

# Social Studies of Science

<http://sss.sagepub.com>

---

## **The Politics of Talk: Coming to Terms with the 'New' Scientific Governance**

Alan Irwin

*Social Studies of Science* 2006; 36; 299

DOI: 10.1177/0306312706053350

The online version of this article can be found at:  
<http://sss.sagepub.com/cgi/content/abstract/36/2/299>

---

Published by:



<http://www.sagepublications.com>

**Additional services and information for *Social Studies of Science* can be found at:**

**Email Alerts:** <http://sss.sagepub.com/cgi/alerts>

**Subscriptions:** <http://sss.sagepub.com/subscriptions>

**Reprints:** <http://www.sagepub.com/journalsReprints.nav>

**Permissions:** <http://www.sagepub.co.uk/journalsPermissions.nav>

**Citations** <http://sss.sagepub.com/cgi/content/refs/36/2/299>

**ABSTRACT** Talk of public dialogue and engagement has become fashionable internationally, and particularly within Europe. Building especially upon recent British experience, this paper argues that 'public talk' (that is, talk both by and about the public) represents an important site for science and technology studies analysis. The relationship between 'new' and 'old' approaches to scientific governance is considered. Drawing upon a series of official reports, and also the *GM Nation?* public debate over genetically modified food, the paper suggests that, rather than witnessing the emergence of a new governance paradigm, the current approach can more accurately be portrayed as an uneasy blend of 'old' and 'new' assumptions. Eschewing a straightforward normative account, the paper explores the social construction of public talk, the relationship between talk and trust, the search for the 'innocent' citizen, and the pursuit of social consensus. Current initiatives should not simply be criticized for their inadequacies, but should also be viewed as symptomatic of the state of science–society relations. In that way, stresses and strains within the politics of public talk assume wider analytical significance than the 'mere talk' epithet would suggest.

**Keywords** genetically modified food, *GM Nation?*, public engagement, science and democracy

## The Politics of Talk:

### Coming to Terms with the 'New' Scientific Governance

*Alan Irwin*

We recommend . . . that direct dialogue with the public should move from being an optional add-on to science-based policy-making and to the activities of research organisations and learned institutions, and should become a normal and integral part of the process. (House of Lords Select Committee on Science and Technology, 2000: 43)

The proposed action plan marks the beginning of a long process, the objective of which is to change the relationship between science and society. (European Commission, 2002: 27)

As the above quotations suggest, talk of public dialogue and engagement has become increasingly commonplace in Europe – with the UK, previously criticized for its narrow reliance on sound science and administrative caution, a prominent example. Conceived largely in response to an

*Social Studies of Science* 36/2 (April 2006) 299–320

© SSS and SAGE Publications (London, Thousand Oaks CA, New Delhi)

ISSN 0306-3127 DOI: 10.1177/0306312706053350

[www.sagepublications.com](http://www.sagepublications.com)

apparent legitimization crisis, the new assumption appears to be that greater public consultation over scientific and technological developments can eliminate (or at least reduce) subsequent opposition to technical change and achieve broad social consensus. Transparency and openness are intended to win back members of the public who have grown sceptical of governmental risk-handling. Stung by criticisms of institutional failings and official aloofness, recent initiatives have attempted to draw the public into decision-making and establish a more responsive culture for innovation.

At the core of this paper is an attempt to engage empirically and conceptually with these developments. In particular, there is a pressing need to move away from the orthodox science and technology studies (STS) defence of public participation and citizen-science engagement (Irwin, 1995) towards an analytically sceptical (but not dismissive) perspective on the 'new' mode of scientific governance. This is especially relevant when the language of STS, and, especially, criticism of the 'deficit theory' (for example, Irwin & Wynne, 1996), has been partly influential in encouraging the emergent governance discourse. It can also be speculated that uncritical treatment of current science–public interactions might lead to an equally uncritical backlash when policy expectations of public consensus and support are (almost inevitably) disappointed.

Taking the British example, from the late 1990s there has been a partial, but nevertheless significant, rhetorical shift towards a style of scientific governance based on public dialogue, transparency and democratic engagement. Assertions of the importance of public trust and the need to take social concerns seriously now represent a standard part of the policy repertoire. In remarkably few years, an (admittedly attenuated) form of the language of STS has been reconstructed as the language of policy. Without wishing to attribute unilinear causality (since debates over public trust and confidence, openness and engagement are a feature of various areas of contemporary social life),<sup>1</sup> it is certainly possible to identify a resonance – and at times an explicitly-drawn connection – between previous STS research and the current policy emphasis on trust, transparency, uncertainty and dialogue.<sup>2</sup> At least on a superficial reading, the 'old' reliance on committees of technical experts has been augmented by 'new' talk of 'science and society' and even the most science-centred government report is incomplete without a section on 'public engagement'. As the 2003 UK *Forward Look* on government-funded science, engineering and technology puts it: 'The public must be given opportunities for dialogue with scientists and policy makers – to learn about and express their views about the possible directions of science and its impacts on society' (Department of Trade and Industry, 2003: 8).

However, and in illustration of the difficulties of this putative shift from 'deficit' to 'democracy', reports from government-funded scientific bodies simultaneously endorse the old policy imperative of 'sound science'. For example, the chair of the Food Standards Agency (FSA) argues in his contribution to the 2003 *Forward Look* that '(s)ound science is essential for

underpinning the Agency's policies' (Department of Trade and Industry, 2003: 55). Later in his short report, he also links 'consumer research' to the goal of earning people's trust, saying that such research can 'ensure that our policies take into account the views and priorities of all groups of consumers' (Department of Trade and Industry, 2003: 58). The apparent assumption is that, far from being in opposition with one another (as in the familiar dichotomy between 'democracy' and 'technocracy'), sound science, public dialogue and indeed social science (at least in the form of consumer and attitudinal research) can be comfortably accommodated. The modernist belief in science-led progress (Bauman, 1991) is not being rejected in such statements, but is instead augmented with an assertion of the essential compatibility of (particular forms of) science and democracy.

While noting the emergence of a fresh phase of science–public relations, therefore, it is also important to stress the apparent tensions, shifts in emphasis and partial contradictions within the 'new' mode of scientific governance. As this paper will discuss, many familiar challenges of science–society relations remain in place with the 'new' approach to public policy-making. Not least among these is the status to be granted expert knowledge within more open engagement processes (Collins & Evans, 2002). At a very practical level, the form and design of such processes can have a substantial impact on the content of actual engagement (Renn et al., 1995; Irwin, 2001). It follows that the previous polarization of 'technocracy' and 'democracy' needs to be replaced by a more nuanced discussion of possible forms of engagement and the assumptions underpinning these. Occasional experiments in engagement depend on wider institutional cultures and their operational assumptions. As will be suggested below, the current espousal of more active forms of scientific citizenship has not generally been accompanied by simultaneous policy reflection on the culture of science or the changing character of scientific governance.

The work of a number of social scientific and STS critics can certainly be read as casting reasonable doubt on the putative shift towards a more open and two-way relationship between scientific institutions and the wider publics. For example, Anne Kerr has considered changes in the 'new genetics' and concluded that 'it would ... be naive to assume that ... present relationships between professionals, patients, publics and genetic diseases are fundamentally different from those of the past' (Kerr, 2003: 220). The very plausible implication is that relations of professional power are not likely to disappear simply as a consequence of publicly stated recommendations. A previous study of one specific UK public consultation exercise documented the structural constraints on the possibilities for scientific citizenship imposed by the institutional framing of the exercise (Irwin, 2001). Rob Hagendijk has also observed the merely partial acceptance by policy-makers of lessons from social scientific work in this area. He particularly notes that a recent European Commission paper on *Science, Society and the Citizen in Europe* (European Commission, 2000) 'reads as if two voices are struggling to be heard' (Hagendijk, 2004: 46). A

dominant 'inclusive' voice stresses public dialogue, and a second, 'scientific' voice tells the reader that the public can only make its contributions if it is properly instructed and educated.

A recent European research report (Public Perceptions of Agricultural Biotechnologies in Europe [PABE]) also observed a widespread gap between policy-makers and the wider publics. In particular, the PABE report revealed 'the persistence of a number of entrenched views about the public shared by numerous policy actors which are not supported by our analysis of the views of ordinary citizens' (Marris et al., 2001: 7). Accordingly, the research team identified ten prevalent myths about public responses to genetically modified organisms (GMOs) that were roundly contradicted by focus group participants. The first of these myths is that '[t]he primordial cause of the problem is that lay people are ignorant about scientific facts' (Marris et al., 2001: 9). The clear implication is that, far from entering a new 'dialogic' phase of science–public relations, the old cognitive deficit model is very much alive and well.

All of these commentaries rightly suggest that we should be cautious in the face of institutional claims to have embraced a new social contract of dialogue, transparency and consultation. At best, they imply that a more fundamental change in institutional practices – and in the cultural and epistemological assumptions which lie beneath them – is required before the transformation from deficit to democracy can be complete in those (largely European) countries in which such a shift is being advocated. Certainly, initiatives towards public engagement are usually minor and restricted by comparison with the bulk of scientific committees and institutional processes that remain largely insulated from shifts in governance philosophy.

Perhaps the strongest statement of the institutional challenge comes from Brian Wynne, who has argued that 'more democratic and environmentally sustainable forms of influence over science and technology' have been undermined by the manner in which 'the dominant culture reinvents and extends its unreflexive founding commitments in the face of . . . critique and public disaffection' (Wynne, 2002: 472). In particular, the human dimensions of technical change are denied by expert discourses that reduce more ambiguous framings of such issues as genetically modified (GM) foods to a scientific discussion of risks and benefits. Larger questions of the character and direction of scientific and technological change are effectively ignored whilst 'risk' comes to be defined in narrow, technically measurable terms. Put like this, the challenge is not simply administrative (a matter of tinkering with existing procedures and practices), but is far more radical in scope and depth. In essence, new epistemological as well as political understandings are required before substantial changes in the science–public relationship can occur.

Taken together, the limitations of the 'new' governance initiatives can best be understood as culturally and institutionally embedded rather than narrowly administrative or merely technical. However, it is also important that we avoid the over-hasty dismissal of what, as this paper will argue,

represents an important area of institutional and political activity. The contemporary discourse of scientific governance is indeed contradictory and partial. Certainly, combining as it does the 'new' rhetoric of public engagement and openness with the 'old' language of science-led innovation and sound science, it evades categorization in any easy or straightforward fashion. Nevertheless, and especially in the wake of recent controversies over mad cow disease (bovine spongiform encephalitis [BSE]) and GM food, it represents an important indicator of science–public relations during an especially turbulent period.

For STS, the challenge is to explore the social constitution of both policy institutions and policy discourse. Thus, the pervasive – and influential – STS critique of expertise and its constraints within the policy process<sup>3</sup> also needs to take account of the social construction of scientific citizenship and the operation of political, epistemological and institutional processes in a dynamic global environment. Irwin and Michael have proposed the notion of 'ethno-epistemic assemblage' to describe these shifting forms of encounter which can no longer be constrained to the traditional operation of democratic citizenship or of national governments (Irwin & Michael, 2003). Accordingly, the very assumption that public engagement can be conducted at a national level when so many of the issues have been globalized becomes a provocation to STS research – including, crucially, discussion of the variable meaning of 'globalization' in this context (for example, as presented by economic, scientific and activist discourses).

While noting the substantial existence of continuity as well as change, this paper will argue that there are several noteworthy features that mark the 'new' scientific governance apart from its predecessors. Thus, one can detect that the old language of cognitive deficit increasingly is in competition with talk of a new form of deficit: this time a deficit not of scientific understanding but of *public trust*. Just as top-down communication was seen as the cure for the old deficit, greater openness and consultation can remedy the new one (even if the 'new' style characteristically represents a very top-down commitment to the bottom-up [Horst, 2003]). In addition, at the heart of the emergent scientific governance can be found a commitment to '*social consensus through engagement*', which for the UK and European Commission, in particular, represents a marked departure from previous approaches to science and technology policy. Whilst claiming to be open to changing public assessments and concerns, the commitment to consensus building can suggest a decidedly homogeneous model of wider society (and one that differs markedly from recent social theoretical accounts [see, for example, Urry, 2000]).

Rather than trying to decide whether the 'new' scientific governance is tokenistic or sincere, substance or spin, this paper advocates a treatment of such statements as *symptomatic* of the contemporary culture of scientific and technological change. In particular, it is important to explore the full character of current policy discussions and especially the manner in which they blend modernistic assumptions of sound science, institutional control

and administrative rationality with a language of two-way dialogue, transparency and ‘taking citizen concerns seriously’. In this situation, it is inevitable that external critics will view current initiatives as restricted and compromised – and for reasons that extend beyond the contingencies of institutional action under pressures of time and resources. Meanwhile, there is the distinct possibility that such criticisms will frustrate institutions that view themselves as operating in good faith and to high professional standards. The task for STS is then to explore the nature of these shifting representations of scientific governance and to elucidate their core assumptions about both expertise and citizenship. I will commence this task through a brief discussion of a series of UK and European reports that map out the new landscape of science–public relations.

In what follows, I attempt to move away from a normative debate over the *principle* of public engagement in order to consider the social construction of the public, public opinion and the wider politics of talk. In so doing, I shall raise questions about the likely link between talk and trust, the institutional production of social consensus, and the elusiveness of the ‘innocent’ citizen. I shall consider the case of one UK debate over GM food, in order to reinforce the argument that the enactment and implementation of policy are at least as important as the wider rhetoric. As I shall argue, public talk (talk both by and about the public) constitutes an important, if at times confusing, area of policy discussion and academic inquiry.

While making these points, it should also be emphasized that what is ‘new’ in one context (notably, Britain) can be ‘old’ in others. Denmark, for example, has operated at least partially in this mode for some time – and may even be moving away from it following a change of government thinking and also a certain scepticism about the operation and impact of exercises such as consensus conferences.<sup>4</sup> The Netherlands also has a substantial record of public engagement activities – for example, in the broad area of environmental management. This paper is certainly not suggesting that the movement from deficit to democracy flows in one direction. Equally, and as we will observe, at the heart of the ‘new’ reside some very ‘old’ assumptions.

## The ‘New’ (and ‘Old’) Scientific Governance

As a society we can no longer, if we ever could, expect people to trust blindly in Government and scientists to get it right. Consumers will feel confident only if risks from new technologies are questioned and challenged in an open and informed way. (Department of Trade and Industry, 2000: 51)

In order to explore some of the above points about the constitution of ‘public talk’, we can take a closer look at a series of recent reports that advocate the ‘democratic’ style of scientific governance. The general discussion in this section will thereby clear the way for a more specific discussion of the case of the GM food debate. In this section, we will be

particularly attentive to the relationship between 'old' and 'new' elements within scientific governance.

One appropriate place to begin is with the 1998 UK Royal Commission on Environmental Pollution (RCEP) report on *Setting Environmental Standards*, which anticipated later documents by noting an 'apparent erosion of public trust in environmental regulation' (Royal Commission on Environmental Pollution, 1998: 113). In response, the RCEP offered an early statement of the 'new' style of governance:

A basic requirement for public trust which is not in general met at present is that the bodies setting environmental standards must operate in an open and transparent way. By 'transparent' we mean that there must be full publicity for their existence, their terms of reference, the decisions they take and the reasons for them. By 'open' we mean that there must be adequate opportunities for those outside an institution . . . to contribute fully to the decision-making procedure'. (Royal Commission on Environmental Pollution, 1998: 124)

The suggestion here is that the absence of public trust is a matter of concern for scientific governance (a regular theme of this and subsequent reports), and that openness and transparency can help remedy it. Elsewhere, and in anticipation of the Phillips report into the handling of BSE in the UK, the RCEP considered the particular difficulties of assessing risk and uncertainty, and of making the most appropriate use of scientific expertise. The report also stresses the contribution that can be made by 'non-experts'. Accordingly, lay people must be given a role in defining environmental problems and helping frame questions – not least so that 'people's values' can be articulated and recognized as an integral part of the environmental policy process. In very practical terms, the Royal Commission calls for more effective procedures for articulating values and for a new system of environmental regulation in which such values can be taken into account 'from the earliest stage in what have been hitherto relatively technocratic procedures' (Royal Commission on Environmental Pollution, 1998: 119).

Whilst these suggestions may not seem wildly radical to STS scholars, they do represent a significant shift away from the old UK emphasis on 'sound science' alone. However, and not unusually in this context, there is a particular danger of selective quotation from the RCEP since a large proportion of the report is spent on 'scientific understanding', 'technological options', statistical criteria for tolerability, and economic appraisal. It is here that Hagendijk's 'two voices' of inclusiveness, on the one hand, and scientism, on the other, become very apparent.

Whilst the latter parts of the RCEP report endorse an inclusive style of decision-making, the section on economic appraisal operates largely within a narrower universe in which objectives are clear and decision-making involves choosing between alternative methods for attaining them. As stated, such forms of appraisal offer little scope for direct public engagement. Elsewhere the report notes: 'A clear dividing line should be drawn between analysis of scientific evidence and consideration of ethical and

social issues which are outside the scope of a scientific assessment' (Royal Commission on Environmental Pollution, 1998: 28).

The point is that sound science has not been replaced or outmoded by the new style of governance. Instead, transparency and openness are presented as a means of convincing sceptical members of the public to trust decision-making processes: 'Openness and transparency will help satisfy the public about the expertise, objectivity and impartiality of the bodies involved in dealing with environmental problems' (Royal Commission on Environmental Pollution, 1998: 126). A similar 'presumption towards openness' can be found in the Government Chief Scientific Adviser's guidelines as they have appeared since 1997:<sup>5</sup> where uncertainty exists, this should be acknowledged; otherwise, public trust will be lost. The possibility that openness might *create* further grounds for criticism and concern is not considered. Instead, trust, transparency and restored legitimacy are tightly coupled. Meanwhile, the conventional model of 'best expertise' remains unchallenged: perhaps unsurprisingly, the central issue appears to be public trust in current mechanisms of science policy rather than a more fundamental reappraisal of the relationship between science and social change. As already noted, it is not too hard to detect within such rhetoric a more subtle version of the old deficit model: the deficit of trust partially replaces (or simply augments) the previous concern with the deficit of understanding. The Secretary of State for Trade and Industry put it as follows in the 2000 UK white paper on science and innovation:

... as the debate over GM has shown, consumers will only buy new products which they trust ... Proposals in this White Paper will introduce a framework of proper safeguards, information and accountability, *providing the public trust which scientific developments must secure in order to benefit society*. (Department of Trade and Industry, 2000: ii, emphasis added)

One essential element within – and major stimulus to – this partial reconstitution of science policy–public relations has been the UK's BSE (mad cow disease) debacle. Although the Phillips report on the government's handling of BSE did not appear until 2000, the issue of BSE and the particular suggestion that science–public relations had been badly managed cast a long shadow over UK policy discussions during the late 1990s. As the Phillips report summarized the issues:

The Government did not lie to the public about BSE. It believed that the risks posed by BSE to humans were remote. The Government was preoccupied with preventing an alarmist over-reaction to BSE because it believed that the risk was remote. It is now clear that this campaign of reassurance was a mistake. When on 20 March 1996 the Government announced that BSE had probably been transmitted to humans, the public felt that they had been betrayed. Confidence in government pronouncements about risk was a further casualty of BSE. (Phillips et al., 2000: para. 1)

Certain themes emerge strongly in the Phillips report: poor risk communication; a bureaucratic system that struggles to deal with uncertainty;

unwarranted reassurances being offered to the public which ultimately caused even larger problems; a culture of secrecy within the main government department; an overall reluctance to reveal what the Chief Scientific Advisor termed the 'full messy process whereby scientific understanding is arrived at' (Phillips et al., 2000: para. 1297); and a characteristic willingness, as another key witness put it, to 'make more reassuring sounding statements than might ideally have been said' (para. 1295). Among the various lessons presented by the Phillips report, two stand out in the present context: 'Trust can only be generated by openness'; and 'The public should be trusted to respond rationally to openness' (para. 1301). The policy formula once again would appear to be that greater openness will engender enhanced public trust. What Phillips does not consider is that (as Kevin Jones [2004] has argued) public groups may have more far-reaching questions to ask than can be raised within this 'risk and consequences' framework (for example, about the state of modern agriculture or the status accorded to science by policy-makers). Equally, the precise relationship between openness/engagement and enhanced institutional control is left unexplored.

Meanwhile, the lessons from Phillips have continued to percolate through government strategy and risk management. Thus, the Cabinet Office Strategy Unit's 2002 report on risk repeatedly emphasizes the importance of building public trust and confidence even if the call for a 'more proactive two-way communication process' (Strategy Unit, 2002: 76) sits somewhat uneasily with the governmental concern to adopt what are seen as systematic approaches to strategic policy-making (for example, attempts to link the tolerability of risk to the 'as low as reasonably practicable' [ALARP] principle). What seems to be emerging is that the new scientific governance advocates *both* increased openness *and* a more professional/centralized control over risk-management. Although not necessarily in contradiction, the clear implication is that the possibilities for public challenge to the dominant institutional framework of risk management will be constrained.

Perhaps the most considered statement of the 'new' policy approach comes in the House of Lords Select Committee on Science and Technology 2000 report on *Science and Society*. Drawing quite explicitly on STS,<sup>6</sup> the report notes the 'crisis of confidence' in society's relationship with science. Although scientific knowledge does not have a moral dimension in itself, science is conducted by individuals who certainly possess morality and values and these should be applied to their work. Scientists should 'declare' these values, engage with the values of the public and in so doing become 'far more likely to command public support' (House of Lords Select Committee on Science and Technology, 2000: 5).

The Lords' report continues by emphasizing the 'new mood for dialogue'. Currently, such initiatives as citizens' juries and local consultations tend to be 'isolated events'. Instead '(t)he United Kingdom must change existing institutional terms of reference and procedures to open them up to more substantial influence and effective inputs from diverse

groups' (p. 7). Direct dialogue with the public should therefore 'move from being an optional add-on to science-based policy making' and instead become 'a normal and integral part of the process' (p. 8). Science ignores public attitudes and values at its peril. However, the call for 'increased and integrated' dialogue is intended to secure what the Lords see as science's 'licence to practise', but not to *restrict* it. As the report emphasizes, the 'presumption of openness' is not intended to block scientific progress, but instead to create a more open and reflective culture where new scientific possibilities can be fully realized. Put differently, the historical commitment to progress through science is maintained: the challenge is to find more inclusive methods to achieve such progress.

The theme of securing social and scientific progress through enhanced public confidence can be identified in other official reports. Thus, in line with the quotation at the beginning of this section, the 2000 UK White Paper on science and innovation treats such issues under the revealing heading of 'confident consumers' (Department of Trade and Industry, 2000). Meanwhile, one of the most evocative statements of social progress through science – with public engagement the route to rebuilding trust and confidence – came with the UK Prime Minister's April 2002 speech suggestively entitled 'Science Matters' (Blair, 2002). Largely a paean to science ('we stand on the verge of further leaps forward in scientific endeavour and discovery'), the speech stressed three main points. First, that science is 'vital to our country's continued future prosperity'. Second, that science is posing 'hard questions of moral judgement and of practical concern, which, if addressed in the wrong way, can lead to prejudice against science'. Third, 'the benefits of science will only be exploited through a renewed contract between science and society, based on a proper understanding of what science is trying to achieve.' The clear implication is that society must understand science better rather than vice versa.

Having specifically admired current research in nanoscience, environmental technologies, e-science and biomedical science, and praised Britain's research productivity, Tony Blair noted: 'We need strong funding and strong public support'. Public concerns about the pace of change meanwhile are seen as not entirely new. Science is sometimes 'wrongly blamed' for others' faults: 'Bad science didn't cause the spread of BSE; it was bad agriculture and poor government.' At this point, the now-familiar litany of 'openness, transparency and honesty' emerges. At the core of the speech there is a 'fundamental distinction', however: 'between a process where science tells us the facts and we make a judgement; and a process where a priori judgements effectively constrain scientific research. So let us know the facts; then make the judgement as to how we use or act on them.' In the end, the Prime Minister's call – alongside the previous documents considered here – is for a 'robust, engaging dialogue with the public. We need to re-establish trust and confidence in the way that science can demonstrate new opportunities, and offer new solutions'.

Science on this basis will clearly play a central role in 'building the world we want'. Blair's vision is of Britain as a 'powerhouse of innovation'.

The main alternative is a 'culture of unreason'. Reaching for one of the standard rhetorical tools of the politician (and indeed of blues musicians), he presents Britain as standing at a crossroads. On the one side, there is a 'path of timidity in the face of the unknown'. On the other, we have a 'nation at ease with radical knowledge, not fearful of the future, a culture that values a pragmatic, evidence-based approach to new opportunities'. As Blair concludes, '(t)he choice is clear. We should make it confidently.'

It should also be stressed that similar language can be found at the European level. The 2001 White Paper from the European Commission on European Governance discusses issues of building public confidence in the use by policy-makers of expert advice (European Commission, 2001). The European Commission's 2002 action plan on science and society adopts a more muted rhetoric than the UK Prime Minister, but offers a similar blend of praise for science, public concern over the pace of scientific change, and the perceived need to instil 'a sense of trust' in the public (European Commission, 2002: 25). For the Commission, this will involve promoting 'scientific and education culture' in Europe, bringing 'science policies closer to citizens', and putting 'responsible science at the heart of policy making'. The Commission document concludes with the ambitious objective of changing 'the relationship between science and society'. However, and as this section has generally suggested, this change is taking place within pre-defined institutional limits – such that those who wish to see a broader debate over the place of science in everyday life will be disappointed.

### Putting Talk into Action: The UK GM Consultation

As should already be evident, and in some contrast to the narrower policy treatment of the 1980s, a commitment both to economic progress through science and to public engagement can be identified within recent policy announcements. At the same time, these are more subtle shifts than the old/new formulation can wholly or adequately represent. Thus, running through these documents we can find a commitment to public engagement and openness, but also to longer-established notions of sound science. Two-way dialogue is stressed alongside a deep commitment to the 'powerhouse of innovation'. More systematic and managerial approaches to risk management are accommodated with calls for the active involvement of stakeholders. As already noted, there is a particular danger in selective quotation as, typically, one part of a document adopts the new language of re-building trust while another is committed to an established economic and technical agenda. This also applies, selectively, to academic commentators, since it is possible to represent such statements both as radical departures from and as mere re-statements of the cognitive deficit model. Should the new scientific governance be seen as old wine in new bottles (Grove-White, 2001) – as an empty flourish – or as an early portent of a larger change? One conclusion to be drawn from the previous discussion is that contemporary scientific governance represents an uneasy juxtaposition

(or churning) of *all* these elements. Such a conclusion, however, does not detract from the possibility that certain elements – particularly the commitment to science-led innovation – appear more unwavering than others.

The starting point for inquiry must be to view the new scientific governance as a legitimate object of study *in itself*. Rather than contrasting current discussions with some Habermasian ideal, seeking to squeeze them into one analytical model or else dismissing them as ‘business as usual’, it is important to approach these various statements as an expression of government thinking in the face of what is seen as a crisis of public trust in scientific institutions. To take, for example, the Phillips report into BSE, what emerges repeatedly is a picture of institutions highly sensitive to public concerns (not least for economic reasons), but which struggle to find an appropriate way to deal with those concerns. In that case, based on the belief that the risks were remote, the institutional response was to play down uncertainties. As one witness notably put it, ‘one was aware of slightly leaning into the wind ... we tended to make more reassuring statements than might ideally have been said’ (Phillips et al., 2000: 1295). The perceived failures of that approach led directly to the current calls for openness.

The key analytical point is that – in some contrast to policy debates in the 1980s and early 1990s – public anxieties over technical change have become a recognized feature of science and technology policy (at least in certain European countries), such that even the most upbeat of prime ministerial speeches is obliged to contain a section on re-establishing trust and confidence. After all, it is possible to reconstruct the story of BSE in the UK in a number of ways: as a failure of the technical advisory process, as bureaucratic inertia, or as European skulduggery. The attention to public concerns is not inevitable or pre-determined, but is instead a particular institutional and historical construction. The public may be elusive as a category, but talk about the public (and, to an extent, talk with the public) has nevertheless become a significant policy requirement. One question to emerge at this point, however, concerns how seriously we should take this ‘talk about talk’. In particular, what is the relationship between this broad rhetoric and institutional practice?

Accordingly, these points about the institutional construction of public concerns can be further developed through a short review of the UK’s most extensive experiment in public consultation: the *GM Nation?* debate over the commercial growing of GM crops in the UK.<sup>7</sup> Taking place during the Summer of 2003, this exercise involved a series of nationwide ‘top tier’ events attended by more than 1000 people, as well as 40 or so regional and county events and 629 local meetings. A website that covered the debate received over 2.9 million hits, and more than 1200 letters or emails were sent to the organizing body. About 37,000 feedback forms were returned. The debate itself was designed to be ‘innovative, effective and deliberative’ and also ‘framed by the public’. Its aim was to ‘provide meaningful information to Government about the nature and spectrum of the public’s

views, particularly at the grass roots level, to inform decision-making' (*GM Nation?*, 2003: 11). The main conclusions of the report can be summarized as follows: people are generally uneasy about GM crops; the more people engage in GM issues, the harder their attitudes and the more intense their concerns; there is little support for early commercialization; there is widespread mistrust of government and multi-national companies. Simply put, the report characterizes public opinion over the commercialization of GM crops as 'not yet – if ever'.

Against the background of the previous discussion concerning scientific governance, the *GM Nation?* debate particularly raises questions about the translation of sweeping policy statements into actual engagement initiatives. Inevitably, such initiatives hinge both upon the broad aims adopted (in this case, to operate an open exercise in which 'the public is always right'), but also upon the specifics of enactment and implementation. Within *GM Nation?*, there was a particular concern to avoid 'capture' (or subversion) of the debate by 'special interests'. Thus, one important perceived advantage of canvassing general public opinion was that it would avoid the debate being dominated by the familiar stakeholders or becoming polarized between pro- and anti-GM groups. Special measures were taken within the exercise – in the form of deliberately convened workshops – to involve members of the public who had not previously been 'actively involved in discussing GM issues'. Despite such measures, and given the sceptical evaluation of GM crops within the exercise (with members of the public struggling to identify any current benefits from GM crops), there was a lively discussion after the event concerning the possibility that anti-GM groups had indeed captured the public discussion element of the debate. Thus, in a highly critical report on the initiative, a House of Commons committee concluded that '[i]t is profoundly regrettable that the open part of the process, far from being a "public debate", instead became a dialogue mainly restricted to people of a particular social and academic background. *The greatest failure of the debate is that it did not engage with a wider array of people*' (House of Commons, Environment, Food and Rural Affairs Committee, 2003: 15, emphasis added). The Commons report also noted (p. 15) that 'the debate needed to go into their living rooms, rather than be conducted in the village hall'. Lack of time and money were blamed by the cross-party group of Members of Parliament for this alleged failure.

Meanwhile, in a related development, 114 leading UK scientists, including a Nobel laureate and numerous Royal Society fellows, wrote to the UK Prime Minister warning him of the 'demoralization' of British scientists due to the hostile social climate, complaining of the 'backward slide' in the debate over GM, and stressing the risk of 'seeing other technologies lose out to prejudice and procrastination'. The main signatory of the letter, Professor Derek Burke (former chair of the key advisory committee on novel food products) was also quoted as strongly criticizing the GM debate: 'The public meetings were awful . . . They were seen as rallies by the green groups and the questions were just hostile.'<sup>8</sup> If nothing

else, this highly public intervention should remind us of the turbulence that surrounds the 'new' governance of science – and also of the risks of a subsequent backlash from those who feel that their own special standing is being undermined.

Linked to this issue of 'capture', the UK GM debate also illustrates the challenges of creating consensus around such topics and, more generally, of representing (and constructing) public opinion. The organizers were keen to avoid the debate becoming a simple yes or no to GM crops. Instead 'it should establish the nature and full spectrum of the public's views' (*GM Nation?*, 2003: 10). In the end, however, the *GM Nation?* report stressed a singular 'public agenda' and found significant 'common content':

Whether they write a letter or an e-mail, or visit the website, or express themselves at a meeting, or sit down with each other in a deliberative process, people raise the same types of issues and concerns about GM. They use the same kinds of argument whether they are asked to think hard about the issues or choose to express themselves from the top of their head. (*GM Nation?*, 2003: 18)

Meanwhile, the structure of the debate – with groups of citizens placed around separate tables, briefing materials being carefully balanced and a general exhortation to give different opinions a respectful hearing – would appear to encourage the establishment of consensus rather than polarization.

This emphasis on 'common content' is a striking feature of the final report, contrasting as it does with the conventional portrayal of GM in the UK as a controversial and polarized topic (and also contrasting, of course, with the opinion of the 'GM scientists' as represented above). The suggestion is that by circumnavigating the usual stakeholders, it is possible to tap into a less prejudiced (and more 'representative') public opinion. However, organizations such as the Agricultural Biotechnology Council (ABC) argued after the event that this was a false consensus among a restricted range of parties, rather than a representation of true public opinion. In its evidence to the Commons committee, the ABC noted that 70–80% of meeting attendees were 'members of organised campaign groups' and only 12% of the feedback forms were from people with 'no fixed views on GM'. The implicit premise here – as elsewhere in this discussion – is that organized groups represent a problem for this form of public debate and, conversely, that 'true' public opinion must be held by those without 'fixed views'.

One other feature of the *GM Nation?* debate that deserves attention is its relationship to government, on the one hand, and to economic and scientific appraisals, on the other. It is highly significant that in this case the exercise was conducted not by a government department or a particular minister, but by an independent commission acting on behalf of the government. The debate developed from a recommendation by the Agriculture and Environment Biotechnology Commission (AEBC) – a body that provides strategic advice to government on biotechnology issues. The AEBC then set up a steering board to conduct the eventual debate.

This 'arm's length' relationship with government provided a degree of independence (and some lively discussions between the AEBC chair and the government minister concerning the funding and duration of the debate). However, this relationship also raised questions about the status of the eventual conclusions and thus the connection between public debate and public policy. Certainly, the UK Government offered no guarantee during the exercise that it would act upon the report, but instead, in the words of the minister, promised to give the outcome 'careful consideration'. This relationship therefore raises further questions concerning the role of government in such exercises. In this case, government wished not to be too closely associated and certainly not pre-committed to any consequent course of action.

Whilst this may be a reasonable position from government's point of view, it does of course raise questions about the practical value of such exercises from a public perspective. As the Commons committee noted, the danger of this arm's length approach (and specifically of the lack of clarity from the government about how debate findings would be taken into account) is that it will render such exercises toothless and tokenistic. In its eventual response to the dialogue, the UK Government opted for a 'case by case' approach to the future development of GM. The relevant department observed that 'the general public may have a lower degree of outright opposition to GM than the participants in the debate' and 'that to some extent GM crops have become a focus for much wider concerns' (Department for Environment, Food and Rural Affairs, 2004: 4). The implication of this Government response is that the debate is now seen as officially over, with business as usual resuming (although certain points from the wider discussion have been officially acknowledged).

The linkage between public debate and 'technical' appraisal must also be considered. The debate ran in parallel with a separate review of the available science and an economic assessment of the costs and benefits of GM crops. The economics report was published 7 days before the end of debate, while the science review appeared 3 days *after* the debate's conclusion. Meanwhile, public discussion was concluded before publication of the main field trials of GM crops (the farm-scale evaluations, which might, for example, have had major consequences for the possibility of Britain maintaining both organic and GM food production). It would appear that the construction of public debate, economic and scientific reviews as three separate strands inhibited<sup>9</sup> the possibility of transparent public engagement in 'technical' analysis or of public discussion openly reflecting upon technical issues raised by the other streams.

The case of *GM Nation?* therefore suggests something of the practical realities and conceptual challenges of putting the 'new' scientific governance into operation. On the one hand, the exercise can legitimately be presented as Britain's most thoroughgoing attempt to consult with the larger public and to gain broad social consensus over the direction of technical change. On the other, the scale and timing of the debate (essentially, 5 weeks' duration and with a budget of only £500,000), and

the construction of 'firewalls' from both government and technical analysis restricted it in many ways. Certainly, it was difficult for such a limited exercise to gain real national momentum and many citizens could easily ignore the whole debate.

Those who did take part often expressed satisfaction that they had given their views and at least had been listened to. In that sense, talk can be presented as beneficial in itself: not least for allowing concerns to be shared and encouraging a sense that government is responsive to citizen views. However, *GM Nation*<sup>2</sup> was not intended by its organizers to be an exercise in mass therapy, but was to be a substantial contribution to public policy. One is accordingly left to ponder the government intentions for this exercise when so many aspects were either strictly constrained (notably, the tight deadline for completion and the available funds) or else left deliberately open (especially the status of the debate outcome). As the Commons report observes: 'The Government . . . must allay the suspicion that, having agreed to undertake a public debate, it did as little as it could to make it work' (House of Commons, Environment, Food and Rural Affairs Committee, 2003: 18). This view should stand as a corrective to over-exuberant talk concerning the emergent stage of scientific governance.

More broadly, there is a remaining issue concerning the politics of talk and, specifically, of the kind of 'public talk' which took place with regard to the UK GM debate. 'Public talk' for this purpose includes both talk among (or *by*) the wider publics, but also the equally energetic talk *about* the public by policy-makers and others. Amidst the new rhetoric of scientific governance, how is such talk being constructed and what consequences does it have for future deliberations over technical change? Once one moves beyond the normative representation of 'public talk' as a good (or bad) thing, the social constitution of such talk becomes a pressing topic for academic analysis and policy reflection, not least because of what it may suggest about current socio-technical relations.

## The Politics of Public Talk

Thus far, I have made a number of observations about the relationship between scientific governance and public talk. First, I have stressed the *flexible construction* of public talk: terms such as 'consultation', 'dialogue' and 'engagement' are open to variable interpretations and reformulations. Just as STS has emphasized that there is no unmediated access to nature, so too is there no direct or context-free access to 'the public'. Instead, and as was illustrated by the UK GM debate, public opinion is both elusive and open to multiple constructions, including claims and counter-claims about what the public 'really' thinks and what the 'real public' might be.

Second, I have noted the recurrent justifications for broader engagement, and especially the idea that open discussion will lead public groups to greater confidence in the quality and direction of decision-making. However, and as was again seen in the GM case, the link between *engagement and enhanced trust* can be decidedly tenuous.<sup>10</sup> Indeed, such

deliberations may lead to the outcome of enhanced criticism and scepticism: as when public groups express doubts over the practical consequences of a consultation initiative or further challenge takes place over the process itself. At the very least, it would appear that talk generates the desire for more talk. On this evidence, enhanced engagement alone cannot be presented as an antidote for public scepticism over technical change. Put generously, there is a naivety in certain arguments for 're-building' public trust and confidence through talk.

Third, I identified a concern with the *representativeness* of public debate. At times, this has been voiced in terms of the possibility of 'capture' by those with fixed opinions or members of campaign groups. On the one hand, this discussion prioritizes the 'open minded' (or 'innocent') citizen over those with existing views (the 'activists'). On the other, it suggests a model of democracy in which stakeholders can be marginalized and current polarizations avoided. Meanwhile, focus on the representativeness, rather than quality of engagement, contrasts markedly with the manner in which, for example, technical advice is generally considered.

Fourth, and linked to this last point, I have noted that the *pursuit of public consensus* appears to be a noteworthy characteristic of initiatives in scientific governance. At one level, this can be presented as a straightforwardly good thing: the establishment of a clear public view allows a solid platform for future innovation. However, the pursuit of wide social consensus – especially when coupled with the call for 'innocent' citizens rather than activists – represents a significant departure in terms of political culture for the UK, where previously the treatment of controversial technologies has either been adversarial in character (as in media treatments and public protests) or else – and more typically – focused on a narrower consensus between restricted participants (for example, within expert advisory committees). It can also be questioned whether consensus is either achievable or desirable within the complex and shifting conditions of contemporary social life (Irwin & Michael, 2003).

The above discussion also raises important questions about the *relationship between public and expert views*. The *GM Nation?* exercise offered the, apparently disappointed, promise that public views could be informed by scientific review of the same issues. However, and rather than simply criticizing the practical failures of communication between these strands, the wider point must be made that there is a considerable lack of clarity within the discussion of scientific governance concerning this whole relationship. The conventional wisdom generally remains that public and expert opinions should not be confused, but kept separate within decision-making processes (thus indicating once again that talk of the old deficit theory's demise is decidedly premature).<sup>11</sup> This also suggests that there is an unresolved question within policy circles concerning the epistemological status to be accorded public understandings (see also Jasanoff, 2003).

Taking these points together, it is not too hard to see a discursive struggle taking place within exercises in scientific governance over what

counts as legitimate talk and how talk should be constructed: *a politics of public talk*. Control over the framework for engagement – whether a consensus conference, an attitudinal survey, a web discussion or a wider debate – constitutes an important source of power (Irwin, 2001). It can be imagined that governments will be very reluctant to relinquish this or to broaden the form of public talk beyond current democratic and epistemological assumptions. However, and as appears to be the case in the wake of *GM Nation?*, institutions that embark on such exercises may find themselves under considerable pressure to support them more fully and to take their outcomes seriously. The alternative – as may be experienced in certain European nations – is what can, very crudely, be labelled ‘dialogue fatigue’ as engagement exercises come to be viewed as ritualistic and diversionary.

Where does this leave our larger discussion of the ‘new’ scientific governance? One tempting conclusion is that little has changed: we are simply in the old nexus of technocratic aspirations with the public construed as an obstacle to progress. Discussion in this paper certainly gives support to this suggestion – especially in terms of the practical implementation of over-ambitious political rhetoric. Undoubtedly, many issues remain unresolved concerning the purpose and status of public engagement. Such questions include the relationship between a small number of (by definition) atypical exercises and the more routine operation of scientific governance, and also the relationship between ‘public’ and ‘expert’ views.

In this situation, there appears to be something decidedly paradoxical about top-down efforts to stimulate the bottom-up (Horst, 2003). However, it is perhaps inevitable that government institutions will – unless there is a broader challenge – structure engagement initiatives in a manner that accords with their own operational assumptions and understandings of the policy process: hence the current concern with consensus, representativeness and the removal of public scepticism and caution. Meanwhile, the expression of political enthusiasm for a science-led society (the ‘powerhouse of innovation’) sits very awkwardly with calls for greater engagement: what scope can there be for dialogue when the direction is already set? Equally, the characteristic policy formulation persists in presenting engagement as a necessary obstacle before innovation can attain successful fruition.<sup>12</sup>

At this point, the relationship between public talk and the broader culture of governance becomes important. Despite the stated intention of allowing public groups to frame issues in a manner that approximates to their own experience, there is little evidence that public talk has brought about a wider cultural and institutional transformation. This point may be reinforced by the growing assessment in some European countries (such as Denmark and The Netherlands<sup>13</sup>) that such exercises have become increasingly bureaucratized and practically limited. Indeed, it could be argued that, in giving the appearance of democracy, such talk actually diverts from

a more adequate onslaught on deeper institutional and epistemic commitments (Wynne, 2003).

Whilst acknowledging such critical assessments of the 'new' scientific governance, a number of other arguments must be considered. First, that such criticism does not make the phenomenon of public engagement any less significant. On the contrary, even tentative and partial government responses to the perceived legitimation crisis represent an important area of study. Second, and linked to this point, that although science studies has a predilection for a normative treatment of these issues, it is important to explore science–public relations in an open, empirical and symmetrical fashion; rather than seeking to dismiss such initiatives, it is necessary to consider them as social experiments in themselves. Third, it is reasonable to predict that further public debate (or talk about talk) will occur over just the issues reflected upon in this paper. STS is uniquely placed to inform these debates. Fourth, it is precisely the strains and tensions of public talk that make it so indicative of current science–society relations. Thus, in the very pursuit of consensus, there is the implicit suggestion that consensus has become a problematic category within contemporary governance. Fifth (and in parallel to STS arguments about the nature of scientific knowledge [see, for example, Grint & Woolgar, 1997]), far from being a simple input to decision-making processes, public opinion should more accurately be seen as an *output* from particular institutional frameworks and forms of social construction. Sixth, such discussions remind us of the culturally embedded character of science–society relations and challenge us to re-formulate and enrich conventional models of scientific citizenship. As the discussion above suggests, a variety of models are available – from the confident consumer to the representative (or innocent) member of the public. However, the tendency remains in place to operate within a homogeneous model of the social structure and a restricted definition of the underlying issues. Finally, such discussions represent, not simply a response to particular technical issues, but also a re-constitution of political and national identity in the face of a perceived legitimation crisis. Although the engagement initiatives themselves may be marginal, the questions with which they deal are not.

Put in broader terms, the tensions and inconsistencies surrounding the politics of talk reflect larger (but generally marginalized) contestations over the direction and form of technical change. A modernistic commitment to innovation and global growth here encounters more democratic and inclusive perspectives on the necessity for, and direction of, such change. In these circumstances, a greater degree of deliberation and inclusion is presented as a means to resolve latent social tensions – but the effect can be to aggravate rather than assuage, to raise expectations and subsequently disappoint. All this in a situation where everyday discussions of, for example, risk may typically focus on more immediate local issues rather than topics such as GM foods or nanotechnology, which national and international policy-makers deem to be pertinent.

It is still unclear whether the current situation represents a passing trend before neo-liberal perspectives re-impose themselves or a partial shift in the character of scientific governance towards a more open process of social management and evaluation. It is not difficult to identify unchallenged assumptions and restricted frameworks of meaning within the limited number of initiatives so far conducted. At the same time, it would be premature to dismiss the 'new' concern with public talk.

Public talk can easily be derided as unsubstantiated words and empty rhetoric. The argument in this paper has been that such talk in itself represents a worthy focus for social scientific investigation. Rather than 'mere' talk, the current discussion of scientific governance reveals a great deal about governmental sensitivities in the face of an apparent public impediment (at least in certain areas) to science-led progress.

## Notes

I am grateful to Maja Horst and Kevin Jones for their comments on this paper. An early version of the paper was presented to the 2003 Society for Social Studies of Science conference in Atlanta and I am very appreciative of the helpful audience contribution.

1. As I write, the Labour Government in the UK is embarking on a 'big conversation' to engage more broadly with the electorate. This is being met with a predictable level of scepticism within the media. For a wider discussion of trust, see O'Neill (2002).
2. As one illustration of this phenomenon, a recent UK Royal Society/Royal Academy of Engineering report on nanotechnology cites work by many STS scholars and closely-associated social scientists, including Martin Bauer, John Durant, Silvio Funtowicz, George Gaskell, Robin Grove-White, Tom Horlick-Jones, Alan Irwin, Roger Kasperson, Phil Macnaghten, Claire Marris, Sue Mayer, Tim O'Riordan, Judith Petts, Nick Pidgeon, Jerome Ravetz, Ortwin Renn, Arie Rip, Peter Simmons, Paul Slovic, Andy Stirling, Sue Weldon, Brian Wynne and Steve Yearley. See Royal Society/Royal Academy of Engineering (2004).
3. Among many examples see Collingridge & Reeve (1986) and Jasanoff (1990).
4. I am grateful to Maja Horst for reminding me of these facts. However, it is also interesting to observe the possible rediscovery of 'new' styles among 'pioneer' nations such as Denmark. Institutional memory in this area seems to be extremely short.
5. See for example Office of Science and Technology (2000), *Guidelines 2000: Scientific Advice and Policy Making*.
6. Brian Wynne and John Durant were specialist advisers to the Lords sub-committee and a number of STS scholars gave evidence.
7. For a fuller report on the *GM Nation?* debate see Understanding Risk Team (2004).
8. 31 October 2003. Quoted in <www.timesonline.co.uk>.
9. It should be noted that efforts were made to link the three strands – for example, discussions between those overseeing each strand did take place and those involved seem to have found these helpful.
10. A similar point has been made here about the link between trust and *transparency*.
11. On this point, see also Collins & Evans (2002).
12. There is some evidence that this view is being taken by government officials in the UK following the GM debate: talk is over, now selective product innovation can proceed.
13. A point made by Rob Hagendijk in various presentations.

## References

- Bauman, Zygmunt (1991) *Modernity and Ambivalence* (Cambridge: Polity).  
 Blair, Tony (2002) 'Science Matters' (10 April), available at <www.number-10.gov.uk/output/Page1715.asp> .

- Collingridge, David & Colin Reeve (1986) *Science Speaks to Power: The Role of Experts in Policymaking* (New York: St Martin's Press).
- Collins, H.M. & Robert Evans (2002) 'The Third Wave of Science Studies: Studies of Expertise and Experience', *Social Studies of Science* 32(2): 235–96.
- Department for Environment, Food and Rural Affairs (2004) *The GM Dialogue: Government Response* (9 March), available at < [www.defra.gov.uk](http://www.defra.gov.uk) > .
- Department of Trade and Industry (2000) *Excellence and Opportunity: A Science and Innovation Policy for the 21st Century* (London: The Stationery Office).
- Department of Trade and Industry (2003) *The Forward Look 2003: Government Funded Science, Engineering and Technology* (Norwich, Norfolk: The Stationery Office).
- European Commission (2000) *Science, Society and the Citizen in Europe* (Brussels: Commission of the European Communities).
- European Commission (2001) *European Governance: A White Paper* (Brussels: Commission of the European Communities).
- European Commission (2002) *Science and Society: Action Plan* (Luxembourg: Commission of the European Communities).
- GM Nation?* (2003) 'The Findings of the Public Debate', available at < [www.defra.gov.uk/environment/gm/debate/index.htm](http://www.defra.gov.uk/environment/gm/debate/index.htm) > .
- Grint, Keith & Steve Woolgar (1997) *The Machine at Work: Technology, Work and Organisation* (Cambridge: Polity).
- Grove-White, R. (2001) 'New Wine, Old Bottles? Personal Reflections on the New Biotechnology Commissions', *Political Quarterly* 72(4): 466–72.
- Hagendijk, R.P. (2004) 'The Public Understanding of Science and Public Participation in Regulated Worlds', *Minerva* 42: 41–59.
- Horst, Maja (2003) *Controversy and Collectivity: Articulations of Social and Natural Order in Mass-mediated Representations of Biotechnology*, PhD Thesis, Doctoral School on Knowledge and Management, Copenhagen Business School.
- House of Commons, Environment, Food and Rural Affairs Committee (2003) *Conduct of the GM Public Debate*, Eighteenth Report of Session 2002–03 (ordered to be printed 12 November 2003).
- House of Lords Select Committee on Science and Technology (2000) *Science and Society* (London: The Stationery Office).
- Irwin, Alan (1995) *Citizen Science* (London: Routledge).
- Irwin, Alan (2001) 'Constructing the Scientific Citizen: Science and Democracy in the Biosciences', *Public Understanding of Science* 10(1): 1–18.
- Irwin, Alan & Mike Michael (2003) *Science, Social Theory and Public Knowledge* (Maidenhead, Berks.: Open University Press).
- Irwin, Alan & Brian Wynne (1996) *Misunderstanding Science?* (Cambridge: Cambridge University Press).
- Jasanoff, Sheila (1990) *The Fifth Branch: Science Advisers as Policy Makers* (Cambridge, MA: Harvard University Press).
- Jasanoff, Sheila (2003) 'Breaking the Wave in Science Studies', *Social Studies of Science* 33(3): 389–400.
- Jones, Kevin (2004) 'BSE and the Phillips Report: A Cautionary Tale about the Update of "Risk"', in N. Stehr (ed.), *The Governance of Knowledge* (New Brunswick, NJ: Transaction): 161–86.
- Kerr, Anne (2003) 'Rights and Responsibilities in the New Genetics Era', *Critical Social Policy* 23(2): 208–26.
- Marris, Claire, Brian Wynne, Peter Simmons, Sue Weldon et al. (2001) 'Public Perceptions of Agricultural Biotechnologies in Europe', final report of the PABE research project funded by the European Communities (December), available at < [www.lancs.ac.uk/depts/ieppp/pabe/](http://www.lancs.ac.uk/depts/ieppp/pabe/) > .
- Office of Science and Technology (2000) *Guidelines 2000: Scientific Advice and Policy Making*.
- O'Neill, Onora (2002) 'A Question of Trust', Reith Lectures, < [www.bbc.co.uk/radio4/reith2002](http://www.bbc.co.uk/radio4/reith2002) > .

- Phillips, Lord, J. Bridgeman & M. Ferguson-Smith (2000) *The BSE Inquiry: The Report* (London: The Stationery Office).
- Renn, Ortwin, Thomas Webler & Peter Weidemann (1995) *Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse* (Dordrecht: Kluwer).
- Royal Commission on Environmental Pollution (1998) *Setting Environmental Standards*, 21st Report (London: The Stationery Office).
- Royal Society/Royal Academy of Engineering (2004) *Nanoscience and Nanotechnologies: Opportunities and Uncertainties*, RS policy document 19/04 (July).
- Strategy Unit (2002) *Risk: Improving Government's Capability to Handle Risk and Uncertainty* (London: Cabinet Office).
- Understanding Risk Team (2004) 'An Independent Evaluation of the *GM Nation?* Public Debate about the Possible Commercialisation of Transgenic Crops in Britain, 2003', Understanding Risk Working Paper 04-02 (February 2004), available at < [www.risks.org.uk](http://www.risks.org.uk) > .
- Urry, John (2000) *Sociology Beyond Societies: Mobilities for the Twenty-first Century* (London & New York: Routledge).
- Wynne, Brian (2002) 'Risk and Environment as Legitimatory Discourses of Technology: Reflexivity Inside Out?', *Current Sociology* 50(3): 459-77.
- Wynne, Brian (2003) 'Seasick on the Third Wave? Subverting the Hegemony of Propositionalism', *Social Studies of Science* 33(3): 401-17.

**Alan Irwin** is professor of science and technology policy at the University of Liverpool. His most recent book (with Mike Michael) is *Science, Social Theory and Public Knowledge* (Maidenhead, Berks.: Open University Press, 2003).

**Address:** Faculty of Social and Environmental Studies, The University of Liverpool, 23 Abercromby Square, Liverpool L69 7ZG, UK; fax: +44 151 794 2403; email: [alan.irwin@liverpool.ac.uk](mailto:alan.irwin@liverpool.ac.uk)