

Democratising Technology Choices?


European Public Participation in Agbiotech Assessments

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Executive summary

The agricultural biotechnology (agbiotech) sector has faced extraordinary public protest in Europe. In anticipating or responding to public controversy, many state bodies have sponsored formal participatory exercises in technology assessment (TA). These participatory TA exercises have had diverse, overlapping, or even contradictory aims: democratising technology, educating the public, countering “extreme” views, gauging public attitudes, guiding institutional reforms, and/or managing societal conflicts.

This paper examines four national case studies (from Denmark, Germany, France and the UK) of participatory TAs of “agbiotech” to explore:

- How and why state bodies sponsored participatory TA of agbiotech
- The various aims in designing, managing and using such exercises
- Why they matter for efforts to democratise choices of technology designs and priorities
- How we can democratise technology choices or at least hold governments accountable for their technology policies.

To some extent, participatory TA exercises have helped to hold governments accountable for regulatory criteria, but not for innovation choices. These participatory TA exercises generally assumed that agrobiotechnologies represented societal progress, leaving little space for alternatives. Other limitations included imposing artificial boundaries in the design and management of the TA exercises – between biotechnological imperatives versus alternative options, between scientific versus policy issues, as well as between expert versus lay roles – thus closing down issues.

If technology is to be truly democratised, state-sponsored participatory exercises should:

- Synchronise with key periods of government decision-making
- Facilitate overlaps between “lay” and “expert” roles
- Examine the assumptions and limits of “risk” frameworks
- Encourage scrutiny of “technical” aspects as socio-political ones.

Such features may have some scope for influence by activists beforehand and by participants within the exercises.

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Introduction

Public participation in technoscientific issues has recently gained mainstream support in Europe, in response to greater conflict over the development and regulation of controversial technologies. However, opinions have differed on the appropriate design, roles and consequences of these exercises. They have attracted various criticisms—e.g. that participants are not representative of the public, or that the government does not make a prior commitment to implement the views expressed, or that technical aspects are separated from other issues.

These criticisms may be descriptively accurate but imply a simplistic view of direct democracy. Together they assume that participants truly representing the public can guide government decisions, and that the government has no agenda of its own, nor a wider accountability to representative democracy. According to a survey, participatory technology assessment (TA) exercises rarely have a demonstrable impact on political decision-making (Bütschi and Nentwich, 2002). Perhaps such exercises matter in more subtle ways, which therefore need different analytical questions about democratic accountability.

Public participation in technological issues has had diverse agendas. Originally it was promoted as a vehicle for democratisation and citizen empowerment, so that people could challenge policy assumptions and influence decisions. Now public participation goes hand-in-hand with liberalism: politics is seen as a market of opinions, so citizens should be invited into the open market (cf. Popper, 1962).

Participation now becomes yet another governance tool among others, e.g. for adjusting, supplementing or enhancing the policy process. Aware that they often lack public confidence, policy-makers seek methods of upstream conflict-management. These professional reasons have recently driven interest by mainstream institutions in public participation and will continue to do so (Klüver, 2006).

Upstream conflict-management restricts the role of participants. In the UK, for example, there have been various proposals for “upstream public engagement” between the public and scientists at an early stage. According to a UK government report, new procedures should “enable [public] debate to take place “upstream” in the scientific and technological development process, and not “downstream” where technologies are waiting to be exploited but may be held back by public scepticism brought about through poor engagement and dialogue on issues of concern” (HM Treasury, 2004).

Activists had proposed such engagement in order to open up potential innovation choices and to make them more accountable. By contrast to those ambitious aims:

...[public engagement] is sometimes portrayed as a way of addressing the impacts of technology – be they health, social, environmental or ethical—rather than helping to shape the trajectory of technological development. The hope is that engagement can be used to head off controversy... (Wilsdon et al., 2005).

Indeed, conflict-avoidance or conflict-management may be built into the design of public engagement, especially by focusing on risk issues. As an alternative, an EC report proposes a move to a more “upstream” *innovation-governance* (EGSG, 2007).

BOX 1. BIOTECHNOLOGICAL DETERMINISM

Since the early 1990s, the European Commission has promoted infotech and agbiotech as essential factors for enhancing efficiency and thus creating wealth, even ensuring economic survival. In its 1993 White Paper on *Growth, Competitiveness, Employment*, the Commission characterised the entire agri-food industry as “dependent” upon genetic modification techniques (CEC, 1993). Under “risk-based regulation”, product safety according to “sound science” would be the only criterion for approval decisions. More generally, “technological progress” was equated with the common societal good (Levidow and Marris, 2001). Such language foreclosed alternative problem-definitions. That policy framework was undermined by various food scandals, especially BSE (bovine spongiform encephalopathy), better known as the mad cow crisis. Critics questioned the optimistic assumptions which underlie agri-industrial efficiency, safety claims and “risk-based regulation”. Moreover, activists targeted agbiotech as an ominous symbol of “globalisation”, threats to democratic sovereignty and hazards of industrialised agriculture. Public controversy raised the stakes for “science” and generated suspicion towards expert claims.

In this paper I explore these issues for agricultural biotechnology (agbiotech for short), a sector which has faced extraordinary public protest in Europe (Box 1). Agbiotech has provoked diverse forms of public participation, e.g. open mass meetings, protests, boycotts, mass-media stunts and sabotage. Through these means, an emerging citizenry has demanded government accountability for its innovation choices. Among the various responses, many state bodies across Europe have sponsored formal participatory exercises, beyond simply access to regulatory procedures. In this paper I use four national case studies to explore the following questions:

- How and why did state bodies sponsor participatory TA of agbiotech?
- What were the various aims in designing, managing and using such exercises?

- Why do they matter for efforts to democratise choices of technology designs and priorities?
- How can we democratise technology choices, or at least hold governments accountable for their technology policies?

Denmark 1987: Making space for sustainable agriculture?

Denmark's debate on agricultural biotechnology was begun in the mid-1980s by environmental NGOs. NOAH, the Danish affiliate of Friends of the Earth, proposed new legislation to regulate all releases of genetically-modified organisms (GMOs). In response to public concerns, a parliamentary "green" majority enacted the 1986 Gene Technology Act, which did not permit GMO releases unless there was sufficient knowledge about the ecological consequences (Toft, 1996). This burden on the government to provide such evidence meant a de facto ban for several years.

Parliament also allocated funds (including to NGOs and some trade unions) for an information campaign on biotechnology and to stimulate further debate on its advantages and disadvantages. Thus, environmental NGOs gained extra resources and political opportunities to frame the issues for further public debate. NOAH organised 10 public conferences on the wider environmental consequences of GMOs—on sustainable agriculture including organic agriculture, on food labelling, on animal welfare and ethics, on the Third World, on seed diversity (including patents), and on biological warfare. These debates were reported through a series of publications and statements from NOAH.¹

Established by parliament, the Danish Board of Technology held its first consensus conference (Box 2) in 1987 on Gene Technology in Industry and Agriculture, timed to coincide with parliamentary debate on the issue (Hansen *et al.*, 1992; Klüver, 1995). In its report, the lay panel included both risk and ethical issues (Teknologinævnet, 1987). Accepting a key recommendation from the process, parliament voted to exclude animals from the 1987-1990 national research and development (R&D) programme for gene technology. The conference eventually had more profound effects on the Danish regulatory regime through wider public debate.

A further information campaign was co-ordinated by the Board of Technology and Danish Adult Education Association. The government also funded a subsequent programme, organised by trade unions, to stimulate further debate on the advantages and disadvantages of agbiotech. Their educational materials posed questions about sustainable agriculture: for example, would genetically modified crops alleviate or aggravate the existing problems of crop monocultures? (Elert, 1991). Through that wider debate, the consensus conference indirectly influenced parliament and thus regulatory policy.

1. Much information here, supplied by Jesper Toft, is not available in English-language documents.

BOX 2. THE DANISH CONSENSUS CONFERENCE

In Denmark, the consensus conference allows technological decisions to be accounted for through public debate, mediated by parliament. The process has been described as a "counter-technocracy": a means to challenge expert claims through a deliberative process. The lay panel has no vested interests, and its report helps to promote technology assessment as a broad societal process. Its guiding principle is that "a well-functioning democracy requires a well-educated and engaged population" (Klüver, 1995).

Under the EU-wide regulatory process, dominant member states implicitly took for granted the eco-efficiency benefits of herbicide-tolerant crops, while disregarding the herbicide implications or assuming them to be benign (Levidow *et al.*, 2000). By contrast to those EU-level assumptions, Danish regulators were held publicly accountable for assessing the broad implications of GM crops for agricultural strategy, herbicide usage and the environment. Such judgements were scrutinised by parliament's Environment Committee, often by drawing on specific questions from NGOs. This domestic pressure also meant that Danish representatives in EU regulatory procedures in turn proposed that risk assessments evaluate those implications at the EU level (Toft, 1996; 2000).

Thus, citizen participation enhanced government accountability for regulatory criteria, going beyond optimistic assumptions about the environmental benefits of agbiotech. GM crops were evaluated for their potential role in enhancing or hindering sustainable agriculture; such judgements were opened up to the lay expertise of agbiotech critics. Environmental NGOs found greater scope to influence regulatory procedures and expertise.

Agri-innovation choices became more contentious in the late 1990s, however; NGOs demanded alternatives to agbiotech and to intensive agricultural methods. In a 1999 consensus conference, the lay panel asserted the need for extra measures – not only for product safety, but also to prevent GM products "becoming controlled by monopolistic companies" – as well as measures to evaluate ethical aspects (Einsiedel, 2001). As the conference organisers emphasised, these proposals reflected citizens' viewpoints, thus providing a basis for dialogue with decision-makers (Teknologinævnet, 1999).

The panel's proposals challenged the assumptions and limits of the EU legislative framework, though Danish policy remained within a "risk" framework. Public demands for accountability were being channelled into more stringent measures to regulate biophysical risks. This pervasive tension has parallels in later TA exercises.

Germany 1991-1992: Creating a participation trap

Since the 1980s, the German government's promotion of agbiotech has provoked widespread protest—from the Green Party, environmentalist groups and local campaigns. Although critics gained high-profile attention in the mass media and civil society, their views remained marginal to official procedures. Opposition to agbiotech split civil society and the major political parties (Gill, 1996).

TA exercise

German public controversy focused on herbicide-tolerant crops, given their potential for spreading herbicide tolerance amongst related crops or weed species, as well as for changing patterns of herbicide use. To address such conflicts, the government sponsored a TA exercise on GM herbicide-resistant crops in the early 1990s. Funding came from the Ministry of Industry and Research, which was strongly promoting biotechnology. It was initiated and co-ordinated by the Berlin Wissenschaftszentrum (WZB, or Science Centre) as an experiment in environmental conflict management. The 50-odd participants had quasi-expert roles; they included overt proponents and opponents of herbicide-tolerant crops, as well as representatives of regulatory authorities, agricultural associations, consumer organisations, etc. From the start, conflict erupted over how to define the relevant scientific issues and the expertise needed to evaluate them.

The TA was designed to evaluate the arguments for and against herbicide-resistance GM technology – especially its possible consequences – but not to suggest other options for weed control in agriculture. Thus the procedure was “a technology-induced TA, not a problem-induced TA” (van den Daele, 1995). Environmental NGOs objected to this approach. They wanted the TA to compare biotechnology products with other potential weed-control methods. However, the NGOs' proposal was rejected by the organisers (Gill, 1993) and this narrow remit set difficult terms for participation by the broadly representative individuals from NGOs.

As the organisers acknowledged, “The TA implicitly accepted the matter-of-course development of technology as the starting point”, as well as possible risks as the main grounds for state restrictions: “If critics fail to provide evidence of relevant risks, the technology cannot be banned.” So critics held the burden of evidence for any risks. It was up to advocates to demonstrate the benefits, though their failure to do so would have no bearing upon regulatory decisions (van den Daele, 1995). Consequently, the discussion emphasised environmental benefits, especially the prospects for farmers to use less harmful herbicides and/or lower quantities of them (Gill, 1993).

Within that framework, participants were confined to debates about empirical evidence, e.g. the possibility of environmental damage, not about values and goals (van den Daele, 1995). “This procedure placed participants under massive pressure either to admit consensus or justify dissent”, especially through detailed empirical evidence (ibid: 80). From the NGOs' standpoint, this framework favoured experts in specialised technical areas, e.g. gene flow and herbicide effects.

On the basis of the expert reports, the TA symbolically normalised any risks, as if undesirable consequences were similar to those of the dominant agricultural model. According to agbiotech proponents, echoing the government's advisory body, any risks from GM herbicide-tolerant crops were similar to those from conventional crop plants and herbicide usage. In this way, the exercise undermined NGO claims about novel or unknown risks; once normalised, any risks would be manageable through regulatory procedures, even contemporary ones.

Science court or parliament?

Environmental NGOs and their associated research institutes faced a difficult choice: either play a quasi-expert role within the prescribed framework and thus help legitimise it, or else abandon that role and be treated as mere lay voices. After much conflict, they withdrew before the TA exercise could report its conclusions. They gave several reasons for withdrawal, e.g. that their voluntary participation was occupying too much time, especially the task of commenting on long expert reports (van den Daele, 1995). According to one NGO expert, "I had not imagined that you could destroy participation by throwing paper on top of people" (cited in Charles, 2001). By withdrawing from the TA, they could devote greater resources to public protest and preserve their credibility with NGO members and activists (Gill, 1993).

Their withdrawal was criticised by the WZB coordinator:

One cannot present one's position in public as scientifically substantiated and then cast fundamental doubt on science as neutral... Participation in the procedure implies the readiness to submit oneself on the empirical issues to the judgement of science (van den Daele, 1995).

Moreover, the distinction between a science court and parliament is not so straightforward; neither is the distinction between risk assessment and socio-political goals. At issue was the range of questions to be answered by science, their normative assumptions, and the degree to which alternative technological options could be considered. Some questions from participants were pre-empted or marginalised by the TA exercise, especially by constructing particular boundaries between expert and lay voices.

Societal futures were reduced to scientific issues, readily assessable by experts. Civil society representatives found themselves in a "participation trap"; they could either participate within the government's risk-benefit framework for GM crops *per se*, or else be marginalised. Overall, the exercise reinforced the government's policy framework and its public unaccountability.

France 1998: Promoting the benign technocratic state

By 1997 French regulatory policy was facing a legitimacy crisis. France had led efforts to gain EU-wide approval for GM crops, yet these were now opposed by a broad range of organisations. The Confederation Paysanne, which represented peasant farmers, opposed agbiotech while proposing "quality" alternatives to industrialised agriculture (Heller, 2002). An oppositional petition was signed by many prominent scientists, not necessarily anti-agbiotech, but all of them concerned about regulatory failures to develop appropriate ecological expertise and risk research (Marris, 2001).

In February 1997 the Prime Minister decided not to authorise commercial cultivation of Ciba-Geigy's Bt 176 GM maize in France, even though French regulators had led EU authorisation of the same product. This unstable policy indicated a crisis of official

expertise within an elite-technocratic political culture. In November 1997 the government announced a plan to sponsor a consensus, or citizens', conference on GMOs, based on the Danish model (Box 2). The official rationale was that this event would provide "a new way of elaborating decisions" and a means to implement "participatory democracy", according to the Ministry of Agriculture. Yet the government never clarified the relationship between the citizens' conference and its own decision-making procedures (Marris and Joly, 1999). This relationship was subtly played out within the conference process, especially by defining expert roles.

From the start, the conference was designed to re-assert the benign expertise of the state, especially parliament, which saw itself as the only legitimate representative of the nation. Organisation of the citizens' conference was delegated to a parliamentary unit, Office Parlementaire d'Évaluation des Choix Scientifiques et Technologiques (OPECST), which symbolised a political neutrality separate from the government. OPECST appointed the steering committee, which in turn decided that the panel membership should represent diverse views of ordinary citizens, rather than stakeholders in the debate. It also decided which "experts"—all of them scientists—would give briefings or testimony to the panel, thus framing the issues in advance (Marris and Joly, 1999). The organisers saw those arrangements as necessary to correct or avoid biases in the existing public debate (OPECST, 1998a).

At the public hearings, the citizens' panel often challenged claims by experts about risks and benefits of GM crops. According to the panel's report, control by multinational companies could threaten farmers' independence. Genetically altered species posed a risk of standardisation. And GM rapeseed could lead to uncontrolled proliferation, both through pollen and seeds. Nevertheless GM crops could bring economic benefits to European agriculture, according to the report (OPECST, 1998b; Boy *et al.*, 1998). Together these arguments implied the need for national public-sector expertise in agbiotech innovation.

The panel's recommendations focused on institutional arrangements for better managing agricultural biotechnology. Such measures included greater social participation in scientific advice; public-sector research on ecological risks and agbiotech innovation; a system to ensure traceability of food derived from GM crops; and adequate labelling to inform consumer choice. "Until these conditions are satisfied, part of the panel believes that a moratorium would be advisable" (*ibid.*). By advocating state funds for agbiotech innovation, the panel accepted the government's problem-definition of a national technological gap whose solution requires public-funded science, presumed to be benign. The panel's concerns about rapeseed complemented the French government's decision to oppose approval of GM herbicide-tolerant rape, on the grounds that gene flow could complicate weed control (Marris and Joly, 1999).

The panel's conclusions were translated into policy advice by the parliamentary organisers, as if they were neutral experts in the public good. Moreover, having attended the proceedings, the OPECST President presumed to speak for the panel: "Taking all these views into account he then himself adopted a position on a number of topics...He has identified the issues and looked into peoples' fears and concerns" (OPECST, 1998b). This

translation can be illustrated by the strategic issue of how to structure expert advice. The panel had proposed that a citizens' commission should be part of the scientific advisory committee. Yet OPECST recommended instead that it be kept separate; this proposal could better perpetuate a neutral image of scientific advice, thus reinforcing a boundary between expert/lay roles.

The panel's advice anticipated the general direction of government policy: more stringent regulatory criteria, risk assessment by a broader scientific expertise, and "independent" risk research, which was equated with public-sector institutes. It helped to legitimise and reinforce such initiatives, which had not been universally accepted within the government beforehand. In June 1998 the government announced measures along those lines (Marris and Joly, 1999). Institutional reforms emphasised expert procedures to minimise the risks and enhance the benefits of a controversial technology.

Despite its limitations, the citizens' conference initiated a new form of active public representation and knowledge-production. Panel members explored techno-scientific and social aspects together from the perspective of ordinary citizens. They sought to inform decision-makers about the views of those who do not normally speak out—and who do not feel represented by political parties, trade unions, or environmental and consumer NGOs. This potential for participatory evaluation, especially for considering alternative options, was limited by the overall structure, especially the small opportunity to interact with designated experts (Joly *et al.*, 2003). The Agriculture Ministry had claimed to implement "participatory democracy", yet the exercise extended the French tradition of technocratic governance (Marris and Joly, 1999).

UK 2003 public dialogue: Policing lay/expert boundaries

From the late 1990s onwards there has been widespread public controversy over agbiotech in the UK. Protest actions and attacks on field trials gained public support by linking GM crops with various issues—BSE, other food scares, globalisation, "pollution", etc. (Levidow, 2000). The government faced an impasse over regulatory decisions, especially the criteria for permitting a GM herbicide-tolerant maize which the EU had approved in 1998. As a key issue, conservation agencies had warned that changes in herbicide use could harm farmland biodiversity, so the government funded farm-scale trials to monitor such effects.

To address wider issues beyond risk regulation, the government had created the Agricultural and Environment Biotechnology Commission in 2000. Its report, *Crops on Trial*, advised the government to initiate an "open and inclusive process of decision-making" within a framework that extends to broader questions than herbicide effects. It proposed a "wider public debate involving a series of regional discussion meetings" (AEBC, 2001). The government was persuaded to sponsor this, against the backdrop of the existing intense, sporadic debate.

Representing public views?

Called *GM Nation?*, the official public debate was carried out in the summer of 2003. Beforehand the government vaguely promised “to take public opinion into account as far as possible”. The exercise was intended for the organisers to gauge public opinion, rather than for participants to come to a collective view on expert matters (Horlick-Jones *et al.*, 2006). *GM Nation?* also aimed to elicit views of the ordinary public, rather than organisational representatives. This was an artificial distinction, given that most civil society organisations and wider social networks had discussed agbiotech in previous years.

GM Nation? featured several hundred public meetings open to anyone interested. They drew over 20,000 participants (DTI, 2003). The government sponsors had asked the contractors to involve “people at the grassroots level whose voice has not been heard”. As the official evaluators noted afterwards, however, it was difficult to distinguish clearly between “an activist minority” and a “disengaged, grassroots minority”. Many participants in *GM Nation?* were politically engaged in the sense that their beliefs about GM issues formed part of their wider worldview. Indeed, “grassroots” conventionally means local organised activists, yet this term was inverted to mean a passive, uninformed public.

Separate focus groups were organised to allow “the public” to frame the issues according to their own concerns. To exclude “activists” from these focus groups, candidates underwent surveillance and screening. As one critique noted, “Perhaps paradoxically, the desire to allow the public to frame the discussion in their own terms led the organisers to rely on private and closely monitored forms of social interaction” (Lezaun and Soneryd, 2006). In this way, the more informed, expert citizens were excluded from representing the public.

Expert/lay roles

GM Nation? formed part of an overall public dialogue with a tripartite structure. It was designed mainly for the lay public, while explicitly distinguishing between lay and expert issues. In parallel, an expert panel carried out a science review of literature relevant to risk assessment. A government department carried out a cost-benefit review of GM crop cultivation in the UK.

For the carefully selected focus groups, the organisers commissioned “stimulus material”, so that participants would have a common knowledge-basis for discussion. The Steering Group asked the contractors to supply “objective” information. The ultimate material did include divergent views, but their sources were removed from the workbook for focus groups. Afterwards the official evaluators questioned whether such information “is meaningful if it is decontextualised by stripping it from its source” (Horlick-Jones *et al.*, 2004; Walls *et al.*, 2005).

Thus, people had little opportunity to make judgements on the institutional source of expert views in the *GM Nation?* focus groups. Omission of the sources was not simply a design deficiency in the exercise. By default, the issue of expert credibility was diverted and reduced to scientific information about biophysical risk. Participants had little basis

to evaluate such information, so the exercise constructed a lay/expert boundary, constraining public roles even more narrowly than in the wider public debate.

In sum, the UK public dialogue involved a struggle over how to construct the public, especially in relation to expertise. Boundaries were imposed between apolitical grassroots versus activist, as well as between lay versus expert status. Nevertheless participants challenged those boundaries, performed different models of the public and questioned dominant expert assumptions.

Democratising agbiotech or biotechnologising democracy?

The exercises described here differed greatly in several respects—their policy contexts, links to policy-making, basis for participant selection and prevalent problem-definitions. In the Danish and French cases, for example, a parliamentary body hosted the participatory initiative in a crisis period; parliament sought a more authoritative role in agbiotech policy at a time when government decisions were expected soon. This linkage helped to stimulate wider public involvement, to broaden the issues, and thus to influence the overall policy debate (Klüver, 1995; Joss, 1998). The German and UK cases were relatively more distant from government decisions or policy debates. In most cases the participants were chosen as ordinary citizens, while in the German case they were quasi-expert representatives of stakeholder groups.

In responding to or anticipating public concerns about agbiotech, these participatory TA exercises had diverse, overlapping or even contradictory aims. These included democratising technology, educating the public, countering “extreme” views, gauging public attitudes, guiding institutional reforms, and/or managing societal conflicts. Such aims had a bearing upon the design, management, staging and process of each exercise. Each process generated diverse accounts of technology, the public, expertise and democracy (cf. Joss, 2005a).

To some extent, participatory TA exercises have helped to hold governments accountable for regulatory criteria, but not for innovation choices. These participatory TA exercises generally internalised assumptions about agbiotech as societal progress, while leaving little space for alternatives. Despite aspirations to democratise technological choices, the exercises tended to biotechnologise democracy by:

- Constraining the scope of discussion. The process internalised and reinforced policy assumptions that agbiotech is essential, although perhaps warranting more rigorous, publicly accountable regulation. Regardless of other views held by TA participants, any wider deliberation was constrained by a search for consensus, by the design of each exercise, and by the government policy framework. This overall context limited what could influence the process, and thus what roles could be credibly performed by participants (cf. Hajer, 2005). Consequently, tensions arose between discussing a “common” problem—how to make agbiotech safe or acceptable—versus encompassing problems of

political-economic control, innovation choices and societal futures. Some participants questioned whether agbiotech would provide a means for sustainable agriculture and a benign control over the agri-food chain; some suggested the need for alternatives. These questions were generally channelled into regulatory criteria and reduced to control measures.

- Framing citizens' roles within the "risk" frameworks of EU and/or national legislation. The German TA exercise is an extreme example: the NGO representatives could only maintain their official expert status by accepting the risk-benefit framework. Instead they rejected these terms, demanded a broadly comparative assessment, found themselves relegated to the status of lay public or irrational objectors, and ultimately withdrew. In the 2003 UK public dialogue, the official structure separated expert matters from other issues for discussion by lay participants.
- Imposing artificial boundaries. In the design and management of the TA exercises boundaries were imposed—between biotechnological imperatives versus alternative options, between scientific versus policy issues, as well as between expert versus lay roles—thus closing down issues. By contesting those boundaries, some participants opened up policy issues and produced different understandings of the policy problem (cf. Hajer, 2005), implying broader roles for citizens. If analysed in this way, then public engagement can "clarify what conflict is really about" (de Marchi, 2003).

Practical implications

This analysis has practical implications for prospects of democratising technology choices, or at least holding governments accountable for their technology policies. State-sponsored participatory TA can remain marginal to such efforts or even undermine them, depending upon the context, remit, design and management of the exercises. These features should be seen as political issues, in the sense that they favour some relations of power rather than others.

In order to democratise technology, participatory exercises should:

- Synchronise with key periods of government decision-making.
- Facilitate overlaps between "lay" and "expert" roles.
- Examine the assumptions and limits of "risk" frameworks.
- Encourage scrutiny of "technical" aspects as value-laden, socio-political issues.

Such features may have some scope for influence by activists beforehand and by participants within the exercises. Likewise those features should be evaluated as a basis for judging whether or how participation can truly help to democratise technology choices. Regardless of state-sponsored exercises, the overall prospects will depend upon wider, autonomous forms of participation—neither sponsored nor welcomed by state bodies.

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- Critical Social Science for/on Contentious Technologies, workshop in November 2006, Egenis Centre, Exeter.
- Critical Issues in Science and Technology Studies, 6th Annual IAS-STIS Conference, May 2007, Graz.
- Science and Democracy Network annual meeting, June 2007, Cambridge, UK.

A longer version of this paper, including a theoretical literature survey (Levidow, 2007), is available at <http://technology.open.ac.uk/cts/bpg>. Thanks especially to Fiona Hall for the editing of this version.



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