



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Dialogue and science: Innovation in policy-making and the discourse of public engagement in the UK

Citation for published version:

Pieczka, M & Escobar, O 2013, 'Dialogue and science: Innovation in policy-making and the discourse of public engagement in the UK', *Science and Public Policy*, vol. 40, no. 1, pp. 113-126.
<https://doi.org/10.1093/scipol/scs073>

Digital Object Identifier (DOI):

[10.1093/scipol/scs073](https://doi.org/10.1093/scipol/scs073)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Science and Public Policy

Publisher Rights Statement:

This is a pre-copyedited, author-produced PDF of an article accepted for publication in Science and Public Policy following peer review. The version of record 'Pieczka, M., & Escobar, O. (2013). Dialogue and science: Innovation in policy-making and the discourse of public engagement in the UK. Science and Public Policy, 40(1), 113-126.' is available online at: <http://doi.org/10.1093/scipol/scs073>

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Dialogue and Science:

Innovation in policy making and the discourse of public engagement in the UK

Magda Pieczka (Queen Margaret University)

and Oliver Escobar (University of Edinburgh)

Corresponding author:

Oliver Escobar, Public Policy Network, School of Social and Political Science, University of Edinburgh, 21 George Square, Edinburgh, EH8 9LD, Scotland (UK) oliver.escobar@ed.ac.uk

Abstract

This article examines the way in which innovation in science policy in the UK over the last 25 years has been built around a discourse of changing preference for modes of communication with citizens. The discussion, framed in debates and developments that deal with deliberative democracy and public engagement, draws on discourse analysis of key policy documents, statements made by members of the science policy network, and on interviews with public engagement practitioners.

The relationship between science and society emerges as a 25-year old project of crisis management organised into three distinct models: Public Understanding of Science (PUS), Public Engagement, and Public Dialogue. The analysis questions the existing narrative of progress and evolution constructed around key switch points, highlights the overwhelming influence of PUS approaches, and attends to the question of the viability of Public Dialogue as the mainstream activity in science communication and policy making.

Key words: science and society policy, science communication, public engagement, dialogue, practitioners

1. Introduction

This paper examines the way in which innovation in science policy making over the last 25 years has been built around a discourse of changing preference for modes of communication with citizens. We frame this interest in debates and developments that deal with deliberative democracy and public engagement and focus on the case of science policy in the UK since 1985. Our approach is to confront the normative drive in policy making towards public engagement and dialogue, and the resulting institutional efforts (policy discourse), with a view taken on the ground, that is, as seen and experienced by public engagement practitioners (practitioner discourse), in order to reflect on what the policy drive has produced.

2. Governance through public dialogue and deliberation

The demand for direct citizen participation in policy making has grown steadily, underpinned by the idea that a more participatory democracy can complement and strengthen representative institutions, as well as reduce the democratic deficits caused by technocratic governance (Barber, 2003; Fischer, 2000, 2003, 2009; Fung, 2008). The terms dialogue and deliberation¹ are often used interchangeably as part of the rhetoric of public engagement. Public dialogue, rather than deliberation, seems the preferred term in Britain.

The heightened interest in public participation reflects a quest for ways of harnessing collective intelligence as well as achieving public legitimacy that encompasses trust

¹ In communication scholarship, 'dialogue' focuses on reciprocal understanding and relationship building, whereas 'deliberation' is geared towards debating alternatives and making decisions (see Escobar, 2009, 2011; Anderson *et al*, 2004). However, both concepts are conflated in the notion of 'public dialogue' explored in this paper.

and compliance². Firstly, public deliberation can foster social intelligence capable of bearing on the wicked problems that confront our democracies (Fischer, 2000). Secondly, it can infuse legitimacy into the policy making process, thus counteracting democratic deficits (Fischer, 2009) which, coupled with public mistrust, threaten the legitimacy of the institutional system (Dogan, 2005). All in all, the joint effort by normative and practice-oriented scholars (e.g. Bohman, 1996; Dryzek, 2002; Smith, 2009; Gastil, 2008; Hajer and Wagenaar, 2003; Innes and Booher, 2010) as well as their critics (e.g. Young 2002; Mutz, 2007) has moved the focus from normative discussion to empirical research.

2.1 A global trend

Although this study focuses on science policy in UK, our interest in public engagement (PE) cannot be disconnected from a wider, global trend towards citizen participation. For instance, practices such as *participatory budgeting*, which empowers citizens to allocate public expenditure, have spread globally to the point that some countries are passing statutory legislation in order to institutionalise it (Fischer, 2009, p.75). In Britain, the former Labour Government set out to “encourage every local authority to use such schemes” by 2012 (CLG, 2008, p.5). *Consensus conferences* and the use of various *mini-publics* are also popular in Europe (Fischer 2009, pp. 93-7; Smith, 2009) and participatory processes proliferate around the world as part of what Dryzek (2010) has called the empirical turn of deliberative democracy, e.g.: Canada (Warren and Pearse, 2008), China and India (Cornwall, 2008), and USA (Ryfe, 2002; Spano, 2001).

² E.g. The Organization for Economic Cooperation and Development advocates policy dialogue to ‘raise the quality of policies by gaining access to new sources of information [...] raise [...] the chances for successful implementation, reinforce the legitimacy of the decision-making process, increasing [...] voluntary compliance, [and] new forms of partnership’ (OECD 2001, p.22)

Since 2001, the Organization for Economic Cooperation and Development has been an outspoken supporter of citizen participation through a series of initiatives (OECD 2001, 2003, 2008). Judging by the constant reference to OECD reports in UK policy literature, it can be argued that it has bedded well in British PE rhetoric. Many British think-tanks have also been attentive to international developments (i.e. NEF, 1998; Smith, 2005). There has been a constant transfer of ideas, as well as of training expertise from organisations providing services across the globe³.

2.2 Public Engagement (PE) in Britain

In Britain, PE operates as a catch-all term, including practices such as dissemination, consultation, dialogue and deliberation. The current discourse is often framed as part of New Labour's master narratives on community empowerment and citizen participation (Barnes *et al*, 2007), particularly in three policy areas: local governance, National Health Service (NHS), and science and technology.

PE has been used since the early 1990s in local community development and planning (Involve, 2005; NEF, 1998). Multiple policy documents have been produced by central government departments (e.g. Department for Communities and Local Government, 2002; Cabinet Office, 2002; Communities and Local Government, 2008) offering the rationale, frameworks and techniques for embedding citizen engagement in policy making culture. A similar discourse has emerged strongly in the

³ An example is IAP2 (International Association for Public Participation) which offers Certificates in Public Participation (IAP2 2006) often taught by consultants: 'In the UK, over 30 organisations have benefited from undertaking the IAP2 training [...], including the Scottish Executive, Communities Scotland, [...] the Environment Agency, Department for Transport, Department for Communities and Local Government, Department of Educational and Social Services, [...] and other health and education providers.' (Hilton Associates, 2009)

NHS. Two policy documents testify to this: *The NHS improvement plan* (Department of Health, 2004) which understands involvement as the “statutory duty” of consultation (p.78); and *Real involvement* (Department of Health, 2008) which provides guidance on deliberative methods and stresses the need to “develop an ongoing dialogue or relationship with the community [...] and build trust and confidence” (p.50).

Scotland, where most of our interview data were gathered, shows similar trends. Since the Scottish Executive launched *Listening to communities* in 1999 (Clarke, 2002, p. 35), we have seen a consistent replication of the discourses and policies noted above. There has been no overall change with Scottish National Party’s arrival to power in 2007, although it is worth noting that SNP’s plans (Scottish Government, 2009) emphasise three themes: capacity building, user participation, and service delivery, showing a turn towards a managerialist way of thinking about engagement, a point that we make later about science policy too.

The purpose of this introductory discussion was to contextualise the role of communication in science policy in UK by showing its links to ideas, discourses and practices circulated both internationally and across a range of policy areas within UK. Thus science communication is seen alongside trends, practices, and debates beyond the domain of science and technology in order to argue that despite its own set of specific problems to be solved, the solutions are not unique to this area but draw on fashionable ideas put to work elsewhere, i.e. public dialogue and deliberation.

3. Communication and science policy in the UK 1985-2010

Science policy is understood here as “public policy governing matters of science [...] including research, development, regulation and overall support of the national scientific community” (Neal *et al*, 2008, p.9). Our discussion focuses on one aspect of this field, namely on “policy for science” (Barke, 1986, p.4) and specifically on the role communication plays in shaping the relationship between science and society. We therefore follow up what policy statements have had to say about science, society, and science *and* society. Specifically, we examine the area covered by terms such as *communication*, *public understanding*, *public engagement* and *dialogue*. How this issue is approached changes over time, as does the language used and, more broadly, the policy discourse.

Our analysis is grounded in the concept of discourse as a form of social practice, understood in the way Fairclough and Wodak define it, as “a dialectical relationship between a particular discursive event and the situation(s), institution(s) and social structure(s) that frame it.” (1997, p. 258) This approach thus allows us to follow the reciprocal connections between the linguistic (ways of talking and thinking) and non-linguistic (ways of acting) elements in science policy. Changes in the philosophy and practice of science communication we analyse below have been discussed in the literature before (Horst, 2008; Cheng *et al*, 2008; Holliman *et al*, 2009, Bauer and Gregory, 2007). Our contribution to this discussion is to provide more systematic detail of the science policy discourse, to relate it to science communication practice and its institutional existence, as well as to take the story further in time, to the cut off point offered by the election of a new UK coalition government in 2010.

Policy dealing with science extends to a number of sectors and government departments: e.g. education, business, innovation, health; therefore the range of statements, policy actions and their outcomes is vast. For the purpose of this analysis, a sequence of key policy documents originating from members of the science policy network has been identified covering 1985-March 2010, the last statement on the matter coming from the outgoing UK Labour government (see Figure 1). The documents have been analysed to identify their main discursive features. We follow Dryzek's (2005) approach, developed in the context of environmental policy, which is based on four characteristics of the text—basic entities recognized or constructed, assumptions about natural relations that govern the world created by the discourse, agents and their motives, and key metaphors and other rhetorical devices—to allow us to connect language, values and ways of understanding the world, with tangible policy outcomes, for example to do with the funding of research.

Figure 1: Key documents analysed

- Royal Society (1985) *Public understanding of science* ["Bodmer report"]
- Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology (1995) *Report* ["Wolfendale report" for the Office of Science and Technology of the British Government]
- House of Lords (2000) *Science and Society*
- Hargreaves, I. and Ferguson, G. (2000) *Who's misunderstanding whom? Bridging the gulf of understanding between the public, the media, and science* [commissioned by the UK Economic and Social Research Council]
- POST (2001) *Open Channels: Public dialogue in science and technology* [Parliamentary Office of Science and Technology]
- POST (2002) *Public dialogue on science and technology* [Parliamentary Office of Science and Technology]

- Research Councils UK (2002) *Dialogue with the public: practical guidelines* [commissioned by Research Councils UK and the Office of Science and Technology from People Science & Policy Ltd & Taylor Nelson Sofres]
- Roberts, G. (April 2002) *SET for success: the supply of people with science, technology engineering and mathematical skills* [published by Her Majesty's Treasury]
- Council for Science and Technology (2005) *Policy through dialogue: informing policies based on science and technology*
- Wilsdon, J., Wynne, B. and Stilgoe, J. (2005) *The public value of science* [published by Demos]
- Lord Sainsbury (October 2007) *The race to the top: A review of Government's Science and Innovation policies* [published by Her Majesty's Stationary Office]
- Department of Innovation, Universities and Skills (July 2008) *A vision for Science and Society* [Consultation]
- Science for All Expert Group (2010) *Report and action plan from the Science for All Expert Group* [Report for the Department of Business, Innovation and Skills]
- Science and Trust Expert Group (2010) *Starting a national conversation about good science* [Report for the Department of Business, Innovation and Skills]

There is a widely circulating narrative of the origins of public engagement with science in the UK, which seems to be drawn from the account produced by the House of Lords (2000) *Science and Society* report (see Hargreaves and Ferguson, 2000; Blakemore, 2002; Council for Science and Technology, 2005; Rowe *et al* 2005, pp.332-3; Lengwiller, 2008, pp.194-5; Burchell *et al*, 2009; Irwin, 2009; Stilgoe and Wilsdon 2009). The Bodmer report (Royal Society, 1985) is usually seen as the starting point in the chain of policy statements and initiatives. While acknowledging the foundational role of the Public Understanding of Science (PUS) efforts that followed from the Bodmer report, this popular narrative will typically go on to list a number of controversies over science, for example:

...public disillusionment [with] the scientific advisory process regarding AIDs, mad cow disease BSE and the associated variant of CJD in humans [...]. GM food ...controversy over cloning ... MMR vaccine.... (Blakemore, 2002, p.216),

in order to highlight the resulting public lack of trust in science. At this point, the well-rehearsed story normally refers to the *Science and Society* report (House of Lords, 2000) as the key moment of change.

The House of Lords identified a “crisis of confidence” and called for “more and better dialogue”. [As a result, scientists] have adopted new, and better, models of science communication. There is a growing confidence that lessons have been learned. (Wilsdon *et al*, 2005, p.16)

In fact, the story is more complex and, as we shall demonstrate, weaves together three discursive shifts, with threads of continued development, and subtler readjustments in both language and philosophy. For ease of discussion, we offer a rough subdivision into two periods ---1985-2000, with public understanding of science (PUS) as the dominant discourse, and 2000-2010 dominated by the public engagement (PE) discourse, with public dialogue (PD) as a model articulated more fully in the latter part of that second period --- and overlay the chronological with thematic analysis in the three sections that follow: change, continuity, and the meaning of dialogue.

3.1 Change

The central point of change in our discussion is marked by the *Science and Society* report (House of Lords, 2000) and the shift in the identification of the key problem--- from lack of public knowledge about science and its methods to a crisis of trust in science:

It is argued that the words [public understanding of science] imply a condescending assumption that any difficulties in the relationship between science and society are due entirely to ignorance and misunderstanding on the part of the public; [...] as Sir Aaron Klug put it..., “Engagement with society is a two-way process, involving dialogue between different (though not necessarily opposing) sets of values.” (House of Lords, 2000, paragraph 3.9)

PUS and PE thus become distinct policy positions as well as distinct communication practices, inseparable from sets of values and ways of reading the world in which scientists operate. Comparing the discourses of the Wolfendale report (Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, 1995; see Figure 2) and the House of Lords report (2000; see Figure 3) offers a good illustration of the nature of the change.

The Wolfendale report presents the world as consisting primarily of institutions such as COPUS (Committee on the Public Understanding of Science), the Royal Society, British Science Association, Research Councils UK, universities, and professional bodies. People appear only as parts of those institutions: researchers, or students. In the backdrop, we see a sketchy picture where we find “society”, “companies”, “the general public”, and “nations”. The world is also split into discrete domains of private and public activity, and scientific and non-scientific activity. Science is understood as a number of traditional disciplines, such as mathematics and natural sciences. It is also constructed as fundamentally beyond the reach of the “general public” who need to be taught how to “appreciate” and understand it. This world is governed by hierarchical, bureaucratic relationships, where scientific elites are needed to lead the general public. It is also a world where the key value is “national wealth and

wellbeing” (paragraph 1.3), i.e. economically driven prosperity enabled by instrumental knowledge, and measured at the level of a state/nation.

Figure 2: Summary of key recommendations in the Wolfendale report (Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology, 1995)

- “Duty to explain their work to the general public” instrumentalised through criteria attached to grant funding
- Communication skills training at all level in Higher Education Institutions
- Reshaping COPUS (Committee on the Public Understanding of Science) to broader scope
- Office of Science and Technology (OST) to study present levels of understanding through attitude surveys
- OST to commission best practice guides

Science and Society (House of Lords, 2000) takes a different view. The world is seen as primarily the world of “people”, gadgets and processes that apply science to everyday lives (x rays, refrigerators, kidney machines). It is a world of complexities and controversies surrounding judgments which people have to come to, for example as consumers around issues such as GM foods. Other controversial issues mentioned are therapeutic cloning, food irradiation, and deep-sea disposal of offshore installations (paragraph 1.11). The backdrop to this world teeming with controversy and uncertainty is, on the one hand, the institutional landscape (of Research Councils, OST, COPUS, Research Academic Exercise) and of history, on the other hand. Thus confusion and controversy are far from being a modern crisis, and are presented, at least partly, as the natural history of public acceptance of innovation (paragraph 1.8).

The sharp division between the world of science and the “general public” in the Wolfendale report (Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology, 1995) has been replaced by a vision of the world in which scientists, and policy makers, are people as well, as the report puts it:

[S]cience is conducted and applied by individuals; as individuals and as a collection of professions, scientists must have morality and values, and must be allowed and indeed expected to apply them to their work and its applications. By declaring openly the values which underpin their work, and by engaging with the values and attitudes of the public, they are far more likely to command public support. (House of Lords, 2000, paragraph 2.66)

Gone is the elitist technocratic view of society, instead the plane of engagement is that of democratic citizenship and egalitarian pluralism, where scientific rationality is pushed back to make room for other kinds of reason. The way in which this is to be managed is dialogue (House of Lords, 2000, chapter 5).

Figure 3: Summary of key recommendations in the *Science and Society* report (House of Lords, 2000).

- Continued funding for COPUS (Committee on the Public Understanding of Science); COPUS to lead on public dialogue
- Attitude of openness: access to internal working and sharing of findings and work
- Communicating risk
- Routine engagement through various dialogue methods (“a mood for dialogue”)
- Setting up promotional infrastructure to support communication of research in universities and other bodies
- Continuing recommendations from Wolfendale report (Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology, 1995) on training of scientists to communicate (in particular with the media); funding councils to reward successful public

communication (to “wider audience”); information portal; funding for women in science initiatives

- Supporting education

3.2 Continuity

Despite the overwhelming emphasis on change, there is much evidence of continuity in science policy over the last 25 years, in a number of areas: institutions, problems, the view of science as an engine of national wellbeing, and self-reflexivity expressed through focus on communication as a way of reshaping both policy making and the relationship of science and society.

The most visible example of continuity is to be found in institutional developments, that is, action taken outside the symbolic level of discourse we have discussed earlier. For example, the Committee on the Public Understanding of Science (COPUS) established in 1985 by the Royal Society, the Royal Institution, and the British Association for the Advancement of Science was seen as a key player by later reviews of the area and its remit was subsequently expanded (see Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology, 1995; House of Lords, 2000).

The scientists’ “duty to communicate with the public” articulated in the Bodmer report (Royal Society, 1985, p.6) is reaffirmed in later documents. The Wolfendale report speaks of scientists’ “duty to explain their work to the general public” (Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology, 1995, paragraph 7.5) and indicates ways in which this could be developed, most importantly from our point of

view, “training and provision in communication skills” (paragraphs 3.3-3.5) as well as linking research grants to requirement of public engagement (paragraphs 3.1-3.2) alongside other incentives (paragraph 3.6-3.8). The Roberts’ review (2002, paragraph 0.44) recommended extended training in transferrable skills, which was funded by the government of the time to the tune of £1.25 billion over four years (Department of Trade and Industry, 15 July 2002) and provided funding for communication, and public engagement training for PhD students (see Figure 4).

Figure 4: Summary of Roberts’ review

- Reviews and recommends changes to all levels of education
- Reviews factors that affect availability of scientists, e.g. labour market, conditions of employment
- Recommendation “4.2 PhD training”: provide funding for two weeks a year of transferrable skills training (including communication skills)
- Focus on evidence emerging from the sector of education,
- The opening four paragraphs set the scene by focusing on the logic of the economy and the market with references to UK’s “productivity and innovation performance”, “survival and growth of businesses”, and “consumer-led demand [as] a powerful motivator in the production and development of novel products and services” (paragraph 0.5)

Despite the emphasis on dramatic change in the science/society relationship, the effort to frame the public understanding of science in terms of economy and nation endures beyond 2000. As Burchell *et al* put it, “[a] kind of national moral purpose was seen to be served by improving the quality of public and private decision-making...” (2009, p. 9).

3.3 The meaning of dialogue

The period of about five years following the publication of the House of Lords report (2000-2005) can be seen as the first phase of the proposed “cultural shift” (POST, 2001, p.7) and is characterised by an intense diffusion of knowledge about dialogue and the practical applications of deliberative tools, with some key documents coming out in 2005⁴. It is followed by a phase, starting around 2008, focused on institutional tooling up for dialogue. Two important projects were established in that year, following decisions made about funding around 2006: Sciencewise, Expert Resource Centre for Public Dialogue in Science and Innovation, funded by DIUS (Department of Innovation, Universities and Skills); and Beacons for Public Engagement, funded by UK Higher Education Funding Councils, Research Councils UK and the Wellcome Trust (see Figure 5 for examples of dialogue initiatives). Some key statements which mark this latest period are the DIUS/BIS⁵ consultation document, *A vision for Science and Society* (Department of Innovation, Universities and Skills, July 2008) and its follow up, the Science and Trust Expert Group (2010) report, *Starting a national conversation about good science*. The meaning of dialogue thus becomes a key site for discursive change in the last decade.

Figure 5: Examples of PE/PD projects, networks and funders in the UK

1998-	• <i>Café Scientifique</i> (local sponsors; Wellcome Trust 2002-2005)
2001-	• PEALS <i>Dialogues</i> (Policy, Ethics and Life Sciences Research Centre)
2001-5	• Royal Society <i>Dialogue Programme</i>

⁴ In 2005 Research Councils UK established its Science in Society Unit ‘to raise public awareness and engagement in science and innovation’ (RCUK, *Science in Society*, brochure retrieved on May 2010 from www.rcuk.ac.uk/cmsweb/downloads/rcuk/scisoc/sisbrochure.pdf) later renamed as Public Engagement with Research.

⁵ Department for Business, Innovation and Science (BIS) was created in June 2009 by merging Department for Innovation, Universities and Skills (DIUS) and Department for Business, Enterprise and Regulatory Reform (BERR).

2002-	<ul style="list-style-type: none"> • ESRC <i>Genomics Network</i> (Economic and Social Research Council) • <i>Engaging Science Programme</i> (Wellcome Trust) • <i>DEMOCS</i> game -Deliberative Meetings of Citizens (New Economics Foundation)
2003	<ul style="list-style-type: none"> • <i>GM Nation? Debate</i> (UK Government)
2005-	<ul style="list-style-type: none"> • <i>Sciencewise Programme</i> (DIUS / BIS, Department for Business, Innovations and Skills) • Research Councils UK <i>Public Engagement with Research Team</i>
2006-	<ul style="list-style-type: none"> • <i>Science Engagement Programme</i> (Scottish Government)
2007	<ul style="list-style-type: none"> • <i>Sciencehorizons</i> (Department for Business, Innovations and Skills)
2008-	<ul style="list-style-type: none"> • <i>Sciencewise –Expert Resource Centre for Public Dialogue</i> (Department for Business, Innovations and Skills) • <i>National Coordinating Centre for Public Engagement</i> and the 6 UK <i>Beacons for Public Engagement</i> (UK Higher Education Funding Councils, Research Councils UK, Wellcome Trust) • <i>Gengage</i>, Scottish Healthcare Genetics Public Engagement Network (Scottish Government)
2009-	<ul style="list-style-type: none"> • <i>Engaging Scotland</i> (Scottish Funding Council) • <i>Dialogue Academy</i> (UK Association for Science and Technology Centres, Wellcome Trust, Glasgow Science Centre, At Bristol, Life Science Centre, Thinktank, The Living Rainforest) • <i>Edinburgh Beltane Dialogue Training Programme</i> (UK Beacons for Public Engagement)

The two early documents, *Open channels* (POST, 2001) and *Dialogue with the public* (Research Councils UK, 2002), acknowledge the House of Lords (2000) report as their starting point, the latter more directly so, explaining that the guidelines have been produced with the express purpose of addressing the report’s call for making direct dialogue with the public a “normal and integral part of the [policy making] process” (Research Councils UK, 2002, p.1). Both documents focus extensively on teaching the techniques of dialogue --- and provide many case studies of dialogues

such as UK national consensus conferences on plant biotechnology in 1994, nuclear waste management in 1999 --- including guidelines on costs, planning, skills needed, and objectives-setting. In this sense, they clearly add to and continue the discussion of dialogue methods in chapter 5 of *Science and Society* (House of Lords, 2000).

Although in broad terms, the philosophy, actors, and values apparent in these two early documents are not fundamentally different from those discussed in *Science and Society* (House of Lords, 2000), there are two points of notable development.

Firstly, dialogue is discussed not only in relation to science, but the starting point for the discussion is the crisis of trust in government and democratic institutions more generally, referred to as “the democratic deficit” (POST, 2001, p.3). The argument put forward by this report proceeds from a broad basis and justifies dialogue both as the defence of the principle of democracy and a reform of the way in which it is put into practice: “There are two main reasons put forward as to why dialogue has been developing rapidly in recent years: supporting democracy [and] making better decisions” (p. 3). Thus the understanding of the core issue for science policy changes: the problem is no longer the distinct expert nature of science; rather, science, like other policy areas, is now seen primarily as a battleground for the shape of contemporary democracy.

Secondly, the way in which dialogue is framed --- some of the vocabulary and the preoccupation it reveals --- turns it into a business-like, managerial approach. There is talk about “building the capacity for increasing public involvement” (POST, 2001, p. 4); about legitimacy and the need to earn trust; and about increasing the sense of “ownership” of decision-making (p.7). *Policy through dialogue* (Council for Science

and Technology, 2005) makes the business framing unmistakably explicit: with “stakeholders” now as the name used for those who must be engaged with by government; mechanisms for “ministerial ‘buy-in’ to the purpose of any dialogue process” as one of the recommendations; and “returns on the government’s ten-year investment framework” as the starting point of the report. This report is very explicit about its agenda: the first steps on the road to using dialogue to “command public and stakeholder confidence” have been taken, and now mechanisms are required to imbed this culture change. Much of the report lays out such mechanisms: clarifying its purpose “not to determine but inform policy... government must retain responsibility for decision making” (paragraph 14); offering a five-point framework for managing dialogue, which starts with identifying emerging issues, ministerial buy-in, structure of governance (which now will have sponsors, directors and contractors), resourcing, and evaluation. In short, dialogue becomes an issues management technique and plays a role similar to that of Corporate Social Responsibility (CSR) in the business context, i.e. re-constructing public legitimacy, in this case, of science (Pieczka, 2002).

The last policy statements on science and society before the 2010 change of government were made in reports from the five expert groups carving up the territory into Science and the Media, Science for Careers, Science and Learning, Science for All, and Science and Trust. Public engagement is covered by the last two expert group reports. The area is divided into the more traditional sense of public engagement as constructed since 1985 out of the PUS agenda by a range of public outreach methods (Science for All Expert Group, 2010), and the post-2000 preoccupation with risk, uncertainty, trust, and a more complex view of “the public” dealt with through dialogue (Science and Trust Expert Group, 2010). Thus again we see an approach

which continues some lines of thinking and acting, repositions some ideas, and makes a more radical gesture of challenging elements of the established discourse.

The preoccupation with explaining/understanding risk and uncertainty, tracking public attitudes, as well as ensuring access to science and discussion about science for both policy makers and “the public” is an interest that goes back to *Science and Society* (House of Lords, 2000) and even back to 1985. Bringing evaluation to the forefront of the activity, as well as drawing “business” into the core of the recommendations is a development of themes that have been introduced post 2000. The same is true about the main aim guiding the group’s work: “[enhancing] society’s capabilities to make better-informed judgments about the sciences and their uses in order to ensure that ‘the licence to operate’ is socially robust” (Science and Trust Expert Group, 2010, p.3).

As we have seen, recasting scientific activity in business management terms started gaining impetus in policy documents around 2005 but was promoted to the headline position in the last policy gestures of the outgoing Labour government in 2010. If the categories in which the world is perceived have not changed by 2010, with science being framed yet again in terms of “the economic destiny of nations as well as well-being of individuals as we move towards an increasingly knowledge-driven economy” (Science and Trust Expert Group, p.5), the new, dramatic gesture is to “reject the idea of a ‘crisis of trust’ in science” (p.3) and to lay a claim to being “among the world’s leading nations ...in public dialogue” (p.4).

It would seem that after several years of experimentation with dialogues and rethinking of the role of scientists, citizens and policy makers, the dust has settled: the

control is firmly reclaimed by the state, and the new technology for policy making --- dialogue--- is reclaimed by the state's technical cadre. Public dialogue thus appears as the cutting-edge expertise in managing the science and society relationship, whereas conventional public engagement remains as the more established field of traditional activities concerned with education and awareness-raising in general. Public dialogue becomes also a sign of confidence and democratic prowess of the state.

4. Public engagement practice

Public engagement discourse emerges from our discussion so far as strategic and effective: it offers a coherent argument about the role of science in society and appears to be translated into action by institutions and individuals in the field of science. However, the effectiveness of this discourse cannot be accepted on its own word; it needs to be confronted with public engagement practice. In order to understand what is involved in public engagement with science, how the practice is conducted and organised, and how the shape of the field can be understood in relation to policy efforts, we conducted 28 semi-structured qualitative interviews with public engagement practitioners working in a broad range of science and technology fields and organisations. The interviews took place in Scotland between January and March 2010 and included people engaged in PE activities at Scottish and UK level either as an element or as the key activity of their job.

In terms of sampling, we followed a snowballing strategy, recruiting research participants through established PE networks and communities of practice (e.g. UK

Beacons for Public Engagement⁶, UK ESRC Genomics Network⁷, Gengage⁸). The interviews produced 32 hours of audio data, which was analysed and thematically coded using the qualitative research software Nvivo 8. We settled on 28 interviews as the point at which our sample seemed to reach theoretical saturation; that is, when the testimonies and arguments began to be reiterative without offering new emerging themes.

Our interviewees included: research scientists employed in a number of universities and research institutes; science communicators employed by universities and other organisations such as the Royal Botanic Gardens or Edinburgh International Science Festival, and self employed practitioners; as well as policy makers, training organisers, and project managers. We granted anonymity to our interviewees as part of the research terms of engagement. Nevertheless, in Appendix 1 we provide a list indicating their area of work and type of job in order to show the breath of fields covered, as well as the variety of posts at various levels of activity and seniority within educational, research, public outreach and policy making settings. Many interviewees, however, hold a number of overlapping roles within their PE context – i.e. they may organise PE, deliver PE training and also sit on PE advisory or policy making bodies. In the following sections we discuss some of our interview findings in relation to themes identified in our previous analysis of policy documents.

4.1 Institutionalisation and professionalisation of PE

Policy documents on science and society position public engagement as crucial to

⁶ www.publicengagement.ac.uk/about/beacons

⁷ www.genomicsnetwork.ac.uk/forum

⁸ www.gengage.org.uk

managing the relationship, yet there is very little research on “the people who professionally attend to science communication” (Nielsen, 2010, p.1). Even in the better-researched area of studies investigating scientists’ involvement in public engagement, there is a fairly modest amount of published research (Bauer and Jensen, 2011). Although PE, like science communication, is often seen as the domain of scientists (Burchell *et al*, 2009), there are, in fact, three distinct groups of PE practitioners: scientists, science communicators, and consultants (for a more detailed account see Pieczka and Escobar, 2010).

In the case of scientists, the prevailing mindset for engagement is that of PUS (Public Understanding of Science), which translates into outreach skills and activities (e.g. public lectures, workshops). For this group, it is mostly a matter of personal choice and inclination, although there is also a clear sense of culture change in academic institutions, with outreach activities being seen as more acceptable now.

Science communicators are considered by our interviewees as *the* public engagement professionals. This group consists of people ---employed by universities or other institutions--- who either combine research with popularising science or focus exclusively on the latter. There is no single pattern of contractual arrangements: posts might be 100% funded for PE, they may combine teaching or research with a PE element (e.g. ESRC Fellowships), some practitioners are partly self-employed, and many operate on the basis of securing grants. These professional *engagers*, as we like to think of them (Pieczka and Escobar, 2010), typically combine science and teaching backgrounds, and many have also worked as research scientists before choosing to focus on PE. They seem to recognise the PUS paradigm as obsolete, and embrace a

more interactive conceptualisation of PE. Their daily activity typically combines multiple skills: project management, performance, public relations, marketing, fund-raising and networking.

Finally, the third group are consultants. They operate as specialists and tend to be brought in to do training (e.g. performance skills), to facilitate dialogue events, or to evaluate PE. Although this group seems to be growing, at the moment there is a relatively small and specialist consultancy sector mostly based in London⁹.

In terms of institutionalisation, the shift towards organisational capacity building and the creation of incentive structures is visible on the ground. Our interviewees recognise the ubiquitous presence of both voluntary and mandatory incentives for PE in their working environments, for example PE requirements attached to grants or schemes such as the Roberts' funding.

In terms of training, we can clearly distinguish two generations of practitioners. The first one obtained their skills in the form of vocational training, learning by doing and attending occasional courses. The second generation, which entered the field post 2000, seems to have had more opportunities for systematic and institutionalised training. Nevertheless, our interviewees agreed that their real training happens on the job, by doing or watching, acting as reflective practitioners (Schon, 1983), and being paired with experts. In this sense, PE operates as a craft where principles, techniques and practices circulate through networks of masters and apprentices.

⁹ For instance, *AEA Technology Group* runs major operations such as Sciencewise-ERC (www.sciencewise-erc.org.uk/cms/programme-team); *Shared Practice* and *Dialogue by Design* collaborate with Sciencewise, Involve (2005), and various governmental departments (Warburton *et al* 2006); and new firms like *Laura Grant Associates* do evaluation work for some of the Beacons for Public Engagement (www.lauragrantsassociates.co.uk).

When Burchell *et al* (2009) interviewed scientists involved in PE ---mostly in England--- they found an emergent dilemma: is institutionalising and mandating PE a positive step, or could it kill the spirit of (bureaucratise) activities that seem well served by personally committed volunteers? In contrast, we found consistent support for institutionalisation as a way of solving a number of problems, namely: precarious conditions of science communicators (e.g. uncertainty of career paths, lack of clarity on pay structures); obtaining support from middle management within academic institutions; defining time in and out of the lab; creating specialised PE divisions to support scientists overwhelmed with activity; rewarding and recognising PE as a basis for promotion, instead of it being a commitment that, as one researcher put it, can “destroy your career as a scientist”; and changing funding schemes to minimise time spent on chasing small grants.

While our interviewees saw the benefits of institutionalisation, they also viewed some ways in which this has been happening recently as problematic. In the case of academic institutions, the drive towards embedding PE is often linked to the purpose of raising their public profile. In practice, this seems to create confusion by conflating several strategic agendas, namely: Public Engagement, Knowledge Transfer, and Commercialisation. Some perceive that the Government’s desire to get a return on investment is driving a shift “from public outreach, to knowledge transfer, to knowledge exchange, to economic impact”. For others, the problem is the coexistence of contradictory policy trends. For instance, an interviewee with first hand insight into funding bodies describes the predicament of the PE agenda:

On the one hand, ... RCUK [Research Councils UK] ... are encouraging

this, but on the other hand you've got REF [Research Excellence Framework] and the Impact agenda, which is driving people in the other direction, and there is more weight behind that. So the national policies are working against each other rather than in synergy...

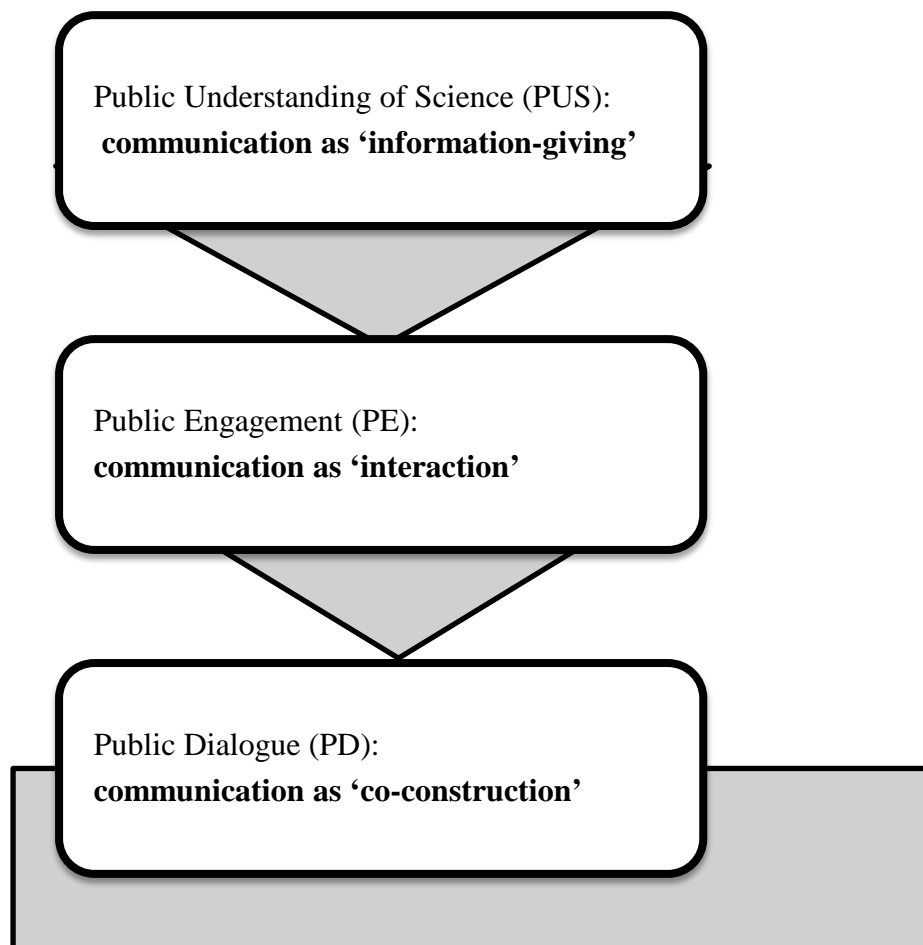
The development of simultaneous strategies with blurred boundaries seems to be subsuming the PE agenda within a broader move towards commercialisation¹⁰. This resonates with the managerial trend in policy discourse that we have identified, where PE seems to be turned into a technology to educate publics, legitimize investments, improve public relations, manage risk, and deal with the media.

4.2 Change and continuity in PE practice

In this section we argue that while policy documents offer a narrative of evolution from PUS through PE to Public Dialogue (see Figure 6), in practice the way in which these models of science communication have developed and coexisted is more complicated than such a straightforward picture of progress suggests.

Figure 6: Communication modes within science & society models

¹⁰ Attracting business investment was highlighted as a top priority in events such as 'Science Scotland 2010' in Edinburgh, and the 'EU Research & Development' at the Scotland House in Brussels, 2009.



Despite the post 2000 developments that we mapped in policy discourse, PUS activities and mentality still characterise most practice on the ground. Ranging from large-scale school tours (e.g. 65,000 pupils) to meet-the-scientist workshops, and from engaging policy audiences to responding to consultations, mainstream PE seems dominated by information-giving events and exhibitions (e.g. 70,000 participants in the Edinburgh Science Festival). However, we have also found examples of deliberative activity more in tune with the “new mood for dialogue”. These events typically deal with controversial science (e.g. stem cells, synthetic biology, assisted suicide, brain imaging) where the organisers often rely on external consultants due to lack of in-house expertise in participatory techniques. Such events tend to be part of ‘upstream engagement’ (Rogers-Hayden and Pidgeon, 2007; Pidgeon and Rogers-

Hayden, 2007), and we found that they are hardly ever directly connected to a policy making process, countering what one might have expected after reading various policy statements.

We have demonstrated that the policy discourse has framed the interface between science and society in terms of models of communication that evolve towards more democratic relationships. The PE model has been incrementally built on the PUS model--- both clear-cut paradigms that organisations and practitioners can readily understand and implement (i.e. “informing”, “interacting”; see Figure 6). They are based on traditional communication theory and have been encouraged and rolled out extensively across the UK (e.g. schools, museums, centres, festivals). In contrast, the PD model is being set up differently, more like an experimental pilot with epicentres of activity and expertise (e.g. London; Edinburgh). PD requires an understanding of communication as the mechanism for “the mutual constitution”, to borrow from Horst (2008, p. 264), of communication partners; it also requires an alteration of the traditional hierarchies of knowledge so that not only scientific but also cultural rationality play a central role in deliberation (Fischer, 2009).

Implementing the evolution from PUS to PE was seen as relatively straightforward; in our interviews, we repeatedly found statements about the transition from one to the other consistent with those we have seen in policy documents. For instance, PE as correcting a traditional tendency to patronise the public, and PE as fostering more creative, interactive and responsive methods of engagement. Here the problem to be solved is still that of public ignorance and mistrust and, therefore, the solution is to tool up accordingly, developing resources for better public education and public

relations. In this sense, the move from PUS to PE seems widely understood, and acted upon by creating new posts and training schemes.

That is not the case with Public Dialogue (PD). The majority of our interviewees show real difficulty in understanding the PD model. Very few saw the relationship between scientists, citizens and policy makers as a socio-political issue with implications for democratic governance. Instead, mistrust was mostly framed as public misunderstanding, aggravated by the media. Accordingly, the role to be played by the new dialogue approach is to enable practitioners to be better, as some interviewees explained, at “selling the science”. This ideological commitment (Fischer, 2009, p. 146) is a far cry from the policy discourse about ongoing open, and mutually constituting, dialogue. In practice, the fast pace of these policy-driven shifts ---implemented through the management of funding--- has puzzled many practitioners. In the words of a former scientist/science communicator and now a consultant: “[s]urely we're just being asked to do the same thing, they're just calling it something else this year.”

Although we have found genuine attempts to set up deliberative dialogues, we also found much confusion about the new mindsets and practices required for facilitating dialogic communication (see Escobar, 2012). For many, it is primarily a more sophisticated tool for managing public perceptions. As one of our interviewees responsible for a major dialogue process on a controversial topic explains: “by learning about these things and by talking to people about them, you could deflect a huge reaction, and you could perhaps accommodate or do something that would nonetheless keep the development of the field on track.”

This is clearly in line with the managerialist trend that we noted earlier (see also Rayner, 2003; Irwin, 2006). Here dialogue is a methodology of stakeholder management and intelligence gathering to anticipate public reactions and manage media framing of new technologies. It is much like focus groups in the commercial world, where consumers are exposed to a new product so that its feasibility, and appropriate packaging, can be worked out. As two consultants told us, in their experience policy dialogues often function as “market research” or “policy intelligence [...] trying to find out...is there a show-stopper here?”

To conclude, the PUS model has crystallised and the more interactive PE model is being embedded by adding a layer of sophistication to PUS practices. In contrast, the PD model is inconsistent in many aspects. It appears vague and misunderstood, experimental and dependent on elite centres and external actors (e.g. consultants), used as a policy research tool, and fraught with difficulties stemming from cultural barriers in the worlds of policy making and science.

5. Conclusions

The relationship between science and society emerges from our analysis of policy discourse and public engagement practice as a 25-year old project of crisis management. Our approach allows us to question the narrative of progress and evolution constructed around key switch points (1985, 2000). We show that the relationship between science and society is worked out both at the levels of ideas and of communication practice in three models: Public Understanding of Science (PUS), Public Engagement (PE), and Public Dialogue (PD).

While the narrative in policy documents presents these models of science communication as evolutionary steps, we argue that they co-exist rather than replace one another in succession. We also find some evidence of a pattern of preference in the way in which these models and activities within them are utilised by distinct groups of science communication practitioners: for example, scientists are likely to approach communication with the aim of informing and explaining (PUS); science communicators' work may have more room for interactive and innovative communication designs underpinned more explicitly by theories of learning and an understanding of different audience needs (PE); while only a limited group of consultants and practitioners, and a limited number of science communication events, uses dialogic designs (PD). At the same time, the PUS paradigm is perhaps the most influential: it underpins the understanding and modelling of most communication practice on the ground. In other words, the scientific community ---broadly understood--- seems anchored in the PUS mindset while it also works with the rhetorical resources of the PE and PD models.

Looking back from the perspective of 2012, we argue that policy documents presented by the outgoing Labour government between January and March 2010 (i.e. Science for All Expert Group, 2010; Science and Trust Expert Group, 2010) offer a point of closure ---as much as elaboration--- to this distinct, long period of legitimacy crisis. In other words, while change has taken place over the last 25 years, much of it was gradual, following long lines of development, for example in institutional arrangements to do with funding and leading the field, rather than by dramatic shifts of direction as presented in the narratives circulated in policy documents. The 25-year

science communication project also seems to have come full circle: the difficulties in the relationship between science and society have been resolved through communication, if one believes the science policy discourse.

From a broader perspective, if we pay attention to deliberative developments internationally, on the one hand, and the clear policy drive by the UK Labour government since 1997 towards engineering citizen participation and deliberative engagement, on the other hand, science and society policy in the UK has not been fundamentally distinct or innovative. It is broadly in line with discourses that are being mainstreamed globally, and indeed nationally in local governance or the National Health Service.

If the policy discourse presents a fairly confident and settled picture of science and society, the dynamics of the relationship in practice are somewhat different. Despite over 20 years of rhetorical and ---more recently--- financial efforts, on the ground there is a sense of fragility to the area and a clearly expressed need for firm institutionalised solutions to imbed PE. Indeed, science public engagers face a number of dilemmas in terms of professionalization and career development.

Dialogue is less common, less understood and ---despite the claims of excellent and fresh effort to drive dialogue into the mainstream---it remains something of a specialist activity. Even major dialogue operations, such as those run or supported by *Sciencewise*, function more as research methods for understanding public perceptions and attitudes (see Start, 2010) rather than as deliberative processes that feed into

policy making¹¹. At this point, it is difficult to predict whether gaps between scientific and cultural reason (Fischer, 2009) are about to be bridged through democratic processes or whether they will be managed by technocratic means. Is democratic innovation being turned into managerial technology?

Acknowledgements:

We would like to thank the three anonymous reviewers and the European Editor of *Science and Public Policy* for their helpful comments and suggestions. An early and substantially different draft of this paper was discussed at, and included in the proceedings of, the 2010 Conference of the UK Political Studies Association.

REFERENCES

- Anderson, R., Baxter, L. and Cissna, K. eds. (2004). *Dialogue. Theorizing difference in communication studies*. Thousand Oaks, California: Sage.
- Barber, B. (2003). *Strong democracy. Participatory politics for a new age*, 20th Anniversary Edition. London: University of California Press.
- Barke, R. (1986). *Science, technology and public policy*, Washington, DC: QC Press.
- Barnes, M., Newman, J. and Sullivan, H. (2007). *Power, participation and political renewal. Case studies in public participation*. Bristol: The Policy Press.
- Bauer, M. and Gregory, J. (2007). From journalism to corporate communication in post-war Britain, pp. 33-51. In M. Bauer, and M. Bucchi (Eds). *Journalism*,

¹¹ As an example, see the latest polemic around the Food Standards Agency dialogue on GM at www.sciencewise-erc.org.uk/cms/food-the-use-of-genetic-modification-a-public-dialogue

- science and society*. London: Routledge.
- Bauer, M. and Jensen, P. (2011). The mobilization of scientists for public engagement. *Public Understanding of Science*, 20 (1) 3-11.
- Blakemore, C. (2002). From the “public understanding of science” to scientists understanding of the public, pp. 211-223. In S. J. Marcus (Ed.) *Neuroethics: mapping the field, Conference proceedings*. USA: Dana Press.
- Bohman, J. (1996). *Public deliberation. Pluralism, complexity, and democracy*, Cambridge: The MIT Press.
- Burchell, K., Franklin, S. and Holden, K. (September 2009). *Public culture as professional science. Final report of ScoPE project*. BIOS (Centre for the Study of Bioscience, Biomedicine, Biotechnology and Society), London School of Economics and Political Science: London.
- Cabinet Office (2002) *Viewfinder: A policy maker’s guide to public involvement*. Retrieved 5 January 2010 from www.nationalschool.gov.uk/policyhub/docs/Viewfinder.pdf
- Cheng, D., Claessens, M. Gascoigne, T., Metcalfe, J., Schiele, B. and Shi, S. (Eds). (2008). *Communicating science in social contexts: New models, new practices*. Springer.
- Clarke, R. (2002), *New democratic processes. Better decisions, stronger democracy*, London: Institute for Public Policy Research / EMPHASIS.
- Communities and Local Government (2008). *Communities in control: real people, real power*. Retrieved 10 August 2010 from www.communities.gov.uk/documents/communities/pdf/885997.pdf

Committee to Review the Contribution of Scientists and Engineers to the Public Understanding of Science, Engineering and Technology (1995). *Report*. Retrieved 15 October 2009 from <http://collections.europarchive.org/tna/20060215164354/http://www.dti.gov.uk/ostbusiness/puset/report.htm>.

Cornwall, A. (2008). *Democratising engagement. What the UK can learn from international experience*, London: DEMOS.

Council for Science and Technology (2005). *Policy through dialogue: informing policies based on science and technology*. Retrieved 10 December 2009 from www.cst.gov.uk/cst/reports/files/policy-through-dialogue/report.pdf

Department for Communities and Local Government (2002). *Guidance on enhancing public participation – full report*. Retrieved 11 March 2010 from www.communities.gov.uk/publications/localgovernment/guidanceenhancing

Department of Health (2004). *The NHS improvement plan. Putting people at the heart of public services*. Retrieved 11 March 2010 from www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4084476

Department of Health (2008). *Real involvement. Working with people to improve health services*. Retrieved 11 March 2010 from www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_089787

Department of Innovation, Universities and Skills (July 2008). *A vision for Science and Society* [Consultation]

http://interactive.dius.gov.uk/scienceandsociety/files/A_Vision_for_Science_and_Society.pdf.

Department of Trade and Industry (15 July 2002). *Boost for science and innovation*

[Press release] http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/spend_sr02_pressscience.htm

Dogan, M. (Ed.) (2005). *Political mistrust and the discrediting of politicians*, Leiden: Koninklijke Brill NV.

Dryzek, J. (2002). *Deliberative democracy and beyond. Liberals, critics, contestations*, Oxford: Oxford University Press.

Dryzek, J. (2005). *The politics of the Earth: environmental discourses*, 2nd edn, Oxford: Oxford University Press.

Dryzek, J. (2010). *Foundations and frontiers of deliberative governance*, Oxford: Oxford University Press.

Escobar, O. (2009). The dialogic turn: dialogue for deliberation, *In-Spire Journal of Law, Politics and Societies*, 4(2), 42-70.

Escobar, O. (2011). *Public dialogue and deliberation. A communication perspective for public engagement practitioners*, Edinburgh: Edinburgh Beltane –UK Beacons for Public Engagement. Retrieved 1 June 2012 from www.edinburghbeltane.net/content/dialoguethory

Escobar, O. (2012). The politics of dialogue, *People & Science*, June, p.12. Retrieved 1 July 2012 from www.britishtscienceassociation.org/web/News/ReportsandPublications/Magazine/MagazineArchive/June2012.htm

- Fairclough, N. and Wodak, R. (1997). Critical Discourse Analysis. In T.van Dijk (Ed.) *Discourse as social interaction*, pp.258-284. London: Sage.
- Fischer, F., (2000). *Citizens, experts and the environment. The politics of local knowledge*, Durham/London: Duke University Press.
- Fischer, F. (2003). *Reframing public policy. Discursive politics and deliberative practices*, New York: Oxford University Press.
- Fischer, F. (2009). *Democracy and expertise. Reorienting Public Policy*, New York: Oxford University Press.
- Fung, A. (2008). Democratising the policy process. In M. Moran, K. Reinand and R. Goodin (Eds.) *The Oxford handbook of publicPolicy*, pp. 669-685. New York: Oxford University Press.
- Gastil, J. (2008). *Political communication and deliberation*, Thousand Oaks/London: Sage Publications.
- Hajer, M. and Wagenaar, H. (Eds.) (2003). *Deliberative policy analysis: understanding governance in the network society*. New York: Cambridge University Press.
- Hargreaves, I. and Ferguson, G. (2000). *Who's misunderstanding whom?* [Report]. London: Economic and Social Research Council.
- Hilton Associates (2009). *Certificate Programme in Public Participation*. Retrieved March 2010 from www.workwithus.org/CampaignHelper/EmailLinkRedirect.aspx?param=q7z8rbLTiDrTK53iaVm08zcVWrWlevN

- Horst, M. (2008) In search of dialogue: staging science communication in consensus conferences, pp. 267-274. In D. Cheng, M. Claessens, T. Gascoign, J.Metcalf, B. Schiele and S. Shi, (Eds). *Communicating Science in social contexts: New models, new practices*. Springer.
- Holliman, R., Whitelegg, E., Scanlon, E., Smidt, S and Thomas, J. (Eds.) (2009). *Investigating science communication in the information age: Implications for public engagement and popular media*. Oxford: Oxford University Press.
- House of Lords (2000). *Science and Society*. Retrieved 10 December 2010 from www.parliament.the-stationery-office.co.uk/pa/ld199900/ldselect/ldsctech/38/3801.htm
- IAP2 (2006). *Planning for effective participation. Student manual*, International Association for Public Participation.
- Innes, Judith E. and Booher, David E. (2010). *Planning with complexity: an introduction to collaborative rationality for public policy*. New York: Routledge.
- Involve (2005). *People & participation. How to put citizens at the heart of decision-making*. Retrieved 11 March 2010 from www.involve.org.uk/assets/Uploads/People-and-Participation.pdf
- Irwin, A. (2006). The politics of talk: Coming to terms with the 'new' scientific governance, *Social Studies of Science*, 36(2), 299-320.
- Irwin, A. (2009). Moving forward or in circles? Science communication and scientific governance in an age of innovation. In R. Holliman, E. Whitelegg, E. Scanlon, S. Smidt and J. Thomas (Eds) (2009). *Investigating science communication in the information age: Implications for public engagement and popular media*, pp.3-17. Oxford: Oxford University Press.

- Lengwiller, M. (2008). Participatory approaches in Science and Technology: historical origins and current practices in critical perspective, *Science Technology Human Values*, 33, 186-199.
- Lord Sainsbury (October 2007). *The race to the top: A review of Government's Science and Innovation policies*. HMSO: London.
- Mutz, D. (2007). *Hearing the other side. Deliberative versus participatory democracy*, New York: Cambridge University Press.
- Neal, H., Tobin, L. and McCormick, J. (2008) *Beyond Sputnik: U.S. science policy in the 21st century*. Ann Arbor, MI: University of Michigan Press.
- New Economics Foundation (1998). *Participation works! 21 techniques of community participation for the 21st century*. Retrieved 12 March 2010 from www.dundecity.gov.uk/dundecity/uploaded_publications/publication_286.pdf
- Nielsen, K. (2010). More than “mountain guides” of science: a questionnaire survey of professional science communicators in Denmark, *Journal of Science Communication*, (2), 1-11.
- OECD (2001). *Citizens as partners. Information, consultation and participation in policy-making*. Retrieved 13 March 2010 from http://ecnl.org.hu/dindocuments/214_OECD_Engaging%20Citizens%20in%20Policy-Making.pdf
- OECD (2003). *Open government. Fostering dialogue with civil society*. Retrieved 13 March 2010 from www.oecdbookshop.org/oecd/display.asp?CID=&LANG=EN&SF1=DI&ST1=5LMQCR2K4R5K

- OECD (2008). *Mind the gap: fostering open and inclusive policy making*. Retrieved 13 March 2010 from www.oecd.org/document/20/0,3343,en_2649_33735_40755604_1_1_1_1,00.html
- Pidgeon, N. and Rogers-Hayden, T. (2007). Opening up nanotechnology dialogue with the publics: Risk communication or ‘upstream engagement’?, *Health Risk & Society*, 9(2), 191-210.
- Pieczka, M. (2002) Public relations expertise deconstructed, *Media, Culture and Society*, 24 (3), 301-323.
- Pieczka, M. and Escobar, O. (2010). *The engagers: professionalization of science public engagement in Scotland*. Paper presented at the Science and the Public 2010 conference, Imperial College & Science Museum, July, London.
- POST (2001) *Open Channels: Public dialogue in science and technology*, Report No. 153, Parliamentary Office of Science and Technology. Retrieved 15 December 2009 from www.parliament.uk/post/pr153.pdf
- POST (2002). *Public dialogue on science and technology*, Postnote 192, Parliamentary Office of Science and Technology. Retrieved 15 December 2009 from www.parliament.uk/post/pn189.pdf
- Rayner, S. (2003). Democracy in the age of assessment: reflections on the roles of expertise and democracy in public-sector decision making, *Science and Public Policy*, 30(3), 163-171.
- Research Councils UK (2002) *Dialogue with the public: practical guidelines*, Report commissioned by Research Councils UK and the Office of Science and Technology from People Science & Policy Ltd & Taylor Nelson Sofres.

- Roberts, G. (April 2002). *SET for success: the supply of people with science, technology engineering and mathematical skills*. [Report] HM Treasury: London, www.hm-treasury.gov.uk/ent_res_roberts.htm .
- Rogers-Hayden, T. and Pidgeon, N. (2007). Moving engagement ‘upstream’? Nanotechnologies and the Royal Society and Royal Academy of Engineering’s inquiry. *Public Understanding of Science*, 16(3), 345-364.
- Rowe, G., Horlick-Jones, T., Walls, J. and Pidgeon, N. (2005). Difficulties in evaluating public engagement initiatives: reflections on an evaluation of the UK GM Nation? public debate about transgenic crops, *Public Understanding of Science*, 14, 331-352.
- Royal Society (1985). *Public understanding of science*, Royal Society: London.
- Ryfe, D. (2002). The practice of deliberative democracy: a study of 16 deliberative organizations, *Political Communication*, 19, 359-377.
- Science for All Expert Group (2010) *Report and action plan from the Science for All Expert Group*. Retrieved 10 march 20101 from <http://interactive.bis.gov.uk/scienceandsociety/site/science-for-all/>
- Science and Trust Expert Group (2010). *Starting a national conversation about good science* [Report]. Retrieved 3 April 20101 from <http://interactive.bis.gov.uk/scienceandsociety/site/trust/2010/03/08/new-science-and-trust-expert-group-report-starting-a-national-conversation-about-good-science/>
- Schon, D. (1983). *The reflective practitioner: how professionals think in action*, Aldershot: Ashgate.

Scottish Government (2009). *Community: Scottish Community Empowerment Action Plan*. Retrieved 5 January 2010 from

www.scotland.gov.uk/Publications/2009/03/20155113/0

Smith, G. (2005). *Beyond the ballot. 57 Democratic innovations from around the world*. Retrieved 11 March 2010 from

www.peopleandparticipation.net/display/Participationlibrary/Beyond+the+Ballot+-57+Democratic+Innovations+from+Around+the+World

Smith, G. (2009). *Democratic innovations. Designing institutions for citizen participation*. New York: Cambridge University Press.

Spano, S. J., (2001). *Public dialogue and participatory democracy. The Cupertino Community Project*. New Jersey: Hampton Press.

Start, D. (2010). *Ethical dimensions in Sciencewise. A review of public perceptions of ethical issues from the Sciencewise dialogues*. Retrieved 10 March 2010 from

<http://interactive.bis.gov.uk/scienceandsociety/site/trust/files/2010/03/Ethics-digest-SW-daniel-start21.pdf>

Stilgoe, J. and Wilsdon, J. (2009) The new politics of public engagement with science. In R. Holliman, E. Whitelegg, E. Scanlon, S. Smidt and J. Thomas (Eds). *Investigating science communication in the information age: Implications for public engagement and popular media*, pp.18-34. Oxford: Oxford University Press.

Warburton, D., Wilson, R. and Rainbow, E. (2006). *Making a difference: A guide to evaluating public participation in central government*, Retrieved 5 January 2010

www.involve.org.uk/evaluation-guide

Wilsdon, J., Wynne, B. and Stilgoe, J. (2005) *The public value of science*, London: Demos.

Warren, M. E. and Pearse, H. (Eds.) (2008). *Designing deliberative democracy. The British Columbia Citizens' Assembly*, Cambridge: Cambridge University Press.

Young, I. (2002). *Inclusion and Democracy*, Oxford: Oxford University Press.

Appendix 1

Interviewee	Area of work / type of job
1	Health / Lecturer and PE practitioner
2	Science and Public Engagement / Top Scottish Government official and policy maker
3	Science communication and PE / Independent consultant specialized in PE organisation and evaluation
4	Biotechnology / Science communicator and PE practitioner
5	Genomics / Policy and PE researcher and practitioner
6	Science PE / PhD researcher
7	Science PE / Independent consultant and facilitator
8	Informatics / Researcher and PE practitioner
9	Chemistry / Science communicator and PE practitioner and trainer
10	Science PE / Manager of a large PE interface, policy maker
11	Botany / PE manager
12	Regenerative medicine / Science communicator and PE practitioner
13	Neuroscience / Science communicator and PE practitioner
14	Professional development / Manager and PE advisor and policy maker
15	Environmental Sciences / Lecturer and PE practitioner and advisor
16	Medicine / Professor and PE policy maker
17	Physics and Astronomy / Professor and PE practitioner and policy maker
18	Human resources / Professional development manager and PE advisor and policy maker
19	Epidemiology, Immunology / Researcher, science communicator and PE practitioner
20	Botany / Science communicator and PE practitioner
21	Engineering / PE manager
22	Professional development / Manager and PE advisor and policy maker
23	Mental health; Genetics / Science communicator and PE practitioner
24	Science PE / Manager of a large science communication and PE platform

25	Astronomy / Researcher, science communicator and PE practitioner
26	Mathematics / Science communicator and PE practitioner
27	Science communication and PE / Independent consultant specialised in training, media and festivals
28	Science and Technology Studies / Senior Lecturer and PE practitioner and trainer