

DEMOS

Nanodialogues Report

Engaging Research Councils

Draft 3

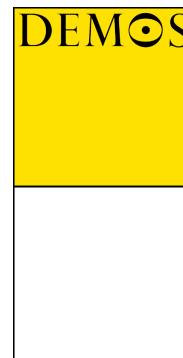
March 2007

Report of an experiment in upstream public
engagement

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Summary

This report reflects on an experiment in public engagement to explore public values, concerns and aspirations about emerging science and technology, the public funding of science and the role of public engagement in shaping research agendas for science. The report sets the conclusions of the experiment in the context of debates about the role of Research Councils in shaping science. The main conclusion is that, for two-way public engagement to be embedded in the work of the Research Councils, it needs to be linked to a more open discussion of research agendas in science. Both the EPSRC and BBSRC can play a leadership role in brokering upstream conversations between scientists and the public. But this will require them to place their own decision-making at the heart of public discussions of science.

The challenge

"In the funding process...we don't get asked what we want, do we?"

"But would we know if we were asked?"

"Well, no-one's asked us"

All quotes from dialogue participants except where noted

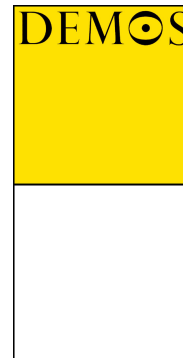
Research Councils are the UK's main distributors of public money for science. For emerging fields of international research interest – such as nanotechnology – Research Councils such as the EPSRC and BBSRC have a particular role in funding and supporting excellent research and training.

But they are also faced with a set of questions that complicate this picture of scientific excellence. With the recent move towards 'upstream public engagement', the Research Councils find themselves at the heart of debates about public engagement and public value.¹ The *Nanodialogues* project is designed to explore the ways in which public engagement can move "from being an optional add-on to science-based policy making and should become a normal and integral part of the process."² For this public engagement to be constructive, it should take place at a time when people can still influence the future of technologies. On the recommendation of the 2004 report from the Royal Society/Royal Academy of Engineering, the emerging debate about nanotechnologies

¹ Wilsdon, J, Wynne, B and Stilgoe, J, 2005, *The Public Value of Science*, Demos, www.demos.co.uk

² House of Lords Science and Technology Select Committee, 2000, *Science and Society*

is seen as a test case for this new style of engagement – an opportunity to avoid some of the mistakes of the past and build a new type of ‘socially robust’ science, in which public questions and concerns are considered at an early stage.³ Upstream engagement recognises the need to look beyond just the *applications* of scientific research. Rather, the challenge is to find mechanisms for infusing basic research and emerging technologies with public values and aspirations. At the same time, upstream engagement looks to open up spaces in which scientists can reflect on science’s social and ethical dimensions.



Developments in nanotechnology are proceeding rapidly, but the truly transformative potential has yet to be realised. So nanotechnology represents an opportunity for early public dialogue in which public values might inform the development of specific nanotechnologies. As supporters of basic scientific research the Research Councils have a key role to play in developing best practice in upstream public engagement around nanoscience and emerging nanotechnologies.

It is clear that the work of the Research Councils is of immense public value and significance. The Research Councils ensure the development of a healthy academic science base that is internationally competitive and publicly important. But early evidence suggests that nanotechnology shares some features of earlier technologies in becoming a locus for public concerns – particularly concerning the human body, privacy, and issues of governance, regulation and responsibility.⁴

In response to the challenges presented by emerging technologies, the Research Councils have developed their capacity for two-way public engagement with science. The BBSRC previously coordinated a valuable consensus conference on plant biotechnology highlighting factors that would later become the focus of vociferous debate. Grantholders are increasingly encouraged to engage members of the public and to reflect on the broader, non-scientific meanings and implications of their work by both BBSRC and EPSRC. The challenge for the Research Councils is now to find ways of ensuring that public values inform their support for and funding of basic research.

The experiment

This experiment forms one quarter of *The Nanodialogues: Four Experiments in Upstream Public Engagement* project. The three other experiments have focussed on nanoparticles and regulation (with the Environment Agency), nanotechnology and development (with Practical

³ Macnaghten, P., Kearnes, M. and Wynne, B. (2005) Nanotechnology, governance and public deliberation: What role for the social sciences? *Science Communication*, 27(2), 268-287; Nowotny, H., Scott, P. and Gibbons, M. (2003): 'Mode 2' revisited: the new production of knowledge, *Minerva*, 41, 179-194.

⁴ Kearnes M, Macnaghten P and Wilsdon J, 2006, *Governing at the Nanoscale*, Demos, www.demos.co.uk

Action) and the nanotechnology and corporate research and development (with Unilever). The aim across all four experiments is to design and carry out deliberative exercises that speak to the distinct contexts of partners, while also taking forward learning about the value and limitations of public engagement. So while they are about nanotechnology, all of the experiments are also about how decisions get made about science.

In Summer 2006, over three sessions, we ran a deliberative dialogue process, involving scientists, members of the public and Research Council staff, as an experiment in public engagement. As well as providing a forum for public participation with emerging nanotechnologies, there were two overriding research questions:

1. What are the sorts of questions that are likely to determine future public responses to nanoscience and nanotechnologies?⁵
2. What should public engagement with early-stage scientific research look like and how can Research Councils build public values into their work?

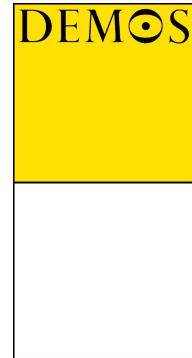
Stimulus material and scientific perspectives focused on nanotechnology and the role of BBSRC and EPSRC in supporting and funding nanotechnology research. But the discussion and the conclusions reached by participants spoke beyond the specifics of nanotechnology to the wider issues of the governance of science and the place of Research Councils in research agendas. By the end of the experiment, the participants developed a sense that public engagement should inform the development of research priorities so as to reflect public values and aspirations. This expands on the work done by the Agriculture and Environment Biotechnology Commission, which considered the role of various players in shaping research agendas and recommended accommodating a diversity of influences and an awareness of a public desire to contribute.⁶

The public dialogue elements of our project were informed by interviews and discussion groups with Research Council staff and scientists. These conversations helped place the engagement in the context of the dynamic role of Research Councils in supporting science and public engagement.

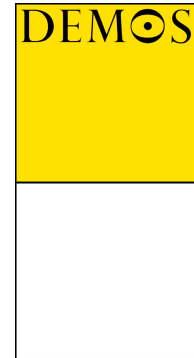
The process

⁵ For an analogous example see: Grove-White, R., Macnaghten, P. and Wynne, B. (2000) *Wising Up: The Public and New Technologies* (Lancaster, Lancaster University).

⁶ What shapes the research agenda? in agricultural biotechnology, A report by the Agriculture and Environment Biotechnology Commission (AEBC) April 2005



Our three days were full of discussion, much of which is relevant to the issue of nanotechnologies and public engagement. The discussion was rich and intelligent, but also problematic. It was peppered with the awkward silences and crossed purposes that always happen in complicated discussions on new topics. With brevity in mind, what follows is a reflection of that evolution, focussing on the questions that are most pressing for the research councils.



Our process engaged with two groups of people. In a departure from the standard Citizens' Jury model, in which a group is brought together from as wide a range of backgrounds as possible, we wanted to build upon focus group methodology in order to develop deep discussions of issues. The purpose of the focus groups was to encourage discussion of potential issues arising for nanotechnology, within a framework set by participants.

The sample consisted of two groups, each of which met twice, with a gap of two weeks between the sessions. A third session was organised as a final workshop in which to develop shared conclusions and recommendations. Most of the participants were from Swindon, (two came from Bristol), most of them knew the Research Council building and some were familiar with the work of the Research Councils.

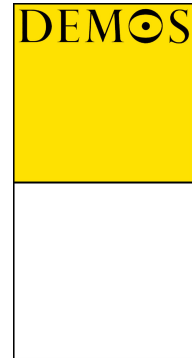
The first group was of full time mothers with children of school age. The second was a group of young professionals with a declared interest in technology. The sessions were conducted in Swindon. The first two were at a hotel on the outskirts of Swindon and the final session was at the Research Council building, Polaris House.

Day One

Our first session was a pair of focus groups. 6 people were in the first group, 8 in the second. The first group, of non-working mothers, gelled quickly and talked freely about the role of science and technology in their lives and the extent to which decisions about science and technology should be public, accountable and democratic. The second group, of male and female professionals between 18 and 30, had a more difficult time. It was not immediately clear to the participants why they were there or what they could offer to our experiment.

Discussions at the first sessions were seeded by people's opinions of science and technology. Using some stimulus material (see appendix one), we narrowed the discussion to nanoscience, nanotechnology and the role of public funding for science. The mothers group was much keener to have its voice heard as part of discussions about science. Most of the young professionals group were unsure what they could contribute, or thought that decisions about science should rest with experts. They were, in the words of one "not qualified" to speak. We explored this point with both groups, and the discussions produced some important questions. These reflect both the groups' exposure to

nanotechnology as a new idea and an emerging uncertainty about the accountability of public research spending.



Selected questions from Day One

- Where do scientists see nanotechnology going?
- What are the implications of nanotechnology for society?
- What are the alternatives to nanotechnology?
- What's the goal of nanotechnology?
- Where do scientists draw the line?
- Where do research ideas come from?
- Who will benefit from science?
- Who's paying for science?
- What is basic research?
- What kind of research ethics do people use?
- What criteria do the Research Councils and scientists use?
- What do the Research Councils do?
- How do Research Councils involve normal people?
- What kind of Research Council guidelines and parameters are there?

Day two

The second session brought our two groups together for the first time. Some of the participants had done homework, looking up nanotechnology on the Internet and trying to make sense of what was happening. In most cases, this information had not brought clarity. Participants had found that, among the Internet's noise, it was difficult to pick out a sense of the reality of nanotechnology.

After an hour's reflection with each group, we began a dialogue with visiting scientists and experts, fuelled by the questions generated on the first day.

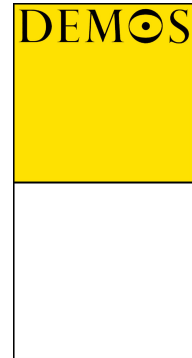
We heard from research scientists about the everyday reality of getting funding and doing research. We explored the motivations behind becoming a scientist and doing science. Jeremy Baumberg reminded half

of the participants that “scientists don’t have easy answers.” Most of the time they are contributing tiny bits to a larger collective activity. He took part, with Ruth Duncan, in a discussion about the more downstream impacts of nanotechnology, in computing and medicine. Themes were intellectual property, ethics, public benefits, risk, regulation and collaboration with industry.

At the same time, other participants talked to Philip Moriarty, who works further ‘upstream.’ He told the participants:

“I could not care less whether my work leads to a new electronic device. What drives me is that there is a question that I want to answer.”

This discussion took in the contingencies of basic science, the nature of scientific uncertainty and the responsibilities of scientists as citizens.



Visiting perspectives

- Professor Philip Moriarty – a nanoscientist at Nottingham University
- Professor Jeremy Baumberg – from Southampton University
- Professor Ruth Duncan – from Cardiff University
- Professor Peter Fryer – from Birmingham University and a BBSRC peer review committee member
- Professor Julian Kinderlerer – from Sheffield University and a member of the BBSRC Bioscience for Society Strategy Panel

We then mixed up the groups. Peter Fryer and Julian Kinderlerer took part in a further discussion of the roles of Research Councils. We talked about how research money was divided up and about how researchers are asked to consider the social and ethical dimensions of their science.

The younger group from the first session were initially most trusting of science governance processes, at least on the surface. Many of them thought they had little to say about such an esoteric, expert activity as pure science. But by the end of the second day, opinions about the need for public accountability and scrutiny began to emerge even from those participants who at first didn’t see the point. These opinions were expressed in broad – rather than nano-specific – terms. The participants from the mothers group needed no encouragement to question the structures behind science. Their concerns reflected those that have emerged from similar focus groups in the past – the ethics of bodily intervention, the complexity and invisibility of nano, the concentration of research towards commercial ends etc.⁷

⁷ See Kearnes, M, Macnaghten, P and Wilsdon, J, 2006, Governing at the Nanoscale, Demos, available from www.demos.co.uk

The session allowed the scientists to not just talk about their science, but also to reflect as citizens. So Jeremy Baumberg talked about science and development, suggesting that “We have no idea what would be relevant science for Africa” and Philip Moriarty talked about the relationship between science and the lay public, suggesting the possibility of including some element of lay review, in addition to peer review, to widen the frame of grant proposal assessment. One participant, in conversation with Philip Moriarty, volunteered herself as a lay reviewer, adding,

“Listening to what you’re saying, some of it is worrying me even more, but some of it is reassuring as you’ve got the same concerns as me. But there’s still some gaps.”

Our scientists talked about the pressures upon them to justify their research in terms of its usefulness and the increasing involvement of industry in university science. When we asked our participants what they felt the scientists had taken away from the experiment, they were optimistic:

“Did you feel that, Philip Moriarty, his views about what he’s doing changed, having spoken to you?”

“Yeah, I did, yeah”

“Well, I’d agree as well, yeah”

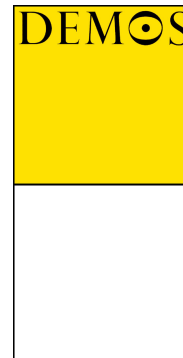
“Yeah, cos I think he was like, ‘oh, yeah, I hadn’t really thought about that,’ cos he said he doesn’t really think about that, he just thinks about what he’s doing, he gets very excited about what he’s doing... So I think it was probably quite interesting for him.”

The second day reminded us of the importance of face-to-face dialogue between scientists and members of the public in exploring issues of emerging science and technology. Many of the deeper insights into the processes and contingencies of science emerged from hearing about what goes on behind science’s public façade.

Day three

The third day was hampered by a poor showing of participants from the previous two sessions. Only four women turned up (3 from the mothers group and one from the other), but the discussion was focussed and deep.

Asked to look back on how their thoughts had developed over the last few weeks, the participants agreed that it had been useful to meet scientists and others to learn about some specifics of nanotechnology and some general points about being a scientist. This produced a



sophisticated picture of the uncertainty and value of curiosity-driven research:

"My thinking's changed, because I did say when we were in our last group, I said that perhaps, the research that's going on should be of benefit to people, like you're paying tax into things. But sitting at home in the last few weeks, I felt I'd hate to stop research that's going on, you know, have it on our heads that you're stopping research that's going on, because it's valuable in other fields rather than just beneficial to us..."

The participants thought that scientists following their curiosity would not be able to take account of all of the broader social questions around their work. There was, therefore, a role for broader engagement in both science and the ethical structures that are designed to monitor science. This would be complicated, as one participant reflected:

"How can you decide the ethics of something that's so far removed from what it might be used for."

But it was felt that members of the public should be able to ask, in the words of one participant,

"Have you thought about ethical issues, have you thought about this, and this and this?"

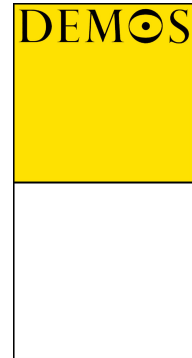
Although much Research Council funded science might not have tangible benefits in the short term, the group realised that there were other important driving forces behind science. Research agendas are complex webs of possibility and feasibility:

"I still think like, when you talk about the future ten years down the line research, we don't know what's going to come along in the next ten years, we don't really know what's going on now."

"No, but then nobody does in, well, no, I don't quite mean that. But yeah, but it's just a kind of a vision or a direction isn't it?"

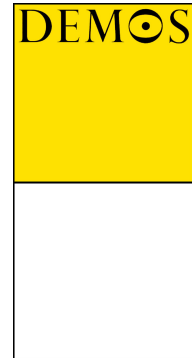
These research agendas, visions and directions were seen as important areas for public engagement and dialogue. It was felt that, although they were difficult to pin down, scientists and organisations involved in science should be asked to think and talk more about what is driving science.

The final session presented the participants with a BBSRC organogram and asked where public engagement should happen and what it should look like. One participant concentrated her stickers at the top, strategic level, arguing that it is most important for the public to be involved in shaping research agendas. Another covered her piece of paper in stickers, and said that it was also important for scientists and peer review committees to keep talking and listening to members of the public so



that their work can be seen in context. The discussion reflected a recognition that public engagement and systems of openness and accountability would have to look different at different levels of the funding process.

Concerns that were expressed specifically about nanoscience and nanotechnology were less easy to elucidate in this experiment than in previous work, because of the focus on early-stage research.⁸ The most valuable findings from the experiment speak beyond nanotechnology to broader issues of science, technology and society.



What can we learn?

1. An acknowledgement of the value of science. The groups saw the importance and value of science, particularly the generic quest for new knowledge and the role of research in addressing important social concerns.
2. The assertion that the science is both of public value and concern. By the end of the experiment, there was a clear desire for more openness and more public engagement. This engagement should not just be limited to discussions of technology. It should also involve consideration of basic science, where the ethics aren't clear but an open conversation is important.

The dialogue revealed an emerging desire for openness and accountability from all participants, and an instinct for more direct engagement by some of the participants. The evolution of their opinions was such that the more they talked about science and its governance, the more room they could see for their own voice, and the voices of others. None of the participants thought that public engagement would be easy. Nor could they suggest magic bullets that would work to make basic science more 'engaged.' They were well aware that issues of basic science and public engagement were outside their everyday experience.

Past deliberative experiments have been successful in opening up debates about emerging technologies. Our experiment uniquely tried to extend such a tool into an organisational context within which direct decisions are taken about science. This made for a more interesting and difficult discussion, offering pointers rather than answers.

The recommendations from the final session provided some sense of consensus for the participants to leave with. They reflect the instinct for greater engagement and the appetite, once encouraged, for information

⁸ More information on nano-specific concerns arising from public engagement can be found in Kearnes M, Macnaghten P and Wilsdon J, 2006, *Governing at the Nanoscale*, Demos, www.demos.co.uk

and deliberation. But they also reflect uncertainty about what this might look like.

Recommendations – as written by the four participants in the final session of the Research Councils’ Nanodialogue:

1. Science should be communicated in plain English. If the public are to be involved in science then they need to be able to understand it.
2. Science/Scientists should actively engage with the public. Science should come to the public as opposed to the other way round. Science should be transparent.
3. The public should be involved at all levels of the research process. Engagement, however, should be different at different levels of the research process.
4. We support the move for more public engagement on nanotechnology. But this needs to be informed by the latest science.

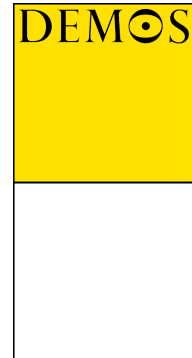
The experiment produced a conversation that was broadly optimistic about science. The discussion was not motivated by grand visions of promise or threat, which accounted in part for its slow acceleration. Rather group members acknowledged the importance of science’s ongoing exploration.

Upstream discussions can be constructive. Organisations can test the water and explore provisional issues. For science funders, however, this comfort presents a problem. They need to think through for themselves the value of public engagement. Such recommendations from members of the public are unlikely to make sense to Research Councils in such a desiccated form. There is a need for further interpretation and reflection.

What is clear, however, is that public engagement presents an opportunity to Research Councils, rather than a threat. There is an opportunity to engage people in new ways and to inject a new set of social insights into Research Council funded science.

Challenges and tensions

There are some challenges highlighted by our experiment that need to be thought through. Our experiment picked up on some challenges and tensions that are live within Research Councils and within university science in general. The increasing involvement of industry generates significant ambivalence: people are happy that science is useful and contributes to the economy, but concerned that agendas are driven by commercial interests. There was also concern that valuable knowledge



would be kept under wraps by companies. The openness of intellectual property was seen as an important value for science.

Though this concern is generic in nature⁹ it speaks to a understanding of the role and limits of public engagement. The participants were concerned about the role of public dialogue in the work of the Research Councils. Rather than simply being a down-stream activity, or the responsibility of funded scientists, they suggested that public engagement should be threaded through the councils' other work. If public engagement is just seen as a fringe activity, this will undermine their attempts to engage people. But they also realised that, within the Research Councils' decision-making, public engagement represents a complicated set of discussions.

The instinctive response of the groups was a desire for greater transparency and the need for some form of public conversation. It is this that instinct needs to be unpacked by the Research Councils. The demands made by participants for greater transparency and accountability represent recognition of the unique public value and significance of the research councils. Our conclusion offers some pointers for the next few years of Research Council engagement.

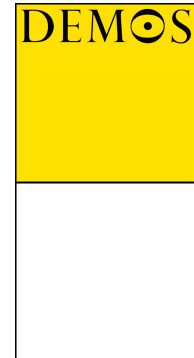
Swindon 2012 – Creating Engaging Research Councils

These areas of tension highlight the challenge of upstream public engagement. Future discussions of public engagement at the Research Councils need to be linked to discussions of where research agendas come from. Our preparatory interviews with scientists and Research Council officials revealed that there is still a lack of clarity about how such agendas are created. The traditional picture, in which funding is a mix of directed and responsive modes, needs to be coloured in to better represent the current state of science funding.

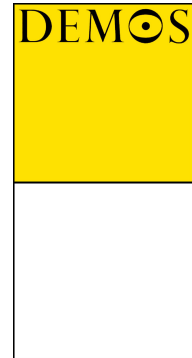
The assumption that Research Councils in responsive mode *simply* respond to the academic community's views of excellent science does not reflect the real world of science. It is clear that Research Councils play a crucial mediating role between central government and the research community and play an active role in the development of research priorities and objectives. Representatives of EPSRC acknowledged a more subtle role:

"We see ourselves as facilitators and encouragers. So even in responsive mode you can do all sorts of things to encourage new or different thinking. So for instance we might see it as appropriate to run a workshop in an area and I can guarantee that nine months after

⁹ This concern is a consistently reported feature of adverse public reactions to new technology. See Grove-White, R., Macnaghten, P. and Wynne, B. (2000) *Wising Up: The Public and New Technologies* (Lancaster, Lancaster University) and Kearnes M, Macnaghten P and Wilsdon J, 2006, *Governing at the Nanoscale*, Demos, www.demos.co.uk



we've held a workshop there would be an increase in responsive mode proposals in whatever the topic area of the workshop. That helps shaping the research. ... It's much more about saying to the community; 'Do you have a resonance here? Is there something we need to do? What would you do about it? How do we work together? ... We think we have some influence.'



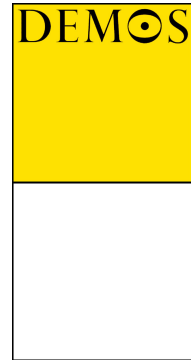
Research Councils need to develop a richer sense of their own roles, so that public engagement can be re-imagined. Once we understand that research priorities and agendas are developed iteratively by a range of people, we can see the Research Councils playing a crucial role in mediating and facilitating conversations. Acknowledging the complex way in which research priorities are negotiated, it would be possible to embed public engagement as a central Research Council activity by including members of the public in conversations about the future of research.

The research councils, particularly the BBSRC, have a strong track record in public dialogue. In addition to requirements for ethical reflection, both councils regularly engage in science communication activities and are active in encouraging funded scientists and laboratories to engage with members of the public. Naturally the focus of these activities is the social and ethical dimensions of currently funded science. So the research councils act as facilitators, enabling the assessment and broad public communication of funded science. This is to be commended, but the findings of our public engagement experiment suggest the need for additional public engagement linked to the role and function of the research councils themselves.

The groups agreed that although the work of the research councils was of low public visibility it was publicly significant and important. The potentially transformative implications of nanotechnology were a useful way of highlighting this. Though most of the participants were residents of Swindon, and knew of the existence of the research councils, most did not know how the research councils operated. As the conversation progressed many of the participants expressed a degree of surprise in relation to the importance of the work undertaken by the research councils. This suggests that Research Councils need to find new ways to include themselves in conversations between scientists and the public.

Brokers of Conversations

The first step therefore towards more productive public engagement is for the Research Councils to reflect on their own role between scientists, Government, industry and society. A standard view might see them as brokers of funding – linking scientific (bottom-up) demands with top-down policy directives and available money. More broadly, we would suggest they see themselves as *brokers of conversations* – conversations about money, conversations about science and conversations about public value.



As part of this broker status, we recommend that the BBSRC and EPSRC clarify their own role in these debates:

- Does response-mode funding really mean that they are just responding to excellent science?
- What role do they play in setting the agenda for science?
- How clear is the distinction between basic science and technology, especially in an area like nanotechnology?
- Are there tensions between funding what peers think is excellent science and what others think is valuable – economically, socially, ethically etc.?

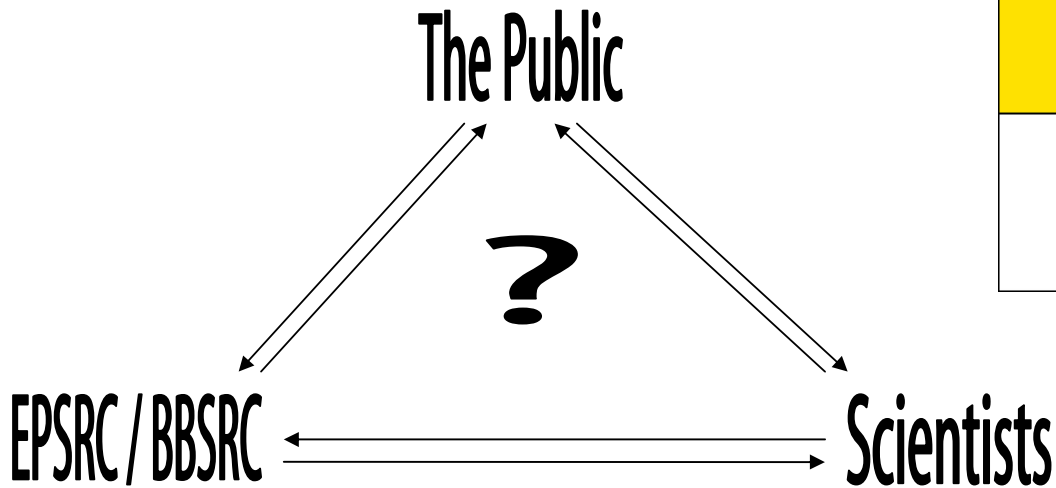
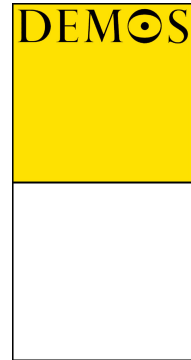
This will not be easy, and the Research Councils will face a similar challenge to that faced by scientists talking about basic research – it's not easy to say in public why they're doing what they're doing.

To help clarify this role, the EPSRC and BBSRC could invite an ethnographer to work within each council to explore employees' views of what Research Councils do. Prompted also by the work of the AEBC, this would be a step towards greater reflection of the Research Councils' potential roles as honest brokers of science and of conversations about science.¹⁰

A more open, staged conversation about science in its public context could take place within forums such as the EPSRC's "Ideas Factories." These are an opportunity for new upstream conversations about science, disrupting traditional funding processes, and making more explicit the conversations between scientists and funders. There is an opportunity for these to include discussions of ethics and public value as part of making decisions about excellent science. And there is an opportunity for the BBSRC to learn from these experimental, conversational forms of science funding, especially in the area of nanotechnology, that necessarily crosses disciplinary borders.

Throughout our dialogue experiment, we have imagined the conversations in which Research Councils are involved as a triangle. Our hope is that consideration of conversations along the triangle's sides is a useful tool of analysis for public engagement. The triangle also forces the question of what is going on in the middle. What value is produced with the combination of all 3 conversations? For rich, useful public engagement, the Research Councils must put themselves into the conversation between scientists and members of the public.

¹⁰ Agriculture and Environment Biotechnology Commission (AEBC) (2005) *op cit*

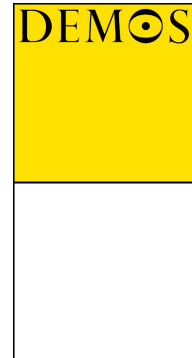


1.	RCs → The Public	Public communication, openness, web sites, information for schools, leaflets
2.	The Public → RCs	Formal accountability processes and consultation processes
3.	RCs → Scientists	Directed funding, also demands for engagement and ethical reflection
4.	Scientists → RCs	Responsive funding, Ideas factories, science workshops etc.
5.	Scientists → The Public	Traditional science communication
6.	The Public → Scientists	"Reflective engagement" - Learning from dialogue, exploring new areas of interest

All of these conversations, along all three sides of our triangle, provide value for public science. But individually they miss the bigger picture. Research Councils try to encourage conversations in all of these areas: the requirement that BBSRC scientists take part in some form of public engagement tries to broker conversation – of whatever sort – between scientists and the public. Research Councils should think about how well each conversation is going, as well as considering the middle of the triangle – conversations involving all three groups.

Given our previous discussion of the uncertain brokerage role of Research Councils, diversity of engagement should be seen as a good thing in itself. As our participants described, different engagement methods for the Research Councils will serve different ends. But individual scientists should be encouraged to innovate with different engagement methods. Some may excel at public lectures, some may want to go to a school and ask children what they think about science. Research Councils need to keep those scientists who want to engage engaging, and continue to give

them the resources to do so. At the same time, they should do their best to connect these conversations to Research Council work and other agendas.



Embedding engagement

Public engagement at the Research Councils has a long history rooted in science communication and the need for public accountability. As the Wolfendale report put it:

*"In principle, all who receive grants from public funds should accept a responsibility to explain to the general public what the grant is enabling, or has enabled them, to do and why it is important and how it fits into the broader area of knowledge."*¹¹

This model of "engagement for all" makes sense in an accountability/communication dominated model of public engagement. But it does not make for the best possible conversations about science. Not all science is of equal public interest, and not all scientists are equally able or willing to engage in conversations. This insight pushes us towards recommending that more active forms of engagement should be encouraged and supported for those scientists who are willing.¹² However, the question remains how to encourage all scientists to reflect on the social and ethical context of their work as part of the natural process of science. The track record and practical know-how of the Research Councils in science communication is an excellent base upon which to engage in a two-way dialogue with the public. This suggests that Research Councils need to encourage conversations to connect at each side of the triangle. This will also allow them to continue their leadership in public engagement, transferring learning upwards to the OSI/DTI and outwards to researchers, universities and other funders of science.

The BBSRC's Bioscience for society strategy panel and the EPSRC's newly-created Societal Issues Panel are necessary sites for the injection of public values into science. But our participants thought they were not sufficient as they currently stood:

"I don't know how to put this really, they could start getting their own focus and then just keep going for that as opposed to thinking around other issues. I don't know if that happens or not."

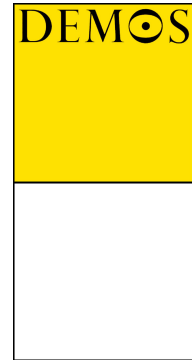
"The panel, the strategic society panel, I don't really feel that's public, not really... They're, I think they're perhaps a little bit removed from, if

¹¹ Wolfendale Committee, 1995, Final Report, Office of Science and Technology

¹² Support, encouragement and opportunities are particularly important given the recent findings of the Royal Society Survey that highlight the cultural and institutional barriers to engagement. See Royal Society, June 2006, "Factors affecting Science Communication"

<http://www.royalsoc.ac.uk/downloaddoc.asp?id=3052>

they're all basing on quite a high level all the time, you think they're a little bit removed from ... And ethics is, anybody can be involved in that, anybody can say, well, that doesn't seem right for this reason, or that reason, you don't have to be a scientist to say that, so yeah, I do think there needs to be some sort of, I don't know, some involvement of somebody, some group saying how about this? How about that? People that aren't scientists."



There are many ways of interpreting this call for greater public involvement and a wider remit for existing processes. It is evidence of a demand for transparency and openness. Beyond this instinctive response, this call speaks of a need to embed public engagement not simply in existing processes for ethical appraisal, but more centrally in decisions over research funding.

Discussion of these social and ethical panels, which are a welcome recent effort by Research Councils to inject broader questions into science, point to deeper tensions uncovered by our experiment. The BBSRC and EPSRC need to better appreciate these tensions in their position and their work – between government and scientists, between responding and directing, between publicly- and industrially-funded science, between demanding and encouraging engagement. Upstream is a complicated space in which to talk. It demands new processes, new cultures and new ways of thinking. Research Councils must look for new ways to assert their public value and the public value of science. We therefore end this report as we ended our dialogue – with more questions than answers. Our experiment has demonstrated that, in the context of early-stage research, dialogue is not good at answering these questions. But it can help focus on the challenge. These are the questions that could drive the next phase of Research Councils' upstream public engagement.

- How can Research Councils draw out value from the public engagement activity that is already going on? What can they and their scientists learn from informal and individual engagement?
- Diversity is valuable in public engagement. But what sorts of value can be gained from different levels of engagement, in different contexts and with different groups?
- As major funders of public science, how can Research Councils seed and lead new conversations about science and its public value?
- How can the Research Councils encourage innovation in engagement, from scientists, within the Research Councils and with the help of intermediaries?
- How can Research Councils listen to and interpret engagement in a new way, as well as just doing it?
- How can public engagement move from being something that happens to science to something that science and scientists do?
- At the broadest level, how can Research Councils make public engagement make sense to themselves and use it to help redefine what they do?

NANOTECHNOLOGY

Nanotechnology is defined as a technology in which dimensions and tolerances in the range 100nm to 0.1nm play a critical role.

Potential to produce smaller, lighter, cheaper and faster devices with greater functionality, which use fewer raw materials and less energy.

There are issues about its application which will need to be carefully considered and publicly debated.

Figure 2.1 Length scale showing the nanosphere in context. The length scale at the top ranges from 1m to 10⁻¹⁰m, and illustrates the size of the football compared to a carbon 60 C₆₀ molecule, also known as a buckyball. For comparison the world is approximately one hundred million times larger than a football, which is in turn one hundred million times larger than a buckyball. The section from 10⁻¹⁰m to 10⁻⁹m is expanded below. The length scale of interest for nanotechnology and nanobiotechnology is from 100nm down to the atomic scale - approximately 0.1nm.

Current Research

"Tissue engineering is part of a brave new world of biomedicine in which our scientific understanding of how living cells function will enable us to gain control and direct their activity to promote the repair of damaged and diseased tissues."

Much of the research is at the interface between the life and physical sciences. This includes: lab-on-a-chip and smart sensors for medical and environmental monitoring and diagnosis; tissue repair; targeted drug delivery.

Nano-electronics in which nanostructures are used to produce improved optical, electronic or magnetic properties.

Molecules that act like conventional computers but can operate in tiny places where no silicon-based chip or semiconductor can go. Molecules can also be used as information processors in medical and other applications.

Research Funding

EPSRC: Engineering and Physical Sciences Research Council - the main UK government agency for funding research and training in engineering and the physical sciences.

BBSRC: The Biotechnology and Biological Sciences Research Council is the UK's principal funder of basic and strategic biological research.



Non-departmental public bodies supported through the Science Budget by the Department of Trade and Industry.

Nanotechnology related funding £200mil

DEMOS

Nanodialogues Report

Engaging Research Councils

Draft 3

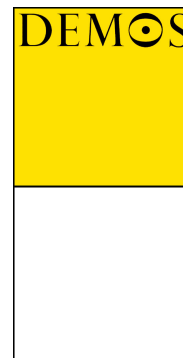
March 2007

Report of an experiment in upstream public
engagement

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Summary

This report reflects on an experiment in public engagement to explore public values, concerns and aspirations about emerging science and technology, the public funding of science and the role of public engagement in shaping research agendas for science. The report sets the conclusions of the experiment in the context of debates about the role of Research Councils in shaping science. The main conclusion is that, for two-way public engagement to be embedded in the work of the Research Councils, it needs to be linked to a more open discussion of research agendas in science. Both the EPSRC and BBSRC can play a leadership role in brokering upstream conversations between scientists and the public. But this will require them to place their own decision-making at the heart of public discussions of science.

The challenge

"In the funding process...we don't get asked what we want, do we?"

"But would we know if we were asked?"

"Well, no-one's asked us"

All quotes from dialogue participants except where noted

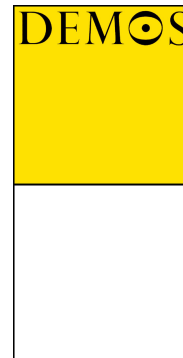
Research Councils are the UK's main distributors of public money for science. For emerging fields of international research interest – such as nanotechnology – Research Councils such as the EPSRC and BBSRC have a particular role in funding and supporting excellent research and training.

But they are also faced with a set of questions that complicate this picture of scientific excellence. With the recent move towards 'upstream public engagement', the Research Councils find themselves at the heart of debates about public engagement and public value.¹ The *Nanodialogues* project is designed to explore the ways in which public engagement can move "from being an optional add-on to science-based policy making and should become a normal and integral part of the process."² For this public engagement to be constructive, it should take place at a time when people can still influence the future of technologies. On the recommendation of the 2004 report from the Royal Society/Royal Academy of Engineering, the emerging debate about nanotechnologies

¹ Wilsdon, J, Wynne, B and Stilgoe, J, 2005, *The Public Value of Science*, Demos, www.demos.co.uk

² House of Lords Science and Technology Select Committee, 2000, *Science and Society*

is seen as a test case for this new style of engagement – an opportunity to avoid some of the mistakes of the past and build a new type of ‘socially robust’ science, in which public questions and concerns are considered at an early stage.³ Upstream engagement recognises the need to look beyond just the *applications* of scientific research. Rather, the challenge is to find mechanisms for infusing basic research and emerging technologies with public values and aspirations. At the same time, upstream engagement looks to open up spaces in which scientists can reflect on science’s social and ethical dimensions.



Developments in nanotechnology are proceeding rapidly, but the truly transformative potential has yet to be realised. So nanotechnology represents an opportunity for early public dialogue in which public values might inform the development of specific nanotechnologies. As supporters of basic scientific research the Research Councils have a key role to play in developing best practice in upstream public engagement around nanoscience and emerging nanotechnologies.

It is clear that the work of the Research Councils is of immense public value and significance. The Research Councils ensure the development of a healthy academic science base that is internationally competitive and publicly important. But early evidence suggests that nanotechnology shares some features of earlier technologies in becoming a locus for public concerns – particularly concerning the human body, privacy, and issues of governance, regulation and responsibility.⁴

In response to the challenges presented by emerging technologies, the Research Councils have developed their capacity for two-way public engagement with science. The BBSRC previously coordinated a valuable consensus conference on plant biotechnology highlighting factors that would later become the focus of vociferous debate. Grantholders are increasingly encouraged to engage members of the public and to reflect on the broader, non-scientific meanings and implications of their work by both BBSRC and EPSRC. The challenge for the Research Councils is now to find ways of ensuring that public values inform their support for and funding of basic research.

The experiment

This experiment forms one quarter of *The Nanodialogues: Four Experiments in Upstream Public Engagement* project. The three other experiments have focussed on nanoparticles and regulation (with the Environment Agency), nanotechnology and development (with Practical

³ Macnaghten, P., Kearnes, M. and Wynne, B. (2005) Nanotechnology, governance and public deliberation: What role for the social sciences? *Science Communication*, 27(2), 268-287; Nowotny, H., Scott, P. and Gibbons, M. (2003): 'Mode 2' revisited: the new production of knowledge, *Minerva*, 41, 179-194.

⁴ Kearnes M, Macnaghten P and Wilsdon J, 2006, *Governing at the Nanoscale*, Demos, www.demos.co.uk

Action) and the nanotechnology and corporate research and development (with Unilever). The aim across all four experiments is to design and carry out deliberative exercises that speak to the distinct contexts of partners, while also taking forward learning about the value and limitations of public engagement. So while they are about nanotechnology, all of the experiments are also about how decisions get made about science.

In Summer 2006, over three sessions, we ran a deliberative dialogue process, involving scientists, members of the public and Research Council staff, as an experiment in public engagement. As well as providing a forum for public participation with emerging nanotechnologies, there were two overriding research questions:

1. What are the sorts of questions that are likely to determine future public responses to nanoscience and nanotechnologies?⁵
2. What should public engagement with early-stage scientific research look like and how can Research Councils build public values into their work?

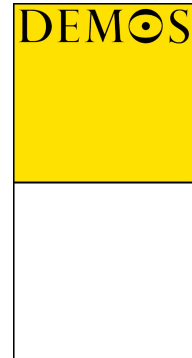
Stimulus material and scientific perspectives focused on nanotechnology and the role of BBSRC and EPSRC in supporting and funding nanotechnology research. But the discussion and the conclusions reached by participants spoke beyond the specifics of nanotechnology to the wider issues of the governance of science and the place of Research Councils in research agendas. By the end of the experiment, the participants developed a sense that public engagement should inform the development of research priorities so as to reflect public values and aspirations. This expands on the work done by the Agriculture and Environment Biotechnology Commission, which considered the role of various players in shaping research agendas and recommended accommodating a diversity of influences and an awareness of a public desire to contribute.⁶

The public dialogue elements of our project were informed by interviews and discussion groups with Research Council staff and scientists. These conversations helped place the engagement in the context of the dynamic role of Research Councils in supporting science and public engagement.

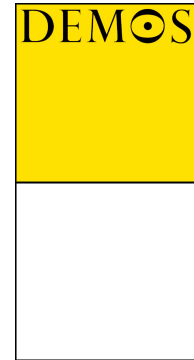
The process

⁵ For an analogous example see: Grove-White, R., Macnaghten, P. and Wynne, B. (2000) *Wising Up: The Public and New Technologies* (Lancaster, Lancaster University).

⁶ What shapes the research agenda? in agricultural biotechnology, A report by the Agriculture and Environment Biotechnology Commission (AEBC) April 2005



Our three days were full of discussion, much of which is relevant to the issue of nanotechnologies and public engagement. The discussion was rich and intelligent, but also problematic. It was peppered with the awkward silences and crossed purposes that always happen in complicated discussions on new topics. With brevity in mind, what follows is a reflection of that evolution, focussing on the questions that are most pressing for the research councils.



Our process engaged with two groups of people. In a departure from the standard Citizens' Jury model, in which a group is brought together from as wide a range of backgrounds as possible, we wanted to build upon focus group methodology in order to develop deep discussions of issues. The purpose of the focus groups was to encourage discussion of potential issues arising for nanotechnology, within a framework set by participants.

The sample consisted of two groups, each of which met twice, with a gap of two weeks between the sessions. A third session was organised as a final workshop in which to develop shared conclusions and recommendations. Most of the participants were from Swindon, (two came from Bristol), most of them knew the Research Council building and some were familiar with the work of the Research Councils.

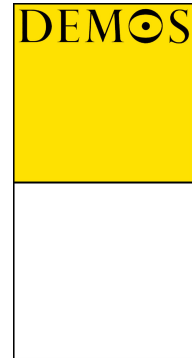
The first group was of full time mothers with children of school age. The second was a group of young professionals with a declared interest in technology. The sessions were conducted in Swindon. The first two were at a hotel on the outskirts of Swindon and the final session was at the Research Council building, Polaris House.

Day One

Our first session was a pair of focus groups. 6 people were in the first group, 8 in the second. The first group, of non-working mothers, gelled quickly and talked freely about the role of science and technology in their lives and the extent to which decisions about science and technology should be public, accountable and democratic. The second group, of male and female professionals between 18 and 30, had a more difficult time. It was not immediately clear to the participants why they were there or what they could offer to our experiment.

Discussions at the first sessions were seeded by people's opinions of science and technology. Using some stimulus material (see appendix one), we narrowed the discussion to nanoscience, nanotechnology and the role of public funding for science. The mothers group was much keener to have its voice heard as part of discussions about science. Most of the young professionals group were unsure what they could contribute, or thought that decisions about science should rest with experts. They were, in the words of one "not qualified" to speak. We explored this point with both groups, and the discussions produced some important questions. These reflect both the groups' exposure to

nanotechnology as a new idea and an emerging uncertainty about the accountability of public research spending.



Selected questions from Day One

- Where do scientists see nanotechnology going?
- What are the implications of nanotechnology for society?
- What are the alternatives to nanotechnology?
- What's the goal of nanotechnology?
- Where do scientists draw the line?
- Where do research ideas come from?
- Who will benefit from science?
- Who's paying for science?
- What is basic research?
- What kind of research ethics do people use?
- What criteria do the Research Councils and scientists use?
- What do the Research Councils do?
- How do Research Councils involve normal people?
- What kind of Research Council guidelines and parameters are there?

Day two

The second session brought our two groups together for the first time. Some of the participants had done homework, looking up nanotechnology on the Internet and trying to make sense of what was happening. In most cases, this information had not brought clarity. Participants had found that, among the Internet's noise, it was difficult to pick out a sense of the reality of nanotechnology.

After an hour's reflection with each group, we began a dialogue with visiting scientists and experts, fuelled by the questions generated on the first day.

We heard from research scientists about the everyday reality of getting funding and doing research. We explored the motivations behind becoming a scientist and doing science. Jeremy Baumberg reminded half

of the participants that “scientists don’t have easy answers.” Most of the time they are contributing tiny bits to a larger collective activity. He took part, with Ruth Duncan, in a discussion about the more downstream impacts of nanotechnology, in computing and medicine. Themes were intellectual property, ethics, public benefits, risk, regulation and collaboration with industry.

At the same time, other participants talked to Philip Moriarty, who works further ‘upstream.’ He told the participants:

“I could not care less whether my work leads to a new electronic device. What drives me is that there is a question that I want to answer.”

This discussion took in the contingencies of basic science, the nature of scientific uncertainty and the responsibilities of scientists as citizens.

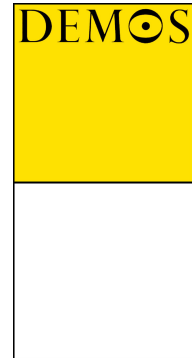
Visiting perspectives

- Professor Philip Moriarty – a nanoscientist at Nottingham University
- Professor Jeremy Baumberg – from Southampton University
- Professor Ruth Duncan – from Cardiff University
- Professor Peter Fryer – from Birmingham University and a BBSRC peer review committee member
- Professor Julian Kinderlerer – from Sheffield University and a member of the BBSRC Bioscience for Society Strategy Panel

We then mixed up the groups. Peter Fryer and Julian Kinderlerer took part in a further discussion of the roles of Research Councils. We talked about how research money was divided up and about how researchers are asked to consider the social and ethical dimensions of their science.

The younger group from the first session were initially most trusting of science governance processes, at least on the surface. Many of them thought they had little to say about such an esoteric, expert activity as pure science. But by the end of the second day, opinions about the need for public accountability and scrutiny began to emerge even from those participants who at first didn’t see the point. These opinions were expressed in broad – rather than nano-specific – terms. The participants from the mothers group needed no encouragement to question the structures behind science. Their concerns reflected those that have emerged from similar focus groups in the past – the ethics of bodily intervention, the complexity and invisibility of nano, the concentration of research towards commercial ends etc.⁷

⁷ See Kearnes, M, Macnaghten, P and Wilsdon, J, 2006, Governing at the Nanoscale, Demos, available from www.demos.co.uk



The session allowed the scientists to not just talk about their science, but also to reflect as citizens. So Jeremy Baumberg talked about science and development, suggesting that “We have no idea what would be relevant science for Africa” and Philip Moriarty talked about the relationship between science and the lay public, suggesting the possibility of including some element of lay review, in addition to peer review, to widen the frame of grant proposal assessment. One participant, in conversation with Philip Moriarty, volunteered herself as a lay reviewer, adding,

“Listening to what you’re saying, some of it is worrying me even more, but some of it is reassuring as you’ve got the same concerns as me. But there’s still some gaps.”

Our scientists talked about the pressures upon them to justify their research in terms of its usefulness and the increasing involvement of industry in university science. When we asked our participants what they felt the scientists had taken away from the experiment, they were optimistic:

“Did you feel that, Philip Moriarty, his views about what he’s doing changed, having spoken to you?”

“Yeah, I did, yeah”

“Well, I’d agree as well, yeah”

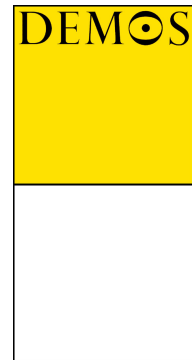
“Yeah, cos I think he was like, ‘oh, yeah, I hadn’t really thought about that,’ cos he said he doesn’t really think about that, he just thinks about what he’s doing, he gets very excited about what he’s doing... So I think it was probably quite interesting for him.”

The second day reminded us of the importance of face-to-face dialogue between scientists and members of the public in exploring issues of emerging science and technology. Many of the deeper insights into the processes and contingencies of science emerged from hearing about what goes on behind science’s public façade.

Day three

The third day was hampered by a poor showing of participants from the previous two sessions. Only four women turned up (3 from the mothers group and one from the other), but the discussion was focussed and deep.

Asked to look back on how their thoughts had developed over the last few weeks, the participants agreed that it had been useful to meet scientists and others to learn about some specifics of nanotechnology and some general points about being a scientist. This produced a



sophisticated picture of the uncertainty and value of curiosity-driven research:

"My thinking's changed, because I did say when we were in our last group, I said that perhaps, the research that's going on should be of benefit to people, like you're paying tax into things. But sitting at home in the last few weeks, I felt I'd hate to stop research that's going on, you know, have it on our heads that you're stopping research that's going on, because it's valuable in other fields rather than just beneficial to us..."

The participants thought that scientists following their curiosity would not be able to take account of all of the broader social questions around their work. There was, therefore, a role for broader engagement in both science and the ethical structures that are designed to monitor science. This would be complicated, as one participant reflected:

"How can you decide the ethics of something that's so far removed from what it might be used for."

But it was felt that members of the public should be able to ask, in the words of one participant,

"Have you thought about ethical issues, have you thought about this, and this and this?"

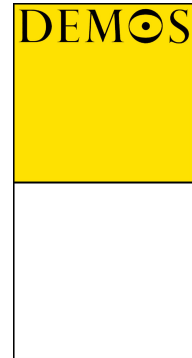
Although much Research Council funded science might not have tangible benefits in the short term, the group realised that there were other important driving forces behind science. Research agendas are complex webs of possibility and feasibility:

"I still think like, when you talk about the future ten years down the line research, we don't know what's going to come along in the next ten years, we don't really know what's going on now."

"No, but then nobody does in, well, no, I don't quite mean that. But yeah, but it's just a kind of a vision or a direction isn't it?"

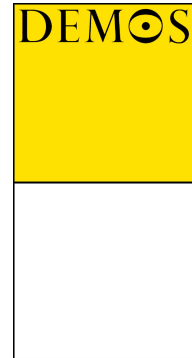
These research agendas, visions and directions were seen as important areas for public engagement and dialogue. It was felt that, although they were difficult to pin down, scientists and organisations involved in science should be asked to think and talk more about what is driving science.

The final session presented the participants with a BBSRC organogram and asked where public engagement should happen and what it should look like. One participant concentrated her stickers at the top, strategic level, arguing that it is most important for the public to be involved in shaping research agendas. Another covered her piece of paper in stickers, and said that it was also important for scientists and peer review committees to keep talking and listening to members of the public so



that their work can be seen in context. The discussion reflected a recognition that public engagement and systems of openness and accountability would have to look different at different levels of the funding process.

Concerns that were expressed specifically about nanoscience and nanotechnology were less easy to elucidate in this experiment than in previous work, because of the focus on early-stage research.⁸ The most valuable findings from the experiment speak beyond nanotechnology to broader issues of science, technology and society.



What can we learn?

1. An acknowledgement of the value of science. The groups saw the importance and value of science, particularly the generic quest for new knowledge and the role of research in addressing important social concerns.
2. The assertion that the science is both of public value and concern. By the end of the experiment, there was a clear desire for more openness and more public engagement. This engagement should not just be limited to discussions of technology. It should also involve consideration of basic science, where the ethics aren't clear but an open conversation is important.

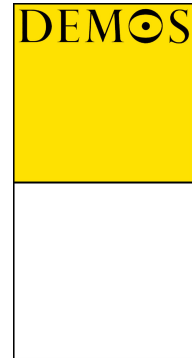
The dialogue revealed an emerging desire for openness and accountability from all participants, and an instinct for more direct engagement by some of the participants. The evolution of their opinions was such that the more they talked about science and its governance, the more room they could see for their own voice, and the voices of others. None of the participants thought that public engagement would be easy. Nor could they suggest magic bullets that would work to make basic science more 'engaged.' They were well aware that issues of basic science and public engagement were outside their everyday experience.

Past deliberative experiments have been successful in opening up debates about emerging technologies. Our experiment uniquely tried to extend such a tool into an organisational context within which direct decisions are taken about science. This made for a more interesting and difficult discussion, offering pointers rather than answers.

The recommendations from the final session provided some sense of consensus for the participants to leave with. They reflect the instinct for greater engagement and the appetite, once encouraged, for information

⁸ More information on nano-specific concerns arising from public engagement can be found in Kearnes M, Macnaghten P and Wilsdon J, 2006, *Governing at the Nanoscale*, Demos, www.demos.co.uk

and deliberation. But they also reflect uncertainty about what this might look like.



Recommendations – as written by the four participants in the final session of the Research Councils’ Nanodialogue:

1. Science should be communicated in plain English. If the public are to be involved in science then they need to be able to understand it.
2. Science/Scientists should actively engage with the public. Science should come to the public as opposed to the other way round. Science should be transparent.
3. The public should be involved at all levels of the research process. Engagement, however, should be different at different levels of the research process.
4. We support the move for more public engagement on nanotechnology. But this needs to be informed by the latest science.

The experiment produced a conversation that was broadly optimistic about science. The discussion was not motivated by grand visions of promise or threat, which accounted in part for its slow acceleration. Rather group members acknowledged the importance of science’s ongoing exploration.

Upstream discussions can be constructive. Organisations can test the water and explore provisional issues. For science funders, however, this comfort presents a problem. They need to think through for themselves the value of public engagement. Such recommendations from members of the public are unlikely to make sense to Research Councils in such a desiccated form. There is a need for further interpretation and reflection.

What is clear, however, is that public engagement presents an opportunity to Research Councils, rather than a threat. There is an opportunity to engage people in new ways and to inject a new set of social insights into Research Council funded science.

Challenges and tensions

There are some challenges highlighted by our experiment that need to be thought through. Our experiment picked up on some challenges and tensions that are live within Research Councils and within university science in general. The increasing involvement of industry generates significant ambivalence: people are happy that science is useful and contributes to the economy, but concerned that agendas are driven by commercial interests. There was also concern that valuable knowledge

would be kept under wraps by companies. The openness of intellectual property was seen as an important value for science.

Though this concern is generic in nature⁹ it speaks to a understanding of the role and limits of public engagement. The participants were concerned about the role of public dialogue in the work of the Research Councils. Rather than simply being a down-stream activity, or the responsibility of funded scientists, they suggested that public engagement should be threaded through the councils' other work. If public engagement is just seen as a fringe activity, this will undermine their attempts to engage people. But they also realised that, within the Research Councils' decision-making, public engagement represents a complicated set of discussions.

The instinctive response of the groups was a desire for greater transparency and the need for some form of public conversation. It is this that instinct needs to be unpacked by the Research Councils. The demands made by participants for greater transparency and accountability represent recognition of the unique public value and significance of the research councils. Our conclusion offers some pointers for the next few years of Research Council engagement.

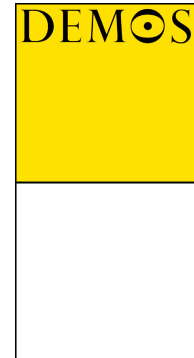
Swindon 2012 – Creating Engaging Research Councils

These areas of tension highlight the challenge of upstream public engagement. Future discussions of public engagement at the Research Councils need to be linked to discussions of where research agendas come from. Our preparatory interviews with scientists and Research Council officials revealed that there is still a lack of clarity about how such agendas are created. The traditional picture, in which funding is a mix of directed and responsive modes, needs to be coloured in to better represent the current state of science funding.

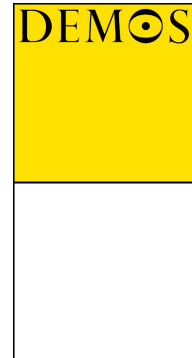
The assumption that Research Councils in responsive mode *simply* respond to the academic community's views of excellent science does not reflect the real world of science. It is clear that Research Councils play a crucial mediating role between central government and the research community and play an active role in the development of research priorities and objectives. Representatives of EPSRC acknowledged a more subtle role:

"We see ourselves as facilitators and encouragers. So even in responsive mode you can do all sorts of things to encourage new or different thinking. So for instance we might see it as appropriate to run a workshop in an area and I can guarantee that nine months after

⁹ This concern is a consistently reported feature of adverse public reactions to new technology. See Grove-White, R., Macnaghten, P. and Wynne, B. (2000) *Wising Up: The Public and New Technologies* (Lancaster, Lancaster University) and Kearnes M, Macnaghten P and Wilsdon J, 2006, *Governing at the Nanoscale*, Demos, www.demos.co.uk



we've held a workshop there would be an increase in responsive mode proposals in whatever the topic area of the workshop. That helps shaping the research. ... It's much more about saying to the community; 'Do you have a resonance here? Is there something we need to do? What would you do about it? How do we work together? ... We think we have some influence.'



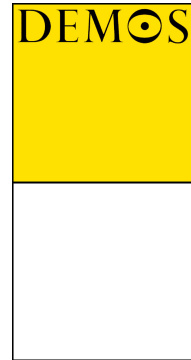
Research Councils need to develop a richer sense of their own roles, so that public engagement can be re-imagined. Once we understand that research priorities and agendas are developed iteratively by a range of people, we can see the Research Councils playing a crucial role in mediating and facilitating conversations. Acknowledging the complex way in which research priorities are negotiated, it would be possible to embed public engagement as a central Research Council activity by including members of the public in conversations about the future of research.

The research councils, particularly the BBSRC, have a strong track record in public dialogue. In addition to requirements for ethical reflection, both councils regularly engage in science communication activities and are active in encouraging funded scientists and laboratories to engage with members of the public. Naturally the focus of these activities is the social and ethical dimensions of currently funded science. So the research councils act as facilitators, enabling the assessment and broad public communication of funded science. This is to be commended, but the findings of our public engagement experiment suggest the need for additional public engagement linked to the role and function of the research councils themselves.

The groups agreed that although the work of the research councils was of low public visibility it was publicly significant and important. The potentially transformative implications of nanotechnology were a useful way of highlighting this. Though most of the participants were residents of Swindon, and knew of the existence of the research councils, most did not know how the research councils operated. As the conversation progressed many of the participants expressed a degree of surprise in relation to the importance of the work undertaken by the research councils. This suggests that Research Councils need to find new ways to include themselves in conversations between scientists and the public.

Brokers of Conversations

The first step therefore towards more productive public engagement is for the Research Councils to reflect on their own role between scientists, Government, industry and society. A standard view might see them as brokers of funding – linking scientific (bottom-up) demands with top-down policy directives and available money. More broadly, we would suggest they see themselves as *brokers of conversations* – conversations about money, conversations about science and conversations about public value.



As part of this broker status, we recommend that the BBSRC and EPSRC clarify their own role in these debates:

- Does response-mode funding really mean that they are just responding to excellent science?
- What role do they play in setting the agenda for science?
- How clear is the distinction between basic science and technology, especially in an area like nanotechnology?
- Are there tensions between funding what peers think is excellent science and what others think is valuable – economically, socially, ethically etc.?

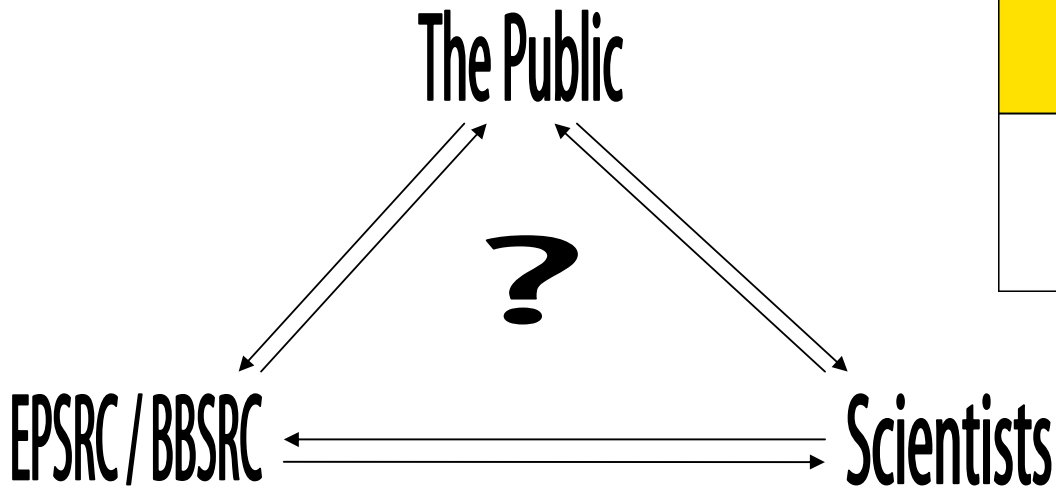
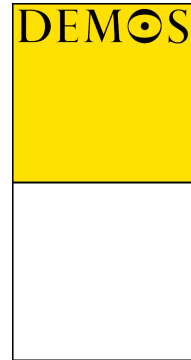
This will not be easy, and the Research Councils will face a similar challenge to that faced by scientists talking about basic research – it's not easy to say in public why they're doing what they're doing.

To help clarify this role, the EPSRC and BBSRC could invite an ethnographer to work within each council to explore employees' views of what Research Councils do. Prompted also by the work of the AEBC, this would be a step towards greater reflection of the Research Councils' potential roles as honest brokers of science and of conversations about science.¹⁰

A more open, staged conversation about science in its public context could take place within forums such as the EPSRC's "Ideas Factories." These are an opportunity for new upstream conversations about science, disrupting traditional funding processes, and making more explicit the conversations between scientists and funders. There is an opportunity for these to include discussions of ethics and public value as part of making decisions about excellent science. And there is an opportunity for the BBSRC to learn from these experimental, conversational forms of science funding, especially in the area of nanotechnology, that necessarily crosses disciplinary borders.

Throughout our dialogue experiment, we have imagined the conversations in which Research Councils are involved as a triangle. Our hope is that consideration of conversations along the triangle's sides is a useful tool of analysis for public engagement. The triangle also forces the question of what is going on in the middle. What value is produced with the combination of all 3 conversations? For rich, useful public engagement, the Research Councils must put themselves into the conversation between scientists and members of the public.

¹⁰ Agriculture and Environment Biotechnology Commission (AEBC) (2005) *op cit*

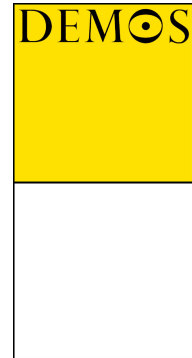


1.	RCs → The Public	Public communication, openness, web sites, information for schools, leaflets
2.	The Public → RCs	Formal accountability processes and consultation processes
3.	RCs → Scientists	Directed funding, also demands for engagement and ethical reflection
4.	Scientists → RCs	Responsive funding, Ideas factories, science workshops etc.
5.	Scientists → The Public	Traditional science communication
6.	The Public → Scientists	"Reflective engagement" - Learning from dialogue, exploring new areas of interest

All of these conversations, along all three sides of our triangle, provide value for public science. But individually they miss the bigger picture. Research Councils try to encourage conversations in all of these areas: the requirement that BBSRC scientists take part in some form of public engagement tries to broker conversation – of whatever sort – between scientists and the public. Research Councils should think about how well each conversation is going, as well as considering the middle of the triangle – conversations involving all three groups.

Given our previous discussion of the uncertain brokerage role of Research Councils, diversity of engagement should be seen as a good thing in itself. As our participants described, different engagement methods for the Research Councils will serve different ends. But individual scientists should be encouraged to innovate with different engagement methods. Some may excel at public lectures, some may want to go to a school and ask children what they think about science. Research Councils need to keep those scientists who want to engage engaging, and continue to give

them the resources to do so. At the same time, they should do their best to connect these conversations to Research Council work and other agendas.



Embedding engagement

Public engagement at the Research Councils has a long history rooted in science communication and the need for public accountability. As the Wolfendale report put it:

*"In principle, all who receive grants from public funds should accept a responsibility to explain to the general public what the grant is enabling, or has enabled them, to do and why it is important and how it fits into the broader area of knowledge."*¹¹

This model of "engagement for all" makes sense in an accountability/communication dominated model of public engagement. But it does not make for the best possible conversations about science. Not all science is of equal public interest, and not all scientists are equally able or willing to engage in conversations. This insight pushes us towards recommending that more active forms of engagement should be encouraged and supported for those scientists who are willing.¹² However, the question remains how to encourage all scientists to reflect on the social and ethical context of their work as part of the natural process of science. The track record and practical know-how of the Research Councils in science communication is an excellent base upon which to engage in a two-way dialogue with the public. This suggests that Research Councils need to encourage conversations to connect at each side of the triangle. This will also allow them to continue their leadership in public engagement, transferring learning upwards to the OSI/DTI and outwards to researchers, universities and other funders of science.

The BBSRC's Bioscience for society strategy panel and the EPSRC's newly-created Societal Issues Panel are necessary sites for the injection of public values into science. But our participants thought they were not sufficient as they currently stood:

"I don't know how to put this really, they could start getting their own focus and then just keep going for that as opposed to thinking around other issues. I don't know if that happens or not."

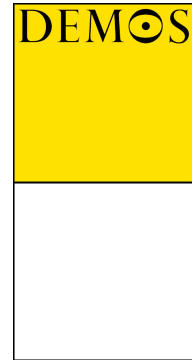
"The panel, the strategic society panel, I don't really feel that's public, not really... They're, I think they're perhaps a little bit removed from, if

¹¹ Wolfendale Committee, 1995, Final Report, Office of Science and Technology

¹² Support, encouragement and opportunities are particularly important given the recent findings of the Royal Society Survey that highlight the cultural and institutional barriers to engagement. See Royal Society, June 2006, "Factors affecting Science Communication"

<http://www.royalsoc.ac.uk/downloaddoc.asp?id=3052>

they're all basing on quite a high level all the time, you think they're a little bit removed from ... And ethics is, anybody can be involved in that, anybody can say, well, that doesn't seem right for this reason, or that reason, you don't have to be a scientist to say that, so yeah, I do think there needs to be some sort of, I don't know, some involvement of somebody, some group saying how about this? How about that? People that aren't scientists."



There are many ways of interpreting this call for greater public involvement and a wider remit for existing processes. It is evidence of a demand for transparency and openness. Beyond this instinctive response, this call speaks of a need to embed public engagement not simply in existing processes for ethical appraisal, but more centrally in decisions over research funding.

Discussion of these social and ethical panels, which are a welcome recent effort by Research Councils to inject broader questions into science, point to deeper tensions uncovered by our experiment. The BBSRC and EPSRC need to better appreciate these tensions in their position and their work – between government and scientists, between responding and directing, between publicly- and industrially-funded science, between demanding and encouraging engagement. Upstream is a complicated space in which to talk. It demands new processes, new cultures and new ways of thinking. Research Councils must look for new ways to assert their public value and the public value of science. We therefore end this report as we ended our dialogue – with more questions than answers. Our experiment has demonstrated that, in the context of early-stage research, dialogue is not good at answering these questions. But it can help focus on the challenge. These are the questions that could drive the next phase of Research Councils' upstream public engagement.

- How can Research Councils draw out value from the public engagement activity that is already going on? What can they and their scientists learn from informal and individual engagement?
- Diversity is valuable in public engagement. But what sorts of value can be gained from different levels of engagement, in different contexts and with different groups?
- As major funders of public science, how can Research Councils seed and lead new conversations about science and its public value?
- How can the Research Councils encourage innovation in engagement, from scientists, within the Research Councils and with the help of intermediaries?
- How can Research Councils listen to and interpret engagement in a new way, as well as just doing it?
- How can public engagement move from being something that happens to science to something that science and scientists do?
- At the broadest level, how can Research Councils make public engagement make sense to themselves and use it to help redefine what they do?

NANOTECHNOLOGY

Nanotechnology is defined as a technology in which dimensions and tolerances in the range 100nm to 0.1nm play a critical role.

Potential to produce smaller, lighter, cheaper and faster devices with greater functionality, which use fewer raw materials and less energy.

There are issues about its application which will need to be carefully considered and publicly debated.

Figure 2.1 Length scale showing the nanosphere in context. The length scale at the top ranges from 1m to 10⁻¹⁰m, and illustrates the size of the football compared to a carbon 60 C₆₀ molecule, also known as a buckyball. For comparison the world is approximately one thousand million times larger than a football, which is in turn one hundred million times larger than a buckyball. The section from 10⁻¹⁰m to 10⁻⁹m is expanded below. The length scale of interest for nanotechnology and nanobiotechnology is from 100nm down to the atomic scale - approximately 0.1nm.

Current Research

"Tissue engineering is part of a brave new world of biomedicine in which our scientific understanding of how living cells function will enable us to gain control and direct their activity to promote the repair of damaged and diseased tissues."

Much of the research is at the interface between the life and physical sciences. This includes: lab-on-a-chip and smart sensors for medical and environmental monitoring and diagnosis; tissue repair; targeted drug delivery.

Nano-electronics in which nanostructures are used to produce improved optical, electronic or magnetic properties.

Molecules that act like conventional computers but can operate in tiny places where no silicon-based chip or semiconductor can go. Molecules can also be used as information processors in medical and other applications.

Research Funding

EPSRC: Engineering and Physical Sciences Research Council - the main UK government agency for funding research and training in engineering and the physical sciences.

BBSRC: The Biotechnology and Biological Sciences Research Council is the UK's principal funder of basic and strategic biological research.



Non-departmental public bodies supported through the Science Budget by the Department of Trade and Industry.

Nanotechnology related funding £200mil