary *et al*, 2008:10). A summary report was produced for researchers bidding into the Grand Challenge call and it will "form an important part of the application process, with researchers being required to describe how they have taken account of public aspirations and concerns within their bids" (*ibid*). The outputs of the project influenced how £15m of research funding was allocated³, including a decision to decline to fund certain areas of nanotech research - those that remove human control/agency.

As the project was organised by a research council with direct responsibility for allocating funding to researchers, the findings of the project were able to be fed directly into the decisions made by EPSRC: the project provided "input to EPSRC's decision making process regarding the scope of the nanotechnology for healthcare Grand Challenges call" (Bhattachary *et al*, 2008: ii). "The connection to a policy decision was clear – EPSRC would be deciding to support one or two sub-themes of nanomedicine, and the decision on which areas to concentrate on would be informed by the results of the public dialogue, together with other inputs from the research community, industry representatives and clinicians" (Jones, 2008:578)

³ <http://www.epsrc.ac.uk/pubs/mags/pioneer/Pages/talkingnano.aspx>

The report on the EU's Nanologue (Türk *et al*, 2006) advises beginning public engagement on emerging technologies “upstream”, when there is more potential for influencing the development of technology. This concept has become prominent in debates around nanotechnologies, particularly in the UK following the publication of the report “Nanoscience and nanotechnologies: opportunities and uncertainties” by the Royal Society and Royal Academy of Engineering in 2004, which recommended upstream engagement with the public and was endorsed by the UK Government (HM Government, 2006).

Meaningful engagement requires time for citizens and scientists to understand each other's positions and perspectives

An evaluation of the Nanodialogues experiment with UK research councils suggests that while “access to information provision and specialist expertise was generally adequate, the consensual view of all those interviewed was that the experiment did not allow enough *time* for the development of competent understandings between participants” (Chilvers, 2006:10). As the timing of the exercise was to some extent determined by the availability of participating scientists, “participants felt rushed and would have benefited from having more space for reflection after receiving information and/or meeting scientists” (*ibid*), and scientists also felt they needed more time to get to grips with the issues. Although all engagement projects could use more time, in this case time constraints “negatively impacted on the competence of the experiment and its outcomes”, which made the constraints critical (*ibid*).

The NEG report, which documents the learning from a series of engagement projects in the UK, suggests that “to maximise the ability of public engagement to inform policy and research, decision-makers need to prioritise time to engage directly with processes before, during, and after they occur ... [This] would help these groups gain a better understanding of how public engagement works in practice and what it can, and cannot, deliver” (Gavelin *et al*, 2007:50).

Participating in dialogue provides opportunities for scientists and industry to reflect on the societal aspects of their work

The NEG team show that “direct involvement in public engagement activities can have a transformative effect on those who take part, and ... such effects can translate into real changes in decision-making in science and technology” (Gavelin *et al*, 2007:50). For participating scientists, the experience allowed them “to reflect on the wider social aspects of their work and their social responsibilities as scientists” (*ibid*, p55).

The report from Germany's NanoKommission describe a similar, if less pronounced, effect on scientists: "Key contributions by various NGOs (environmental and consumer organisations, unions and professional organisations) raised a number of important issues, which greatly helped to consolidate the outcomes. As a result of working together with societal stakeholders, business entities and their associations became more sensitive to socially-relevant risk issues. Strategies to promote the responsible use of nanomaterials were developed with respect to the transparency of risk management procedures, communication and a voluntary code of conduct. Scientists made their research outcomes available for discussion and were given suggestions for areas requiring further research." (Catenhusen and Grobe, 2009:23)

Integrating public engagement with research practice makes the process easier to structure

A rationale for integrating engagement more clearly with research practice is that the engagement process itself becomes easier to structure and outcomes are more immediately obvious, which deals with criticisms of other projects. For example, a "concrete framework" for the EPSRC dialogue was created by presenting the public with a "menu of six possible areas of application of nanotechnology", which "clearly allowed there to be a more focused and engaged discussion than has taken place in other public engagement exercises" (Jones, 2008:578).

In the EU-funded Nanologue report, it is suggested that currently the nanotechnology dialogue in the public domain "tends to be quite generalised, lacking a specific focus on applications... Dialogue and its communication should focus on specific applications rather than, or as well as, nanotechnology in general" (Türk *et al*, 2006:55).

A caveat here is that structuring the process before dialogue begins involves framing the debate in particular ways, and this may serve to narrow the scope of debate or to exclude certain perspectives and ideas. For example, the UK Nanodialogue exercise on engaging research councils was predominantly framed during initial discussions between the Demos/Lancaster University research team and Research Council staff, with little chance for public participants or scientists to shape the framing (Chilvers, 2006). The independent evaluator suggests that these "often contested negotiations held significant implications for process effectiveness and the meanings of nanotechnology counted as legitimate within the process. More thought needs to go into structuring these backstage negotiations and reflexively considering the position of public engagement experts in conversations about future science and technology" (*ibid*, p11).

Integration with research practice may be indirect, long-term and difficult to measure

The impact or resonance of an engagement project is not likely to be immediately apparent. For example, the UK's third "Nanodialogue" was a three-day public forum that explored the potential for public engagement with research council science. An independent evaluation notes that "[p]roper consideration of the outcomes of upstream engagement requires longitudinal study that continues well after processes have ended" (Chilvers, 2006:3). Furthermore, "[r]ather than its potential to shape future directions in nanotechnology research *per se*, it seems that the real value of this experiment lies in its possible influence on learning and reflection within the Research Councils (and other scientific institutions) about the role of public engagement in shaping research agendas in nanotechnology (and other areas of science)" (ibid, p11) [*see impacts – in Ladikas and Decker's (2004) formulation, this would be dimensions one and two but not three; in Guston's framework this would fit in with "general thinking" rather than "actual impact"]*

Public engagement with research practice must be ongoing rather than one-off

The convenors of the Bendigo workshop of the CSIRO project suggest "effective public engagement on matters like nanotechnology development is not achieved through a single workshop and requires ongoing dialogue and commitment" (Mee *et al*, 2004:17). With reference to the same project, Katz *et al* (2005:12) suggest "Ongoing community engagement on these issues will be important to deepen the understanding of the non-technical implications and potential of nanotechnology development for scientists and non-scientists alike."

1.4 Specific projects studied

1. Debat Public Nanotechnologies

A public, multi-sector debate on nanotechnology, with 17 regional meetings held to address technical, regulatory, environmental health and safety issues.

Country/region: France

Timescale: September 2009 – February 2010

Organisers: Commission Particuliere du Debat Public

Objectives: To inform citizens about nanotechnology and to help the government formulate its strategy

Approach: A 4-month discussion took place in 17 cities across France, to inform citizens about nanotech controversies and allow people to express their opinions. The debate involved 3216 participants at public meetings and nearly 170,000 visits to the website. Due to disruptions, some meetings were cancelled and replaced with online dialogue.

Interested persons and organisations were invited to submit comments, opinions, and papers to the website. The independent commission organising the public debate collects all contributions to the debate and reports on the outcomes to the government.

Website: <http://www.debatpublic-nano.org/index.html>

Project report: Deslandes, P. (2010) *Bilan du débat public sur le développement et la régulation des nanotechnologies*. Commission nationale du débat public (CNDP), Paris. Available in French: <http://www.debatpublic.fr/docs//compte-rendu/compte-rendu-nano.pdf>

See also: Enserink, M. (2010) "Loud Starts End France's Nanotech Debates" in *Science Insider*, January 2010. <http://news.sciencemag.org/scienceinsider/2010/01/a-loud-start-to.html>

2. NanoKommission/Nanodialog

A national-level stakeholder dialogue between scientists, federal authorities, representatives from trade and industry, and environmental and consumer associations.

Country/region: Germany

Timescale: 2006-2008

Organisers: The NanoKommission, a federal commission to cover all German states

Objectives: To promote sustainable and future-oriented development and use of nanotechnology

Approach: The basis was an international conference organised by BMU in 2005, when 170 experts met, representing the fields of policy-making, science, business, consumer and environmental organisations, unions and churches. They accepted the invitation to take part in the NanoDialogue, where they discussed potential benefits and risks of nanotechnology, as well as issues of measurement and communication.

The results would form the basis for information to the public and, if necessary, recommendations for action to the authorities.

Website: http://www.bmu.de/english/nanotechnology/general_information/doc/44143.php

Project report: Catenhusen, W-M. and Grobe, A.(eds) (2009) *Responsible Use of Nanotechnologies: Report and recommendations of the German Federal Government's NanoKommission for 2008*. NanoKommission of the German Federal Government, Bonn. Available to download from the website.

Background paper: NanoCommission (2007) *NanoCommission background paper on the NanoDialogue*: <http://www.bmu.de/english/nanotechnology/nanodialog/doc/40549.php>

3. Nanodialogues: Engaging Research Councils

An experiment in upstream engagement involving dialogue between citizens, scientists and research council staff, to explore the potential for public engagement with research council science.

Country/region: UK

Timescale: May-June 2006

Organisers: Demos and Lancaster University, with both the Engineering and Physical Sciences Research Council (EPSRC) and the Biotechnology and Biological Sciences Research Council (BBSRC)

Objectives: The exercise set out to answer two questions (BBSRC and EPSRC, 2006):

1. What are the sorts of questions that are likely to determine future public response to nanoscience and nanotechnologies?
2. What should public engagement with early technologies look like and how can Research Councils build public value into their work?

Approach: 14 participants from Swindon and Bristol took part in two focus groups, one session of dialogue with scientists, and a concluding session at the research council. At this final session, recommendations were drawn up, to which EPSRC and BBSRC wrote a formal response.

Website: <http://www.demos.co.uk/publications/nanodialogues>

Project report: Stilgoe, J. (2007) *Nanodialogues: Experiments in public engagement with science*. Demos, London. Available to download from the website.

BBSRC and EPSRC joint response: BBSRC and EPSRC (2006) *BBSRC and EPSRC joint response to the "Nanodialogues: Engaging research councils" project*: http://www.bbsrc.ac.uk/web/FILES/Workshops/nanodialogues_response.pdf

Independent evaluator's report: Chilvers, J. (2006) *Engaging Research Councils? An evaluation of a Nanodialogues experiment in upstream public engagement*. Independent Evaluator's Report, available on EPSRC's website: <http://www.epsrc.ac.uk/pubs/reports/Pages/publiceng.aspx>

4. EPSRC Public Engagement Project

A public engagement exercise run by the Engineering and Physical Sciences Research Council (EPSRC) as part of a wider consultation to decide how to frame a call for proposals in the field of nanotechnology for medicine and healthcare.

Country/region: UK

Timescale: Project scoping meeting in March 2008. Web-based consultation to engage with the research community from 10th January until 28th March 2008. A town meeting to discuss the call face to face with the research community on 3rd April 2008

Organisers: Organised by EPSRC, with research conducted by BMRB

Objectives:

- i. To identify public concerns and priorities in relation to the development of nanotechnology for healthcare;
- ii. To identify public priorities for nanotechnology for healthcare research given (i);
- iii. To inform researchers undertaking projects subsequent to the call;
- iv. To inform decisions in the call;
- v. To use as an example for EPSRC to learn about public dialogue and how to use it.

(Bhattachary *et al*, 2008:i)

It also aimed to create a space for citizens, scientists and stakeholders to engage in an informed debate on ethical and societal aspects of nanotechnologies at an early stage in their development.

Approach: Two consecutive deliberative workshops took place at four locations across the UK, firstly on the broad social and economic drivers of nanotechnology research for healthcare, and secondly on specific healthcare applications. The second workshop was structured by the outputs of a separate set of consultative processes with the research community: a set of six potential application areas provided a framework for the dialogue and created a focused discussion.

The results of the dialogue influenced EPSRC's decision to decline to fund certain areas of nanotechnology research (those that remove human control).

Website: <http://www.epsrc.ac.uk/pubs/reports/Pages/nanoapplications.aspx>

Project report: Bhattachary, D., Stockley, R. and Hunter, A. (2008) *Nanotechnology for Healthcare*. BMRB Report: EPSRC – Nano and Healthcare 45107290. Available to download from the website.

5. Nanologue

A project designed to support an EU-wide dialogue on the ethical, legal and social aspects of nanoscience and nanotechnology, between science, business and civil society.

Country/region: European Union

Timescale: February 2005 – October 2006

Organisers: A joint project of the Wuppertal Institute for Climate, Environment and Energy (Germany); Forum for the Future (UK); triple innova (pan-European); and EMPA (Switzerland)

Objectives: Aimed to produce a communication and dissemination strategy that would help scientists, policy-makers, and industry consider the long-term and short-term impacts of their nanotechnology work.

Approach: The Nanologue project team developed the NanoMeter, a web-based tool to allow researchers and product developers to assess nanotechnology applications quickly during product research and development, focusing on ethical, legal and social aspects. Other project outputs were a scenario foresight exercise to explore possible future application and impacts of nanotechnologies, and a report that outlined the findings of the consultation with representatives from research, business and civil society organisations.

Website: <http://nanometer.nanologue.net/>

Project report: Türk, V., Kaiser, C., Liedtke, C., Knowles, H., Kastenholz, H. and Köhler, A.R. (2006) *Nanologue: Opinions on the Ethical, Legal and Social Aspects of Nanotechnologies*. Published by the Nanologue project as deliverables D4 and D5 for work packages 3 and 4.

<http://www.nanologue.net/custom/user/Downloads/NanologueWP34FinalPublic.pdf>

Türk, V., Knowles, H., Wallbaum, H. and Kastenholz, H. (2006) *The Future of Nanotechnology: We Need to Talk*. Beacon Press.

ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nanologue_scenarios_en.pdf

6. CSIRO Nanotechnology and Society Project

A workshop in Bendigo to facilitate public participation as well as engagement between scientists and community representatives, followed by a workshop for senior CSIRO scientists designed to transfer knowledge back to the organisation, to encourage socially informed research planning.

Country/region: Australia

Date/timescale: A one-day regional workshop in Bendigo, which provided background information for a one-day citizens' panel in Melbourne, both in 2004

Organisers: The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science research organisation.

Objectives: Aimed to influence CSIRO's nanotechnology planning and generate questions and insights relevant for science and technology research and development [*though organisers say the project did not meet the original goal of influencing CSIRO's N&N research agenda*]

Approach: The workshop organisers used the issues raised by participants to create a community issues checklist, intended to help scientists and research planners reflect on the societal implications of their work and to support integrated forms of research planning and investment. However, there is no evidence of actual impacts.

Website: www.minerals.csiro.au

Project reports:

Solomon, F., Katz, E., Lovel, R. and Mee, W. (2005) *CSIRO Nanotechnology and Society Workshop: integrating social issues in R&D governance*. CSIRO Minerals Report DMR-2780

Mee, W., Lovel, R., Solomon, F., Kearns, A., Cameron, F. & Turney, T. (2004) *Nanotechnology: The Bendigo Workshop*. CSIRO Minerals Report DMR-2561

Katz, E., Lovel, R., Mee, W. & Solomon, F. (2005) *Citizens' Panel on Nanotechnology: Report to Participants*. CSIRO Minerals Report DMR-2673

See also: Solomon, F., Katz, E., Lovel, R. & Mee, W. (2005) *Talking about Nanotechnologies: Experiences of public dialogue at CSIRO*. Paper to International Conference on Engaging Communities, Brisbane, 2005.

7. Consumers Talk Nano Web Dialogue

A public dialogue on nanotechnology and the consumer, which took place via the internet and hence was able to involve participants from a wide range of geographical locations.

Country/region: USA

Timescale: 23-24 October 2007

Organisers: Hosted by The Project on Emerging Nanotechnologies, an initiative of the Woodrow Wilson International Center for Scholars and The Pew Charitable Trusts, in cooperation with Consumers Union

Objectives:

- To provide an easily accessible venue for the public to learn about and discuss the use and potential benefits and risks of consumer products made using nanotechnology
- To explore the key issues surrounding the ways that citizens, consumers, students, scientists, policymakers and the media learn about and respond to nanotechnology consumer products
- Organisers hoped to use the information generated by the dialogue to inform policymakers about consumer perceptions of the risks, benefits and uncertainties of using nanotechnology in consumer products

Approach: The dialogue took place online over two days, with almost 250 participants from 23 states and 14 different countries, who represented a diverse range of organisations. More than 275 messages were posted in response to the queries and comments. Panellists raised complex issues and shared their expertise. A facilitator would introduce focus points, encourage everyone to join in the conversation, and remind people about ground rules; they had the power to edit or delete messages. A summarizer would prepare an overview of the previous day's discussion.

A summary report of the two days' discussions was produced, but little or no evaluation seems to have taken place and the output does not seem to have directly influenced any policy or research decisions.

Website: <http://www.webdialogues.net/cs/pen-consumer-home/view/di/95?x-t=home.view>

Project report: Hedman, S. (2007) *Consumers Talk Nano Dialogue Summary*. Available to download from the website.

8. National Citizens' Technology Forum

The National Citizens' Technology Forum (NCTF) was a public deliberation on human enhancement through nanotechnology. It was the first nation-wide consensus conference in the USA, involving both face-to-face and online dialogue.

Country/region: USA

Timescale: March 2008

Organisers: The Center for Nanotechnology in Society, Arizona State University

Objectives: To conduct a debate on human enhancement through nanotechnology spanning the USA

Approach: A group of 74 diverse and roughly representative participants were selected from a pool of applicants. They met in six locations across the USA, deliberating in their respective geographic groups for one weekend at the beginning of the month. Electronic deliberation between and within the six groups took place in two-hour sessions nine times over the subsequent weeks, with a group of experts. A second face-to-face meeting at each site concluded the NCTF. Each group produced a final report outlining their recommendations, reached by consensus.

Website: <http://cns.asu.edu/nctf/>

Project report: Hamlett, P., Cobb, M.D. and Guston, D.H. (2008) "National Citizens' Technology Forum: Nanotechnologies and Human Enhancement", CNS-ASU Report #R08-0003

Evaluation of the online component: Delborne, J.A., Anderson, A.A., Kleinman, D.L., Colin, M.C. and Powell, M. (2009) "Virtual deliberation? Prospects and challenges for integrating the Internet in consensus conferences" in *Public Understanding of Science* 1?: 01-18

2: Review of evaluations to inform evaluation of the Transnational Knowledge Debate

The second part of this preliminary report reviews evaluations of public engagement with nanotechnology projects and additional evaluation frameworks developed for use with public engagement. The purpose has been twofold, first to help inform the evaluation approach to be taken towards the PERARES Transnational Knowledge Debates, and secondly, to draw lessons from past evaluations in the design of the Knowledge Debates. The approach should also support *formative* evaluation, providing appropriate procedures and mechanisms to assess whether, and to what extent, the process is being successful (Rowe and Frewer, 2004).

2.1 Constructing an evaluation framework

We recommend for consideration an evaluation approach based on the framework developed by Chilvers (2006) for use in his evaluation of the Nanodialogues experiment, *Engaging Research Councils*. This in turn draws on the work of Burgess and Chilvers (2006: 715), which outlines a contextual framework “for the design and evaluation of public and stakeholder engagement processes that are fit-

for-purpose”
(see Figure 1).

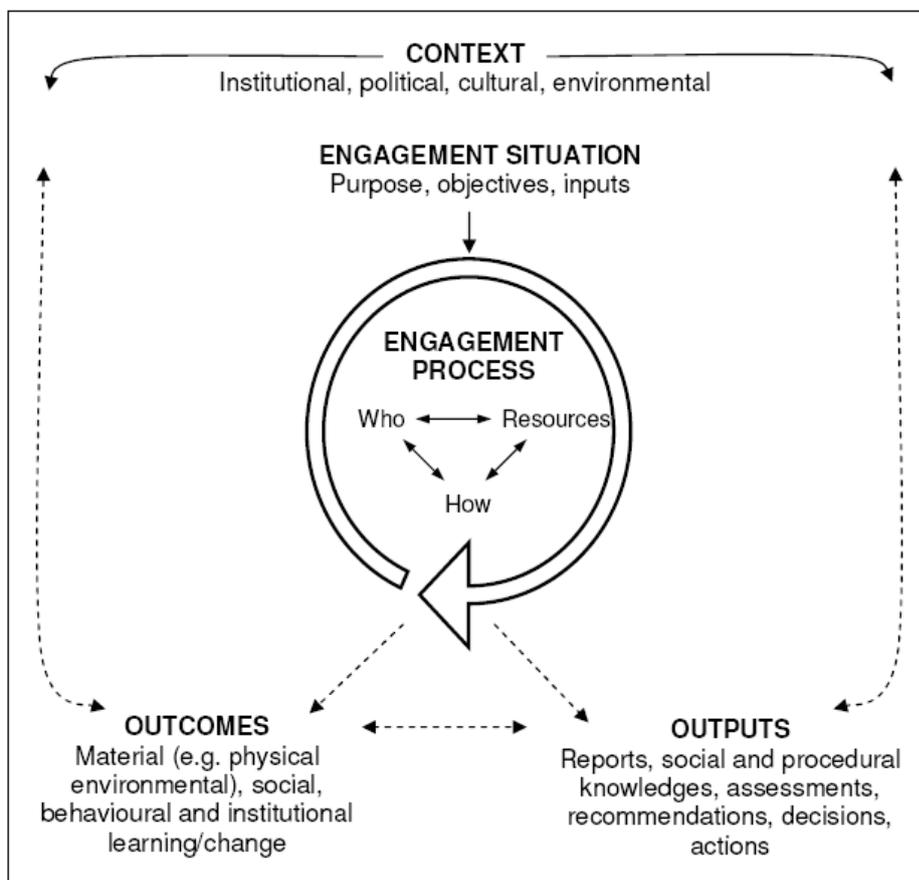


Figure 1, taken from Burgess and Chilvers (2006:716)

Chilvers sets out the evaluation criteria thus:

Box 1. Evaluation questions/criteria

Context and framing

- *Framing*: How was the process framed and by who/what?
- *Clarity, transparency and accountability*: To what extent was the process transparent about objectives, boundaries, and how outcomes of the experiment were used?

Deliberation and competence

- *Effective deliberation*: To what extent did the process develop interactive deliberation that empowered participants to enter the discourse and put forward their views?
- *Competence*: To what extent did the process develop competent mutual understandings through adequate access to resources (such as information, expertise, and time) and citizen-specialist interaction?

Learning and influence

- To what extent did the process enhance learning of individual participants and wider institutions (including its potential to shape future directions in nanotechnology research and the processes by which it is governed)?

Figure 2:
taken from
Chilvers
(2006:3)

These criteria could be adapted to suit the specific interests of the PERARES NKD, namely measuring the effectiveness of a) scaling up public engagement projects over broader geographical areas and b) integrating public engagement projects with research policy and practice. Hence, the category of “Deliberation and competence” may be used to measure a), to assess the extent to which the quality of the deliberation and the competence of the understandings are affected or preserved in projects that have been scaled up. A quality deliberation, as described by Delborne *et al* (2009) is coherent; participants have a controlling role (though this needs to be balanced with having some structure to the debate); and participants are fully engaged throughout the process.

The categories of “Context and framing” and “Learning and influence” may be used to measure b). The context of an engagement exercise greatly influences the extent to which its outputs may be embedded in research policy and practice; for outputs to be translated into “sustainable outcomes”, participatory initiatives need a “strong, explicit link” to decision-making bodies (Burgess and Chilvers, 2006:716). All evaluations must refer to a project’s “wider context of science and technology governance ... in defining the decision situation (purpose(s), objectives, inputs) and shaping engagement processes” (ibid, p715). If the public is involved in the framing of the issue at an early stage, this is more likely to “explicitly address the wider framing of issues, rather than allow the debates to be solely ‘captured by science’” (Rogers-Hayden and Pidgeon, 2006:175).

We develop Chilvers' category of "Learning and influence", in order to assess in more detail how far a project has impacted on research policy and practice. The term "impact" has been criticised for failing to adequately take into account "the complex and multi-faceted nature of the issue" (Joly and Kaufmann, 2008:237). Here, we draw on the three "dimensions of impact" outlined by Ladikas and Decker (2004:2) in their reflections on technology assessment in Europe. These are:

1. Impact on the knowledge used in policy-making (or research)
2. Impact on the formation of the opinions and attitudes of actors involved in knowledge debates
3. Impact on the actions taken by policy makers or other actors

In Ladikas and Decker's "typology of impacts" (see Figure 3), the first row of the matrix is most relevant to the PERARES project i.e. impacts of the technological/scientific aspects.

IMPACT DIMENSION	I. RAISING KNOWLEDGE	II. FORMING ATTITUDES/ OPINIONS	III. INITIALISING ACTIONS
ISSUE DIMENSION			
TECHNOLOGICAL /SCIENTIFIC ASPECTS	SCIENTIFIC ASSESSMENT a) Technical options assessed and made visible b) Comprehensive overview on consequences given	AGENDA SETTING f) Setting the agenda in the political debate g) Stimulating public debate h) Introducing visions or scenarios	REFRAMING OF DEBATE o) New action plan or initiative to further scrutinise the problem at stake p) New orientation in policies established
SOCIETAL ASPECTS	SOCIAL MAPPING c) Structure of conflicts made transparent	MEDIATION i) Self-reflecting among actors j) Blockade running k) Bridge building	NEW DECISION MAKING PROCESSES q) New ways of governance introduced r) Initiative to intensify public debate taken
POLICY ASPECTS	POLICY ANALYSIS d) Policy objectives explored e) Existing policies assessed	RE-STRUCTURING THE POLICY DEBATE l) Comprehensiveness in policies increased m) Policies evaluated through debate n) Democratic legitimisation perceived	DECISION TAKEN s) Policy alternatives filtered t) Innovations implemented u) New legislation is passed

Figure 3, taken from Ladikas and Decker (2004:5)

However, as Guston (1999:461) notes, "the nature of the impacts other than actual impacts is that they propagate outward from the original analysis, expanding their influence over time". Indirect impacts, or impacts on general thinking, may be

difficult to measure at any point, and extremely difficult to gauge during the technology assessment or immediately after it has been carried out.

The resulting framework for evaluation

Criteria for assessing the effectiveness of scaling up

Deliberation and competence

- Effective deliberation: How coherent was the dialogue? Did participants have a controlling role? Did participants remain engaged throughout the process?
- Competence: Could competent mutual understandings develop through the allocation of sufficient time and adequate access to information and expertise?
- *[And possibly a criterion such as “Social and geographical diversity of participants”]*

Criteria for assessing integration with research policy and practice

Context and framing

- Framing: At what stage were the project’s focus main issues framed, and by whom?
- Clarity, transparency and accountability: Were all participants satisfied that these criteria were adequately met?

Learning and influence

- How far did the project impact on the knowledge used in policy-making (or research)?
- How far did the project influence actors’ opinions and attitudes?
- How far did the project impact on the actions taken by policy makers or other actors?

2.2 Specific project evaluations studied

1. The National Citizens’ Technology Forum
2. Public engagement by *La Métro*, the Grenoble metropolitan area council
3. Citizens’ Jury on Nanotechnologies (A)
4. Citizens’ Jury on Nanotechnologies (B)
5. Nanodialogues: Engaging Research Councils

6. Citizens' School of Nanotechnology
7. Technology Assessment in Europe
8. Other evaluations' criteria

1. The National Citizens' Technology Forum

Evaluation

Delborne, J.A., Anderson, A.A., Kleinman, D.L., Colin, M.C. and Powell, M. (2009) "Virtual deliberation? Prospects and challenges for integrating the Internet in consensus conferences" in *Public Understanding of Science* 17: 01-18

Criteria used

Use Mansbridge *et al's* (2006) two standards for evaluating deliberation:

1. "**Satisfaction**" - maintaining a positive group atmosphere
2. "**Productivity**" – making progress on the group's task

They present "three process criteria for quality deliberation that the online component of NCTF appeared to lack" (p5): **coherence**, **autonomy** (defined by Noveck 2004:23 as participants having a "controlling role"), and **degree of engagement**.

Methods

Focus on assessing the quality of participants' experience. "Following feminist science and technology studies approaches that privilege "situated knowledge" (Haraway, [1988] 1999), we foreground insights and opinions of those with least power in the process: the recruited panellists" (p2). Developed evaluation criteria using participants' feedback, with which to evaluate participants' levels of satisfaction with the process

Findings

Panellists developed a strong preference for face-to-face over "keyboard-to-keyboard" communication; comments suggested general frustration with the online component. Reasons for scepticism re online communication include: lack of nonverbal cues; tendency for polarisation; and difficulty of exchanging emotionally complex information

Find that the NCTF was "valuable in two significant ways. First, the completion of the activities by 86 participants across six metropolitan areas and the production of six distinct but overlapping sets of policy recommendations indicate that a coordinated, nationwide consensus conference can be done and can produce meaningful results. Second, the rich data collected at both the national and site-specific levels create the opportunity for learning about and improving the chances for virtual deliberation." (p15)

2. Public engagement by La Metro, the Grenoble metropolitan area council

Evaluation

Joly, P-B. and Kaufmann, A. (2008) "Lost in Translation? The Need for 'Upstream Engagement' with Nanotechnology on Trial" in *Science as Culture* 17 (3): 225 - 247

Criteria used

The ideal “dialogic space” would be independent from the nanotechnology network and policy institutions:

1. It would use a model of participation based on transparent procedures that ensure equity, fairness and competence
2. The process would be delegated to an independent body
3. An independent evaluation of the initiative would be implemented

Rather than trying to assess “impact”, a term that Joly and Kaufmann criticise for “failing adequately to take into account the complex and multi-faceted nature of the issue” (p237), they use Hennen *et al*'s term “resonance”, which “describes any kind of observable reaction to a TA process in its societal environment” (Hennen *et al*, 2004:58)

A key question is “whether the decisionmaking process is characterized by a high degree of irreversibility (and thus a reduced number of available options) or whether the path for alternative choices is still open” (Joly and Kaufmann, 2008:231)

Methods

Joly and Kaufmann produced a set of recommendations for *La Metro*, regarding public participation and nanotechnology, but their proposals were not put into practice

Findings

They evaluate the Grenoble project from an Actor-Network Theory perspective, and find that “many decisions had been made long before the term nanotechnology was even publicly known” (2008:232). Furthermore, “it should be possible to discuss technical matters while questioning the master frame of the Grenoble culture. Decisions taken at the Council of *La Metro* could have provided an occasion to find such an opportunity. However, as already mentioned, this was not the case” (2008:235).

3. Citizens' Jury on Nanotechnologies (A)

Evaluation

Rogers-Hayden, T. and Pidgeon, N. (2006) “Reflecting upon the UK's Citizens' Jury on Nanotechnologies: Nanojury UK” in *Nanotechnology Law & Business* May/June: 167 - 178

Criteria used

Need to “explicitly address the wider framing of issues, rather than allow the debates to be solely ‘captured by science’” (Rogers-Hayden and Pidgeon, 2006:175). “[T]he role of the lay public here is not merely that of weighing the benefits and risks; but, rather, it is the analysis of the possible technology trajectories and the governance of the technologies” (ibid, p177).

It must be possibility that the debate “could influence the technology trajectory”, rather than taking place late in the “investment and development cycle” (ibid, p176)

Engaging upstream must avoid the hazard of “risk amplification”

Methods

Participant observation of the NanoJury sessions in June and July 2005, as well as seeking further contact with jurors. Undertook brief interviews with jurors on the first two nights of the NanoJury, to ascertain their expectations of the process. Finally, they ran a 30-minute focus group on the final evening to determine: jurors' views on the most successful aspects of the jury; aspects they thought could have been improved; and their own criteria for judging the success of the exercise. This discussion was used to generate some qualitative questions, which were sent to all jury members to gain more feedback.

Findings

Success: the jury had a "bottom-up approach [which] allowed the jury as much control over the process as possible, avoiding a "top-down" approach, where specific questions yield only a "yes" or "no" answer" (ibid, p176)

NanoJury UK engaged with broader issues such as "Who needs [this technology]? Who will take responsibility if things go wrong?" (ibid, p178)

Success: "The jurors ... like the majority of the British population, were not familiar with nanotechnology at the outset" (ibid, p176) so there was not a "well-established set of public discourses and established stakeholder positions", as was the case with *GM Nation?*

Success: "there appears not to be, at least for now, the combination of factors that would lead to major risk amplification of the issue" (ibid, p177)

4. Citizens' Jury on Nanotechnologies (B)

Evaluation

Singh, J. (2006) *Polluted waters: The UK Nanojury as upstream public engagement*. A discussion paper, available for download under "facilitator reflections":
<http://www.nanojury.org.uk/perspectives.html>

Criteria used

Discussion should allow deep political analysis, situating nanotechnology in a broader societal context

"[A] dialogue process should allow people to exchange views and perspectives on an issue and reach mutual understanding and respect" (Singh, 2006:9)

NanoJury should open up the policy arena on nanotech to the public

Public participation should have an influence on policy development

Methods

Singh was a co-facilitator of the NanoJury project; his evaluation is based on his reflections as an organiser with direct experience of the process

Findings

“Where participation is controlled by organisers and dialogue is narrowly framed there is little room for deeper political analysis. Hence the Nanojury, rather than providing a space that enabled contestation, led to discussions on the merits and risks of nanotechnology” – this framed the debate so that “the origins or political interests [of] a technology are not contested or problematised. By avoiding these issues, the Nanojury could be accused of merely being a tool, in Chomsky’s terms, with which to “manufacture consent”¹⁵” (ibid, p8)

The jury model “encourages witnesses to take on the role of an expert, presents evidence and merely takes questions from the jurors, rather than entering into a broader debate about our common future with them as valued citizens. In turn, this can reinforce the jurors’ status as lay people, which can be disempowering and even oppressive” (ibid, p8)

“[A] number of factors relating to the original framing and model of facilitation used in the process, such as allowing the overuse of scientific jargon” made it difficult for people to reach mutual understanding (ibid, p9)

“[P]eople were able to get more clarity on where and how decisions regarding nanotechnology are made, and they could articulate perspectives on the developments” (ibid, p9)

It is unclear how far the NanoJury had an influence on policy development: “it is up to the power holders in business and government to voluntarily ‘take on’ the findings from the jury, there is no direct accountability to the recommendations and perspectives of the public” (ibid, p9)

5. Nanodialogues: Engaging Research Councils

Evaluation

Chilvers, J. (2006) *Engaging Research Councils? An evaluation of a Nanodialogues experiment in upstream public engagement*. Independent Evaluator’s Report, available on EPSRC’s website: <http://www.epsrc.ac.uk/pubs/reports/Pages/publiceng.aspx>

Criteria used

Box 1. Evaluation questions/criteria

Context and framing

- *Framing*: How was the process framed and by who/what?
- *Clarity, transparency and accountability*: To what extent was the process transparent about objectives, boundaries, and how outcomes of the experiment were used?

Deliberation and competence

- *Effective deliberation*: To what extent did the process develop interactive deliberation that empowered participants to enter the discourse and put forward their views?
- *Competence*: To what extent did the process develop competent mutual understandings through adequate access to resources (such as information, expertise, and time) and citizen-specialist interaction?

Learning and influence

- To what extent did the process enhance learning of individual participants and wider institutions (including its potential to shape future directions in nanotechnology research and the processes by which it is governed)?

(Chilvers, 2006:3)

Methods

“Close contact was maintained with the research team throughout the experiment in an attempt to offer formative as well as summative advice. Data collected and analysed in relation to key themes of the evaluative framework included:

- “Observation of all three sessions of the experiment in Swindon and collation of process materials provided by the Demos/Lancaster team;
- “Informal interviews with seven participants during the process and follow-up email questions to the four participants who completed the final session (one of whom responded);
- “Interviews with Philip Moriarty and Ruth Duncan, two of the scientists involved in the second session of the experiment;
- “Two semi-structured telephone interviews after the experiment had ended with representatives from both the BBSRC and EPSRC;
- “Two semi-structured telephone interviews after the experiment with facilitators from the Demos/Lancaster team, as well as informal discussions throughout the process.” (Chilvers, 2006: 3-4)

Findings

“A wider range of *contextual factors* meant that the process was to some extent framed before and beyond front-end conversations between the research team and the BBSRC/EPSC” (ibid, p5). Although participants “had an opportunity to define questions to ask scientists as well as information needs”, both “publics and scientists generally felt that they had little influence on how the process was framed” (ibid, p6)

A lack of clarity was felt by some participants e.g. unsure about process – possibly due to “conflicting framing effects, not least ambivalence over the role and influence of Research Councils in shaping research agendas” (ibid, p6). “On the whole the process was well facilitated, with the research team making a concerted effort to meet this criterion. This was not always possible, however, and it seemed inevitable that not all participants would be equally engaged” (ibid, p7).

“A critical area where the experiment did not meet expectations, however, was its inability to retain participants throughout the process... The critical problem with limited inclusion in the final session is that this is where the main recommendations from participants were finalised. This will undoubtedly lead to concerns over legitimacy of these recommendations which in turn impacts on other criteria, not least learning and influence at a wider institutional level” (ibid, p7)

“The competence of the experiment was affected in three main ways through: (i) processes of information provision; (ii) interactions between citizen and scientific expertise; and (iii) the provision of time and space for competent understandings to develop.” (ibid, p8). “The use of the internet to support information provision was a good feature and has potential to be a useful resource in this regard.” (p8), although some participants said the volume of info provided led to information overload.

The experiment was “largely successful in providing access to specialist expertise”, but “relations between citizen and scientific expertise could perhaps have been more symmetrical and interactive” (ibid, p9). Interviewees suggested “the experiment did not allow enough *time* for the development of competent understandings between participants” (p10)

Overall, the project was well-designed and facilitated and it enhanced learning. However, “Rather than its potential to shape future directions in nanotechnology research *per se*, it seems that the real value of this experiment lies in its possible influence on learning and reflection within the Research Councils (and other scientific institutions) about the role of public engagement in shaping research agendas in nanotechnology (and other areas of science)” (p11)

6. Nanotechnology Engagement Group

Evaluation

Gavelin, K., Wilson, R. and Doubleday, R. (2007) *Democratic Technologies? The final report of the Nanotechnology Engagement Group (NEG)*. Involve, London.

Criteria used

Impacts on participants: changing attitudes and outlook

- Preconceptions dispelled?
- Mutual learning?
- Supporting active citizenship?
- Supporting a culture of engagement and communication in science

Wider impacts: opening up and informing science

Clarity of purpose and roles

Institutional capacity and culture

Methods

They explored the impacts of different nanotechnology public engagement projects in the UK, mainly through voluntary interviews with organisers, participants (i.e. scientists and members of the public), and target audiences.

(Selected) Findings

“A central finding of NEG is that all too often the success of a public engagement process is defined too narrowly in terms of the effectiveness of written outputs (eg, reports and recommendations) to impact institutional policy” (Gavelin et al, 2007:49).

NEG found “a tension between the expectations of different groups for public engagement on nanotechnologies” and a “gap between explicitly stated objectives of the projects and subsequent expectations of those involved” (ibid, p62).

“NanoJury UK; Nanodialogues; and Nanotechnology, Risk and Sustainability allocated substantial time for participants to understand the process and the topic, and to get to know each other before deliberations with scientists started” – this “yielded results” (ibid, p64).

A “lack of direct involvement by decision-makers limits the ability of these groups to engage with, and respond effectively to public engagement activities” (ibid, p66).

All public participants interviewed by NEG claimed to have learned new things about science; 6 of 8 participating scientists reported learning how to “reflect on the wider social aspects of their work and their social responsibilities as scientists”; for one scientist, “discussions about ethics and responsibility had a significant impact on their subsequent research” (ibid, p55)

Scientists “found that interaction with members of the public brought unexpected benefits”; others “mentioned a new appreciation of the need to communicate more, and more clearly, with non-scientists” (ibid, p58)

The “context in which the process takes place determines its ability to succeed, rather than the methods used” (ibid, p66).

7. Citizens' School of Nanotechnology

Evaluation

Besley, J.C., Kramer, V.L., Yao, Q. and Tournay, C. (2008) “Interpersonal Discussion Following Citizen Engagement About Nanotechnology: What, If Anything, Do They Say?” in *Science Communication* 30: 209 - 235

Criteria used

“Communication through citizen engagement results in interpersonal discussion” with family and friends (Besley et al, 2008:225)

Methods

The analysis is based on data collected through an online survey of individuals who participated in the Citizens' School between autumn 2004 and spring 2007.

Findings

Yes, the engagement project did result in interpersonal discussion. “[P]articipants in deliberative activities such as the Citizens’ School [of Nanotechnology, at an anonymous university in the USA] claim to talk to people about their experiences (RQ1). Further, they say they talk to people in all facets of their lives. Most of these participants reported a moderate level of interpersonal discussion, but there were also a number of respondents who reported higher levels of talk about technology” (ibid, p225)

“[I]n the overwhelming majority of cases, participants who say they talk about the Citizens’ School report saying positive things about both the technology discussed and the people who lead the discussions” (ibid, p225), and “scientific progress and economic prospects framing appeared consistently in what respondents’ reported telling others” (ibid, p226).

“Consistent with the social science literature on justice as fairness as well as the literature on trust and competence, respondents used outcome, procedural, and competence-oriented ways to frame how they talk about experts.” (ibid, p226)

8. Technology Assessment in Europe: Between Method and Impact

Evaluation

Ladikas, M. and Decker, M. (2004) “Paper 1: Assessing the Impact of Future-Oriented Technology Assessment” from EU-US Seminar: New Technology Foresight, Forecasting and Assessment Methods – Seville 13-14 May 2004

Criteria used

Assess the impact of projects, starting from “a broad understanding of impact as ‘resonance’ with regard to the state of knowledge, opinions held or actions taken by relevant actors in the process of societal debate on technological issues” (Ladikas and Decker, 2004:2)

Ladikas and Decker deduce three “dimensions of impact” (p2):

1. “impact in the dimension of *knowledge* used in policy making or public debates”
2. “impact in the dimension of *forming opinions/attitudes* of actors involved in the debate”
3. “impact in the dimension of *initialising actions* taken by policy makers or other actors”

Methods

N/A

Findings

N/A

2.3 Other evaluations’ criteria

Here are criteria used in evaluations which either are not nanotechnology-specific, or we have not studied them in detail but they have been referenced by other authors

Callon 1999 (quoted in Joly and Kaufmann 2008)

Public participation may serve various objectives:

1. Educate the public
2. Organise debates on the way society can better direct and control the path of technological evolution
3. Involve concerned groups in the negotiation and construction of socio-technical options i.e. (in ANT terms) intervene in the integration of new entities in the socio-technical network

Guston 1999

Table 5. Schematic Research Protocol

Actual Impact

As a consequence of the analysis (consensus conference), has there been any change in relevant legislation?
funding?
regulations?
or any other concrete consequence to any authoritative public decision?

General Thinking

As a consequence of the analysis (consensus conference), has there been any change in relevant vocabularies?
agendas?
problem statements?
or any other political aspect regarding the substance of the policy issue discussed or the process or role of the analysis (consensus conference)?

Training of Knowledgeable Personnel

As a consequence of the analysis (consensus conference), has there been any learning by elite participants regarding the substance of the policy issue discussed?
the process or role of the analysis (consensus conference)?
the participants' own knowledge, role, organization, contacts, and so on?

Interaction with Lay Knowledge

As a consequence of the analysis (consensus conference), has there been any learning by mass participants and mass nonparticipants regarding the substance of the policy issue discussed?
the process or role of the analysis (consensus conference)?
the citizens' own knowledge, role, civic engagement, and so on?

(Guston, 1999:460)

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