

Engaging Research Councils?

An evaluation of a Nanodialogues experiment in upstream public engagement

Independent Evaluators Report

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Introduction

This report presents an evaluation of an experiment in upstream public engagement conducted by Demos and researchers from Lancaster University in collaboration with the BBSRC and EPSRC during Summer 2006. It formed the second of four experiments conducted under Demos' Sciencewise funded *Nanodialogues* project and centred on UK Research Councils as key funders and supporters of 'upstream' scientific research. Taking nanotechnologies as its focus, the experiment involved scientists, publics and Research Council staff in dialogue over three sessions to explore public values, concerns and aspirations about emerging science and technology and the role of public engagement in shaping scientific research agendas. Full details and findings of the experiment can be found in the final report *Engaging Research Councils? New Science and the Public* by the Demos/Lancaster research team.

The framework and methodology by which the experiment was evaluated are introduced before presenting the main evaluative findings. A summary of these findings is given at the end of this report.

Evaluation Framework

A vast array of criteria for evaluating the effectiveness of public engagement in science have been proposed over the past decade around which some consensus is emerging.¹ Rather than apply these criteria exhaustively in a 'tick box' fashion, a more critical form of evaluation is attempted here that seeks to enhance reflection and learning of the people and processes studied. The evaluation framework employed is loosely based on a contextual model recently proposed for designing and evaluating processes of public engagement in science and technology (see Appendix 1).² The model moves beyond popular concerns about process effectiveness, to at once consider the importance of the different contexts within which engagement occurs and the nature of emerging outcomes.

The questions/criteria on which the evaluation is based are given in Box 1. They relate to the framing, process and outcomes of upstream engagement. The former is particularly critical in upstream engagement where diverse visions of development trajectories of new technologies remain possible. It is important to ask how such processes become *framed* and whether framings are made *explicit* to all involved? Asking how the various representations, exclusions, and elements of engagement are constructed demands looking behind the scenes just as much as the actual staging of the experiment. Such enquiry resonates with recent studies demonstrating, or advocating, more critical, situated, ethnographic accounts of 'participation in action'.³ While in-depth study of this nature is beyond scope of this evaluation, it does attempt come to a judgement on framing processes and possible implications. In

¹ See for example Renn, O., Webler, T. and Wiedemann, P. (eds.) (1995) *Fairness and Competence in Citizen Participation: evaluating models for environmental discourse*, Dordrecht: Kluwer; Rowe, G. and Frewer, L. (2004) 'Evaluating public-participation exercises: A research agenda', *Science, Technology and Human Values*, 29(4), 512-557.

² Burgess, J. and Chilvers, J. (2006) 'Upping the ante: a conceptual framework for designing and evaluating participatory technology assessments', *Science and Public Policy*, 33(10), 713-728.

³ Such as Hinchliffe, S. (2001) 'Indeterminacy in-decisions - science, policy and politics in the BSE (Bovine Spongiform Encephalopathy) crisis', *Transactions of the Institute of British Geographers*, 26(2), 182-204; Irwin, A. (2001) 'Constructing the scientific citizen: science and democracy in the biosciences', *Public Understanding of Science*, 10(1), 1-18; Leach, M., Scoones, I. and Wynne B. (eds.) (2005) *Science and Citizens: Globalization and the Challenge of Engagement*, London: Zed Press; Chilvers, J. (in press) 'Deliberating competence: theoretical and practitioner perspectives on effective participatory appraisal practice', *Science, Technology and Human Values*.

terms of process effectiveness, upstream engagement poses considerable challenges due to participants' unfamiliarity with emerging technologies and significant knowledge based and ethical differences between citizens and scientists. It is therefore essential to ensure *effective deliberation*, which provides equal opportunities for participants to enter the dialogue, and *competence*, through supporting peoples' ability to participate and develop informed understandings. Proper consideration of the outcomes of upstream engagement requires longitudinal study that continues well after processes have ended. Pressures to report early mean that emerging outcomes are often missed. This evaluation is no exception, coming so soon after the experiment has ended and before the final report has been received by the Research Councils and other scientific institutions. A concerted attempt has been made, however, to capture perspectives on *potential* outcomes; specifically the experiment's possible influence on *learning* at the level of individual participants and wider institutions. These perspectives of individuals involved in the process are inevitably speculative, however, and do not represent an evaluation of actual outcomes.

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)?

Methodology

The emphasis of this evaluation is to promote learning and reflection rather than produce an exhaustive systematic analysis in relation to the above framework. The approach adopted is therefore more interactive than in-depth. Every attempt has been made to develop a non-subject centred account through gaining views of the main actors involved in the experiment, including the Demos/Lancaster research team, Research Council staff, scientists, and citizen participants. Close contact was maintained with the research team throughout the experiment in an attempt to offer

formative as well as summative advice.⁴ 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.

Evaluation

Context and framing

Framing: How was the process framed and by who/what?

The main influence on framing the process - in terms of overall process design, the agenda for discussion, selection of participants and information provision - came from the *Demos/Lancaster team and Research Council staff* in a series of conversations before the experiment took place. This was a creative process that was by no means straight forward and at times highly contested. As a result of meetings and interviews with Research Council staff the Demos/Lancaster team drafted an initial process and topic guide, followed by intense exchanges with BBSRC and EPSRC representatives via email and telephone to agree a final design. A key area of contention highlighted by both groups in interview centred on what 'stimulus material' to provide participants in the first session of the experiment. The research team proposed introducing nanotechnologies to publics in terms of imaginaries – *i.e.* different scientific visions of nanotechnology futures that describe alternate scientific trajectories and the broader socio-political, economic and regulatory contexts relating to them. BBSRC and EPSRC representatives had serious reservations about this and expressed concerns that the information was controversial, irrelevant, and incorporated negative perspectives on nanotechnology. They proposed an altogether narrower science-centred framing summarising the main types of nanotechnology research and the role of Research Councils in supporting this. The BBSRC's longer track record in public dialogue put them in a good position to do this and their version of information ended up being used in the experiment (see Appendix One of the final report).

⁴ I was enrolled as evaluator shortly before the beginning of the experiment which limited my input into, and observation of, front-end process design. This also meant that I was not able to witness prior interviews and focus groups with scientists and Research Council staff, which form a central part of the final report of the experiment and its recommendations.

This difference of view over stimulus material was about more than what appeared on information boards. Ultimately it was about what meanings of nanotechnology were to be counted as legitimate within this upstream engagement exercise. The main point, however, is that these backstage negotiations, that are a routine occurrence in any participatory process, tend not to be witnessed by participants nor captured in most formal evaluations. Not only do these negotiations largely determine process effectiveness (the effectiveness of information provision is discussed under the competence criterion, below), but they are also crucial in constructing who or what is to be included/excluded with serious implications for the process as a whole (in this case, whether meanings of nanotechnology were to be reduced to a scientific framing of the problem or include wider framings as well).

It is therefore important to allow enough time and space at this stage in the process to work things through and reach agreement; a point emphasised by both the research team and the BBSRC/EPSRC. Furthermore, debate over process design between the two groups highlights the need to give more thought to the relationship between facilitators and decision-making/sponsoring organisations. For example, the experiment could have benefited from both parties agreeing a 'process for process design' or terms of reference *a priori* to help facilitate this relationship. More broadly, these reflections on front-end deliberations between the Demos/Lancaster team and Research Council staff have exposed a further set of conversations not included in the conception of a *Conversational Response Mode* developed in the final report. It highlights the need for a more reflexive appreciation of the role of public engagement experts - be they participatory researchers or practitioners - within these conversations, as well their own conversations with the Research Councils (in helping them understand their role as brokers of conversations), scientists and publics.

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/EPSRC. The experiment was one of four conducted in the wider *Nanodialogues* project. Temporal and resource contexts had largely been pinned down in the initial funding proposal and the consortium meeting at the start of the project. The process was also conducted within the context of three other *Nanodialogues* experiments and a number of other recent UK upstream engagement exercises in nanotechnology. The desire not to replicate these studies influenced the experiment to focus less on values and concerns of nanotechnology *per se* and give greater emphasis on the processes by which science is funded and the possible role of public engagement in this. Finally, the ambivalence of Research Councils about their own roles and responsibilities in setting UK scientific research agendas (as outlined in the final report) made it difficult to develop clarity and be explicit about the focus of the experiment. This final point indicates that the experiment may have been conducted too early in the development of upstream engagement at the Research Councils, with further internal reflection and conversation with stakeholder groups (including public engagement experts) being an important first step.⁵

⁵ Such conversations, that bring together an inclusive range of public engagement experts and other stakeholders in deliberation to develop strategic visions of (upstream) public engagement have already occurred in relation to RCUK's *Energy Research Public Dialogue Project* (see Chilvers, J., Damery, S., Evans, J., van der Horst, D. and Petts, J. (2005) *Public Engagement in Energy: Mapping Exercise*, A report to Research Councils UK, September 2005) and in the context of UK national policy-making on radioactive waste management (see Chilvers, J., Burgess, J. and Murlis, J. (2003) *Managing Radioactive Waste Safely Participatory Methods Workshop Report - Volume 1: Final Report*, Defra/RAS/03.001/Vol1, London: Defra).

Effective upstream engagement should be flexible enough to allow *participants* at least some say in how the process is run and the agenda for discussion. The facilitators were generally open and responsive to where participants wanted to take discussion, especially in the first session where there was an explicit attempt to keep framings open. Participants also 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, however. As one participant responding by email after the process noted, “I don't think we had any influence over how the project was run as the facilitators had certain things that they wanted us to talk about and a set plan”. This was perhaps more to do with the specific nature of the focus group methodology employed than inflexibility on the part of the facilitators *per se*. It is therefore important to recognise repeat focus groups as one possible method for developing interactive deliberation of this type that should be substituted or supported by other techniques⁶ as the Research Councils begin to develop a more coordinated approach to upstream engagement in shaping future scientific research agendas.

Clarity, transparency and accountability: To what extent was the process transparent about objectives, boundaries, and how outcomes of the experiment were used?

Complex and multiple framings created challenges for communicating the purpose of the experiment to participants. It is nonetheless important to be completely explicit in outlining the objectives of the process and its boundaries so as not raise participants' expectations unnecessary. The facilitation team attempted to clearly communicate the objectives and expectations of the experiment verbally on a number of occasions, particularly in the first session. Up until this point participants were completely unaware of the experiment's focus as they were not informed of this during recruitment. During the process some participants expressed a limited understanding of, or remained confused about, the overall objective. One participant described the process as “a bit vague”, while another was unsure were the process was going after an initial focus on nanotechnology in the first session broadened out to consider Research Council governance issues in the second. This lack of clarity felt by some participants despite attempts by facilitators to the contrary might be due to conflicting framing effects, not least ambivalence over the role and influence of Research Councils in shaping research agendas. All participants interviewed stated a desire to receive feedback on the outcomes of the experiment and how it has been used in decision-making. There was no evidence of this having occurred at the time of writing, which is to be expected given that the Research Councils had not received the final report of the experiment by this point.

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?

Of the many features of effective deliberation this evaluation focuses on fairness in terms of process participants being empowered and having equal opportunity to enter the discourse. This partly depends on developing the willingness of participants

⁶ Not least more self-organising citizen-led processes, such as those trialled in other Sciencewise projects including Small Talk and Democs.

to engage with the issues under discussion. 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. As the Demos/Lancaster team emphasise in the final report, as did Research Council staff and scientists in interview, the young technologists group were in general much less engaged in dialogue than the mothers group. The opposite might have been expected before the experiment, but apart from two or three vocal participants most of the young technologists group were reluctant to talk even when promoted by facilitators. All participants stated that the money received as payment for their time was the main motivation for taking part. A few added that they became more interested in the issues under discussion as the experiment progressed, which gave them further reason to participate.

A critical area where the experiment did not meet expectations, however, was its inability to retain participants throughout the process. The main problem was that only four participants attended the final session, all of whom were female. This was identified as a critical issue by all involved in the experiment, including Research Council staff, scientists, public participants and members of the research team themselves. The experiment was never intended to explore socially 'representative' perceptions of nanotechnology across different demographics in the local (Swindon) population. Rather the aim was to be more exploratory and enhance learning through uncovering generic concerns. Although not aiming to be representative in this way, the experiment did not fully meet the criterion of inclusive deliberation throughout the process.

This raises questions over the experiment's ability to develop peoples' willingness to participate. It may be that the esoteric subject of nanotechnology, combined with the unfamiliar context of UK Research Councils, provided too difficult or uninspiring for some. The decision to present the final session of the experiment as 'optional' to participants (as stated in the final report) may have underplayed the importance of developing inclusive recommendations. Perhaps monetary payment for participants to take part should have been spread throughout the process or been made (at least partly) conditional on involvement in the final session. Whatever influenced peoples' willingness to participate, it appears the main reason for the high drop out rate lay in recruitment. Both Research Council staff and the research team highlighted problems with the recruitment company contracted to develop the sample and liaise with participants. The company had in some instances failed to inform participants of the option to take part in the final session. This highlights the need for quality recruitment either through building relationships with recruiters that you can trust or taking full responsibility for conducting recruitment as facilitators of 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.

Competence: To what extent did the process develop competent mutual understandings through adequate access to resources and citizen-specialist interaction?

Upstream engagement in emerging areas of science and technology presents significant challenges to the competence of publics as well as scientists and facilitators. This was especially the case in this *Nanodialogues* experiment which required participants to become informed not only about nanotechnology but also the

institutional context of the Research Councils. Upon signing up for the experiment a few participants already knew something about nanotechnology but most did not. Session one discussion was permeated by long pauses with some participants finding it difficult to relate to the issue in the first instance. It was crucial, then, that the experiment supported peoples' ability to participate effectively and develop competent mutual understandings. 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.

Most participants deemed *information provision* to be adequate for their purposes. Information was provided via information boards (see Appendix One, final report), written material, and by providing web-links for participants to consult in between sessions. Debate over what to include on information boards has already been discussed in relation to framing, although, in terms of delivery, posters would have offered participants more opportunity to take on information in their own time. The use of the internet to support information provision was a good feature and has potential to be a useful resource in this regard. Obviously, it depends on all participants having access to the internet, which was the case this instance. The research team emailed a list of web-links to participants which for the most part they appreciated and found useful. A few participants noted, however, that the sheer volume of information available lead to 'information overload', while another asked for fewer sources that provide an overview of the main issues. This points to a more targeted approach which offers further guidance on useful sources, or perhaps a more facilitated approach to internet information exploration where participants remain in contact with facilitators and each other online in between sessions.

One area where further information might have been provided is on the Research Councils and processes of research funding. Such information was provided in the final session in the form of a BBSRC organogram, examples of research applications, and from Research Council staff in attendance. The provision of such information for participants to digest in their own time would have been a valuable addition. A further omission evident from observing this experiment, and other processes of public engagement in science, is the limited access to social (as opposed to natural/physical) scientific information and expertise. One proposed way of integrating social scientific insights into information provision was through imaginaries of different nanotechnology futures. As we have seen in relation to framing, this approach was eventually decided against. Other forms of social scientific information that could have been useful for participants include social intelligence emerging from existing processes of upstream engagement in nanotechnology, or background information on different approaches to public participation. The latter would have been particularly useful, given that participants were asked to provide recommendations on the nature and extent of public engagement in Research Council activities. In this context it seems that social or procedural knowledge is subject to a kind of inverse 'deficit model' of public understanding, perhaps based on an assumption that participants already hold much social knowledge or that providing social information somehow 'biases' participants' views. However, access to social knowledges and exploration of issues relating to the 'public understanding of the public', and/or the 'public understanding of the participation' (including the extent to which the outcomes of such processes are

deemed credible, legitimate, competent, and so on), becomes crucial as upstream engagement becomes more embedded in scientific institutions.⁷

The experiment was largely successful at providing *access to specialist expertise*, especially through bringing together participants and scientists in interactive dialogue in the second session. As with their degree of engagement more generally, participants experience of interacting with scientists varied. While some found it daunting and rather uncomfortable, others were enthused and excited by meeting with scientists and asked many questions in open discussion. A really good feature of this facilitated interaction was its ability to move beyond a two-way citizen-scientist discussion towards a multi-way dialogue that included exchanges between scientists. This was valuable in helping public participants to see 'scientists and citizens' as well as for the scientists to explore their differing positions on nanotechnology. As the dialogue progressed it became clear, however, that relations between citizen and scientific expertise could perhaps have been more symmetrical and interactive. Within the second session scientists initiated discussion with an opening statement and, in general, proceeded to talk more than participants did. Participants' questions often sought to merely 'find out more' rather than critically challenge or contest scientific framings in any coherent way. Some participants noted that they had not been able to speak to certain scientists because they were not assigned to their group. Other ways that the dialogue could have been staged/structured to empower participants and enhance critical interaction include: allowing participants to initiate discussion with opening statements and questions (based on those elicited in session one) directed at scientists in facilitated discussion; or allowing citizens the freedom to approach individual scientists and speak to them on their terms, in pairs or in groups.⁸

Ensuring competence in public dialogue also depends on selecting the right specialist expertise. Participants' had no say over which scientists were selected to be involved. One scientist mentioned that interdisciplinary nanoscience centres might have usefully been included, while a couple of participants noted the absence of industry. On the whole though, the range of scientists represented was deemed entirely appropriate, especially given constraints on the process. Scientists that did take part were provided with guidance by the Demos/Lancaster team on how to act in public dialogue, the sorts of questions they might be asked, and so on. This was deemed very helpful, especially by those scientists with limited experience of public dialogue. Both scientists interviewed noted that one's competence in this regard not only develops through doing public engagement but also varies between different types of scientist (e.g. a biologist such as Ruth Duncan who develops medical applications has interacted with publics as patients throughout her career, whereas Philip Moriarty, as a physicist, has not been exposed to publics in the same way).

⁷ This observation is not a criticism of the experiment under evaluation, but a broader reflection across many recent processes of public engagement in science. Indeed, the current experiment should be commended for exploring public views on public engagement which highlighted the need for appropriate access to existing social knowledge and expertise in this instance.

⁸ These forms of citizen-specialist interaction have been used in experiments to develop a participatory technique called *Deliberative Mapping* in the context of emerging medical biotechnologies (e.g. xenotransplantation) and radioactive waste management. See Davies, G., Burgess, J., Eames, M., Mayer, S., Staley, K., Stirling, A. and Williamson, S. (2003) *Deliberative Mapping: Appraising Options for Addressing 'The Kidney Gap'*, Wellcome Trust Final Report, Burgess, J., Chilvers, J., Clark, J., Day, R., Hunt, J., King, S., Simmons, P. and Stirling, A. (2004) *Citizens and Specialists Deliberate Options for Managing the UK's Intermediate and High-Level Legacy Radioactive Waste: A Report of the Deliberative Mapping Trial*, London: Defra.

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. As discussed above with regard to framing, the temporal context of the process was very much defined in advance. The timing of the experiment was also defined to an extent by the availability of participating scientists. Within these constraints participants felt rushed and would have benefited from having more space for reflection after receiving information and/or meeting scientists. Scientists noted that they needed more time to get to grips with the issues when interacting with participants. For instance, it was very difficult to put their comments or statements of 'fact' into context in the time available. Research Council staff noted further possibilities for enhancing participant understanding, such as a site visits to a nanotechnology laboratory, that were not possible in the time available. Of course, every public engagement process could usefully use more time. It depends whether these constraints are critical or not. Based on participants' comments and more general observations it appears that in specific instances time constraints have negatively impacted on the competence of the experiment and its outcomes. By way of comparison, around twice as much time was provided in two recent experiments that attempted to achieve similar objectives of engaging citizens, scientists and decision-makers together in complex areas of science and develop recommendations for research/policy.⁹

Learning and influence

To what extent did the process enhance learning at the level of individual participants and relevant institutions?

Full analysis of social learning associated with participatory processes demands systematic and sustained evaluation which includes *in vivo* as well as retrospective elements. The more limited evaluation afforded here indicates that the process was successful in enhancing learning, at least from the many learning experiences of different actors involved. Most participants felt that they had learned not only about nanotechnology but also the inner workings of the Research Councils, which for some rekindled an excitement and interest in science not felt since their school days. One of the scientists, who had not previously engaged with lay publics in this way, had learned about how to act in public fora and about the sorts of questions and ethical perspectives that emerge. The BBSRC/EPSC learned about the importance of building highly interactive relations between citizen-scientists in public dialogue (with implications for interpersonal trust) and marked differences between the two citizen groups (which confirmed a plural view of 'the public'). For the Demos/Lancaster team the process raised more questions than answers but, along with Research Council staff, they learned a lot about the importance of building relationships with partner/decision-making organisations and managing negotiations over process design (as discussed above in relation to context and framing).

Having said this the effectiveness of upstream public engagement will ultimately be judged by its impact on shaping future developments in nanotechnology and its influence on the processes and cultures of institutions that govern (publicly funded) science. This evaluation can only offer perspectives on *potential* outcomes in this regard, especially given its timing before the Research Councils received the final report of the experiment. While the learning and influence criterion encompasses a

⁹ I again refer to the two aforementioned examples of Deliberative Mapping.

wide range of possible changes, those involved in the experiment mainly offered perceptions of its potential to shape future directions in nanotechnology research. Most participants felt rather sceptical about the possible influence of this upstream engagement exercise or felt unable to comment beyond noting that a report will go to the Research Councils. The research team, Research Council staff, and participating scientists were more specific in identifying the main link into the Research Councils as being through consideration of the final report by the BBSRC's Science for Society Panel and the EPSRC's Societal Issues Panel. These actors envisaged, however, that any influence on nanotechnology research agendas may turn out to be relatively limited. This was partly due to the Research Councils ambivalence as to their roles and responsibilities in shaping nanotechnology research agendas, but also the legitimacy of the experiment's recommendations given limited participant inclusion in the final session. Although it is difficult to judge so soon after the process has ended, it appears that the real value of this participatory experiment lies in its ability to engender learning, reflection, and possible culture change within Research Councils and other scientific institutions as to the role of public engagement in shaping scientific research agendas. This is where the experiment has greatest potential influence: through demonstrating what upstream engagement might look like; through exploring Research Council, scientist and public views on where/how upstream public engagement should be built in to existing structures and procedures; and through initiating a broader conversation over the future direction of publicly funded research in nanotechnology and other areas of science.

Summary

In sum, this *Nanodialogues* experiment in upstream engagement relating to UK Research Councils was well designed and facilitated, and successfully brought together citizens, scientists and Research Council staff in interactive dialogue. It is unfortunate, however, that it did not fully meet initial expectations about encouraging participant engagement throughout the experiment and in delivering final recommendations. 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).

More specific conclusions relating to each evaluative criterion can be summarised as follows.

Framing.

- The Demos/Lancaster team and Research Council staff played a major role in framing the experiment through initial conversations over process design. 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.
- The wider context of the *Nanodialogues* project, other recent UK upstream engagement exercises, and the institutional context of the Research Councils, had imposed prior framings before these backstage negotiations took place.
- Despite explicit attempts by the facilitators to keep the agenda for discussion open and flexible, public participants and scientists had little influence on how the process was framed.

Clarity, transparency and accountability.

- These complex and multiple framing influences created challenges for clearly communicating the purpose of the experiment to participants. This led to some participants feeling a lack of clarity in the process, despite attempts by facilitators to the contrary.

Effective deliberation.

- The process was well facilitated with the research team making a concerted effort to ensure equal access to the deliberation. However, this was not always possible. For example, some participants in the technologists group were much less engaged in dialogue than those from the mothers group.
- The experiment did not fully achieve inclusive deliberation due to problems of retention with only four participants attending the final session. The main reason for this lay in recruitment, highlighting the need to ensure quality in this element of any upstream engagement process.

Competence.

- In general, the information provided to participants was adequate. Some participants found internet links useful while others would have preferred a more targeted and managed approach to web-information provision. Possible areas of omission include information about the Research Councils and access to relevant social and procedural knowledges (e.g. the outcomes of previous upstream engagement exercises or information on different approaches to public participation).
- The experiment was highly successful in providing access to specialist expertise, particularly through bringing together participants and scientists in interactive dialogue. It did leave scope, however, for developing more symmetrical and interactive relations between citizen and scientific expertise.
- The majority view of those involved was that the experiment felt rushed and would have benefited from allowing more time to develop competent understandings between participants.

Learning and influence.

- The experiment was successful in enhancing learning, at least from the many learning experiences of the individual actors involved.
- Most individuals that took part in the process envisaged, however, that its potential to shape future directions in nanotechnology research might be relatively limited. This partly related to concerns over the legitimacy of the experiment's recommendations due to limited participant involvement in the final session.
- The real value of this experiment in upstream engagement lies in its potential to engender learning and reflection within the BBSRC and EPSRC about the role of public engagement in shaping scientific research agendas.

Appendix 1. A contextual model of participatory processes design and evaluation (adapted from Burgess and Chilvers, 2006).

