



Talking about GM: Approaches to Public and Stakeholder Engagement

A paper by the Sciencewise-ERC subgroup on GM dialogue September 2011

Foreword

This is a review, conducted on behalf of the Sciencewise Expert Resource Centre (Sciencewise-ERC), of the lessons learned from the short history of public dialogue exercises about genetically modified crops and food. These exercises have been one polite and structured aspect of a broader, noisier public debate about Genetic Modification (GM).

Taken together, the lessons from these dialogue exercises – each of which began with its own set of motivations and institutional interests – tell us a great deal about the contours of public concern and the best ways of beginning such discussions. This report does not comprehensively map public opinion, which is neither fixed nor homogenous, but it does reveal the directions that public discussions have taken in the past. The themes that have defined public concerns, from which policymakers should seek to learn lessons, can be seen at different levels. There are concerns that are to do with the particularities of genetic modification of plants, and there are higher-level concerns about the way that science and innovation in general are governed that cannot be ignored. Crucially, the debate about GM is not just a debate about the risks of a particular technology. It is also a debate about the future of food, agriculture and the global economy.

The substance of this report comes from work conducted by Andrew Acland, Suzannah Lansdell and Diane Warburton for Sciencewise-ERC. Taken together, the messages they have unearthed provide a clear sense of the issues and values that public groups consider important. Some messages have been clearly heard; some have proven more challenging for scientists and policymakers to make sense of. But perhaps the most important political message is that all of these themes were articulated during the first UK public dialogue ever conducted on GM – the consensus conference on plant biotechnology in 1994. This highlights the major lesson of this report – that public dialogue does not take place in a political vacuum.

The framing and design of attempts to engage the public in such a contentious area demand careful thought. Policy-makers should look back and learn from previous dialogue exercises, while appreciating that contexts change. And they should remember that they and their institutions are the vital other half of the conversation. Public dialogue can be a powerful way of opening up a constructive discussion about new technologies. But if it is used disingenuously, to stifle broader debate, it is likely to backfire. Building on the lessons in this report, policy-makers must look carefully at questions of *how* to engage the public, but they must also ask themselves why they want to.

In their 2009 report on food security, the Royal Society reiterated the need for public dialogue on the future of food production, and recommended that such dialogue should “start with the problem that needs to be addressed, i.e. food security, rather than presupposing any particular solutions”.¹ Perhaps the most constructive way to have a dialogue about GM is not to start by talking about GM. The Research Councils’ new Grand Challenge programme on Food Security could be one opportunity for an open discussion covering some aspects of GM, alongside its alternatives. However, Research Councils are not the only public bodies with an interest in this area.

Dr Jack Stilgoe, Senior Research Fellow, Exeter University, chair of the Sciencewise ERC subgroup on GM dialogue

¹ Royal Society, 2009, Reaping the benefits, Science and the sustainable intensification of global agriculture, London, Royal Society

Executive Summary

Background to the report

This paper reviews previous exercises in public and stakeholder engagement on issues related to GM and its application. First, all relevant engagement activities and sources were identified. Then any relevant documentation and evaluation material was then reviewed, and key messages and lessons on methods were identified and summarised.

Purpose of engaging

Conclusions on the ‘success’ of past exercises are inseparable from their varied purposes. The appropriate methods for engaging the public are identified once the *purpose* of the engagement is clear. Different decision making bodies, and different policy decisions, will have different needs from public engagement.

As such, before designing a public or stakeholder engagement process, it must be clear what purpose the engagement is being designed to fulfil. Once the purpose is decided, the process, design, commissioning body, material and language used to describe the engagement must be consistent with this.

Public views

The work exploring public views reviewed here does not paint a simple picture of public opinion, the diversity of which is impossible to capture. There is no evidence of overwhelming intrinsic opposition to GM. Public concerns are conditional. They tend not to be expressed in terms of ‘yes’ or ‘no’ but in terms of ‘yes, but...’ and ‘no, but...’ Concerns can be described at different levels, ranging from those that are specific to GM technologies to those that are about the governance of science and innovation in general:

1. Safety – The entry point for many people’s understanding of new technologies is the question of risk. Much of the public debate about GM food focussed on this controversy to the exclusion of other issues. Public groups do indeed express concern about the potential hazards of GM food, but these concerns are the start of the discussion rather than the end.
2. Novelty – The context for many people’s discussion of risk is the question of how new these new technologies are. GM aroused public suspicion with a familiar pattern in which the technologies’ benefits were advertised as brand new but risks were seen as conventional and well-understood. Clear and comprehensive labelling and independent information are consistently highlighted as essential.
3. Sustainability, uncertainty and ignorance – People are clearly concerned that new interventions in complex ecosystems challenge scientific understanding. Do proponents of GM technologies know as much as they claim about environmental impacts, or are there areas of substantial ignorance that aren’t being acknowledged? The perceived ‘unnaturalness’ of GM technologies is one common manifestation of such concerns.
4. Socioeconomics – GM technology is not just seen as an intervention into just the food chain, nor just the environment. Public dialogue exercises bring to the surface a recognition that GM technologies also present economic issues. Questions about intellectual property, patenting and the livelihoods of developing country farmers therefore become important.

5. Governance and regulation – At the broadest level, people lack confidence in the ability of scientists, companies and governments to understand and regulate the myriad possible implications of new science and technology.

Uncertainty complicates how the public approaches the subject and encourages a default scepticism about the wisdom of accepting GM. The 'need' for GM was also questioned given the potential risks and the availability of other options to solve specific problems. The use of GM in the developing world is seen as a specific issue, although there were mixed views on the need for and value of GM in that context.

The risks to the environment and biodiversity from GM crops were very widespread concerns and there were suspicions that the development of GM was being led largely by industry and other commercial interests rather than to meet needs and serve the public good.

Government, rather than the private sector, was seen as appropriate to lead development and ensure robust regulation of these technologies although there was some distrust of government and multi-national companies, especially around willingness to listen to public worries.

Process of engaging

Public engagement activities around contentious issues such as GM often start from a position of mutual suspicion between those involved. However, in spite of initial (and sometimes continuing) suspicions about balance and bias, there is evidence that trust can be built between public, stakeholders and commissioning bodies if the process is seen to be impartial, honest, open, transparent and well run.

Where policy influence is an intention of the process, it is important for policy-makers to make clear what policies can be influenced by the engagement and what cannot. Ideally, this would mean explicit links to formal policy-making processes, in terms of where and how the results of the public engagement will be used. Clearly different policy decisions related to GM will be at different stages of development and will have different needs from public engagement.

Ultimately, unless engagement is to proceed in an antagonistic mode, the issues need to be framed and described in a way that commands stakeholder confidence. The more controversial the issue the more important it is that the convening body for any engagement exercise is perceived to be independent. An antagonistic mode is not inevitable. Public and stakeholder engagement could, for example, be focused on a joint endeavour to identify the full range of possible policy options, examining the constraints and conditionalities around each, and helping policy-makers to find a way through the conflicting pressures and uncertainties.

There are a variety of public engagement methods available, which can be described in terms of three modes: *Transmit*, *Collaborate* or *Receive*. All engagement is likely to include elements of each mode, but will typically predominate in one. Our judgment is that GM includes issues that would make predominantly *Collaborate* and *Receive* modes most appropriate, and the methods associated with them, depending on the purposes of engagement around specific issues.

Regardless of mode, sufficient attention must be given to engaging stakeholders, in advance of forming plans for public engagement.

During this, uncertainties, whether due to lack of data, information, different interpretations, clarity about others' intentions, or about circumstances beyond any stakeholder's control must be specified and reduced where possible, or managed if not.

Future plans

Any future engagement process has the potential to receive significant media attention and thus raise the public profile of GM and related issues. Negative press coverage could represent a threat to the engagement, or even harm the credibility of the policy-making process. The risk of negative coverage is likely to be enhanced should the engagement lack a clear and widely understood purpose, not be planned or commissioned transparently, or not command the confidence of a broad enough range of stakeholders.

Sciencewise-ERC stands ready to discuss more tailored advice to public bodies looking to include public and stakeholder engagement in developing their policy on issues related GM and its application.

1. Introduction

- 1.1 Funded by the Department of Business Innovation and Skills, the Sciencewise Expert Resource Centre (SW-ERC) provides advice, resources and support to Government Departments, agencies and other public sector bodies to commission and use public dialogue to inform policy decisions which involve science and technology. The SW-ERC also provides co-funding to Government departments and agencies to develop and commission public dialogue activities. More information can be found at www.sciencewise-erc.org.uk.
- 1.2 Following the cancellation of the planned 2009/10 public dialogue, *Food: the use of GM*, launched by the Food Standards Agency (FSA), the SW-ERC Steering Group established a sub-group to review previous exercises in public and stakeholder engagement on issues related to GM and its application. This was in response to the announcement by David Willetts, Minister for Universities and Science, that the FSA's planned dialogue would not continue in its current form.²
- 1.3 The membership of the sub-group is as follows:
 - Dr Jack Stilgoe (chair), Senior Research Fellow, Exeter University
 - Professor Andy Stirling, Director of Science, Science Policy Research Unit, University of Sussex
 - Sir Roland Jackson, Chief Executive, British Science Association
 - Diane Warburton, Evaluation Manager, Sciencewise-ERC
 - Andrew Acland, Dialogue and Engagement Specialist, Sciencewise-ERC
 - Suzannah Lansdell, Dialogue and Engagement Specialist, Sciencewise-ERC
- 1.4 This paper sets out the conclusions of the group and suggests possible ways to involve stakeholders and the public on this issue in the future.
- 1.5 The group's conclusions draw largely on the work by Diane Warburton in reviewing written reports and evaluations of previous public and stakeholder engagement activities, including public opinion surveys, on GM and GM-related issues; and by Andrew Acland and Suzannah Lansdell in reviewing the lessons from the most recent plans by the FSA for a public dialogue on GM foods.
- 1.6 The aim of the documentary review was to undertake a practical analysis designed to draw out from previous engagement exercises the key messages from the public and key lessons from the engagement methods used, and to present these lessons in ways that could inform any future planning of public engagement initiatives on these topics. The first step of the review was to identify all relevant engagement activities and sources, with advice from group members, Research Councils UK, individual Research Councils (particularly BBSRC and EPSRC), the relevant UK government departments, and the Scottish Government. Relevant documentation was obtained and reviewed, and key messages and lessons on methods were identified and summarised; all sources reviewed are identified, and findings summarised, in Annex B.
- 1.7 The group found little material to include on the evaluation of communication and information provision on GM and related issues. The bulk of this review therefore concentrates on two-way modes of public engagement.

² <http://nds.coi.gov.uk/content/Detail.aspx?NewsAreaID=2&ReleaseID=415513>

- 1.8 In the context of public and stakeholder engagement, we have used 'public' to mean any group(s) of the general public brought together, participating or responding as individuals. We have used 'stakeholders' to mean organisations, spokespeople or individuals taking part who have a prior, established interest in the issue at hand.
- 1.9 To date the majority engagement, and wider public debate, on GM has focused on GM crops or GM in the food system. As such, this review is most relevant to future debate on these issues. However, we recognise that GM technology has much wider potential application. Furthermore, even within the food system, GM is a multifaceted issue covering at least research, agriculture, trade and consumer policy with local, national and international considerations. As such, we have taken a deliberately broad definition of what counts as a 'GM issue' and also included some evaluation of engagement on distinct, but similar, issues where relevant.
- 1.10 Conclusions on the 'success' of past exercises are inseparable from their varied purposes. This paper is written to reflect that many different motivations for engagement on the various issues related to GM and its application exist and, as such, there is no one solution to GM and public engagement.
- 1.11 Given the breadth of issues and policy contexts, this review has not extended to international attempts at public engagement with GM issues. As plans for any future engagement are developed, and the policy context of the engagement is clearer, relevant international examples should be considered.
- 1.12 This paper is intended as a general review. It does not seek to provide a definitive conclusions as to what public engagement is *possible* as significant uncertainty remains; what is possible is contingent on the complex and specific policy and political conditions within which any engagement will occur. Indeed, there are circumstances when certain kinds of engagement are unlikely to be possible. If relevant bodies are looking to engage the public with issues related to GM, Sciencewise-ERC can develop advice tailored to their expressed purposes.

2. Lessons from previous experience of public and stakeholder engagement on GM

Please see Annex B for further detail on individual exercises, and the lessons learned from each. Throughout we have referenced examples of engagements which have demonstrated each lesson. Of course, given the complex context within which engagement is set, this is not to say that taking these on board will, by default, lead to a successful engagement in future.

Different public engagement methods achieve different outcomes.

- 2.1 The appropriate methods are identified once the *purpose* of the engagement is clear; form follows function. For example:
- 2.2 Well-designed and carefully structured discursive dialogue methods allow public participants (usually specially recruited) to move relatively quickly from little or no knowledge of, or opinions on, the topic, to understanding the key issues of even complex scientific and technological developments and come to a view³.

Discursive dialogue enables the public to take on new information, have time to discuss and reflect, and develop their own thinking. Policy-makers and scientists have often been surprised at how quickly this understanding can be achieved. In this way, public views are allowed to develop and shift, and conclusions can be reached on specific issues, relatively simply and easily. Policy-makers have found this type of exercise particularly effective in:

- getting beyond vested interests and enabling debate with members of the public without polarisation and acrimony
 - providing useful insights and information on detailed policy issues, from public comments and from their questions
 - fully understanding the considered and informed views of the public, why they are held and how strongly
- 2.3 Open meetings, online and written consultations, publicised widely and/or as part of other activities and programmes, allow those with an existing interest or knowledge of the topic to get involved and air their view⁴. Policy-makers also find this approach useful as it:
 - opens up the process to wide public scrutiny and comment
 - enables those with particular interests to formally present their views
 - allows for free and wide access to the process
 - can reach large numbers of people (depending on the topic and the methods used).

Overcoming distrust

Public engagement activities around contentious issues such as GM often start from a position of mutual suspicion between those involved.

- 2.4 Suspicions might be that the engagement is designed to 'sell' a particular technology to the public (by manipulating or limiting the information that is provided), hidden agendas, bias from the commissioning body, or that the decision has already been made and the engagement is designed simply to 'rubber stamp' that decision and have no real influence.

³ Examples of this type of dialogue given in Annex B include the UK National Consensus Conference on Plant Biotechnology, The Citizen Foresight on the Future of Food and Agriculture, the Industrial Biotechnology dialogue, the Consumer Views on GM Food, and the Synthetic Biology dialogue

⁴ For example, GM Nation? and Consumer Views on GM Food.

These suspicions are likely to be deepened if potentially negative aspects of the technology are not presented as fully as the positives⁵. Furthermore, participants have expressed scepticism about the influence of the engagement they were involved in⁶.

- 2.5 Public participants, stakeholders and others involved are highly aware of issues of fairness, balance and bias in the engagement processes. Questions were raised about the credibility of the design and running of the processes (including recruitment of participants, arrangements with delivery contractors)⁷.

However, in spite of initial (and sometimes continuing) suspicions about balance and bias, there is evidence that trust can be built between public, stakeholders and commissioning bodies if the process was seen to be impartial, honest, open, transparent and well run⁸.

- 2.6 Consistent with a body of literature and guidance on public dialogue, techniques used successfully to tackle suspicion and distrust include:

- The purpose and nature of the process being clear from the outset, and the language used to describe the process being consistent with the purpose⁹.
- Where policy influence is an intention of the process, clear statements by policy-makers about what policies can be influenced by the engagement and what cannot. Ideally, this would mean explicit links to formal policy-making processes, in terms of where and how the results of the public engagement will be used.¹⁰
- In the case of GM, at the very least there needs to be a clear statement of what government is minded to do about GM¹¹ and what remains open for public and stakeholders to influence
- Direct personal involvement by policy-makers in the design and delivery of the engagement activities, including attending events in person. Scepticism about the value and influence of a process can be overcome if policy-makers participate and are seen to respond¹².
- Sufficiently diverse perspectives on the issues included in the engagement activities, both pro- and anti- the topic, with information and involvement from a range of types of sources (e.g. academic, government, industry, NGO)⁶. Negative implications and consequences of the technology, potential or known, need to be articulated explicitly. Without this, the process is less likely to be seen as fair and trustworthy and thus participants won't engage fully and the results not be representative of the full range of views.

⁵ As found in the evaluation of the Industrial Biotechnology dialogue

⁶ For example, in GM Nation?

⁷ For example, at the UK National Consensus Conference on Plant Biotechnology and the Synthetic Biology dialogue (at the reconvened meeting).

⁸ For example, at the Industrial Biotechnology dialogue

⁹ This worked well in the UK National Consensus Conference on Plant Biotechnology and The Citizen Foresight on the Future of Food and Agriculture.

¹⁰ A criticism of the most recent dialogue on GM Food was that this element was lacking, which was felt to have contributed to suspicions amongst some stakeholders about the purpose of the process.

¹¹ The most recent public dialogue about nuclear energy used a similar approach on the advice of a process designer that starting with a blank sheet would not be considered credible.

¹² This worked well in the Industrial Biotechnology and the Synthetic Biology dialogues.

- Independent convening, design, delivery and facilitation of the engagement¹³.
- Participant control of the conclusions from the engagement. Several initiatives have provided opportunities for participants to write up the conclusions themselves, and sometimes present those in person to key policy-makers, independently from the commissioning body for the engagement⁶.
- Maximising transparency and openness, for example by publishing all information provided to participants, and lists of experts involved; publishing the results of the engagement; opening meetings to public audiences; publishing the responses of the commissioning body to the results of the engagement¹⁴.
- The scale and diversity of public participants, alongside the depth of the process, affects the credibility of the results for policy-makers and for public participants. A small but diverse group considering issues in depth over time can be as credible as large numbers of participants¹⁵, especially if policy-makers are involved first hand to hear the public discussions.
- A clear response by the policy-making body to the conclusions of the public engagement¹⁶, identifying and explaining: those issues raised by the public that have or have not been taken into account in policy development; and how issues that were not directly relevant to the policy-making body have been dealt with (e.g. passed on to the appropriate body).

Framing and commissioning

2.7 How the process is framed and what can be influenced come together in deciding the purpose and nature of the process. Because the issue is so polarised between those for and against GM, the likelihood is that stakeholders and publics alike will consider any engagement process to be essentially adversarial and the outcome distributive: pro vs. anti; who is right vs. who is wrong; and ultimately whose interests and opinions should prevail.

This is not inevitable. Public and stakeholder engagement could, for example, be focused on a joint endeavour to identify the full range of possible policy options, examining the constraints and conditionalities around each, and helping policy-makers to find a way through the conflicting pressures and uncertainties.

2.8 Ultimately, unless engagement is to proceed in an antagonistic mode, the issues need to be framed and described in a way that commands stakeholder confidence. The more controversial the issue the more important it is that the convening body for any engagement exercise is perceived to be independent. There is an inevitable tension between an exercise having a credible policy influence, and the convening body being independent. As a minimum, the project needs to be steered by an independent oversight mechanism that has the trust and confidence of stakeholders.

¹³ The Industrial Biotechnology and the Synthetic Biology dialogues both commissioned independent contractors for the design, delivery and facilitation; the UK National Consensus Conference on Plant Biotechnology and The Citizen Foresight on the Future of Food and Agriculture did the same and also had independent convenors.

¹⁴ All four initiatives identified in footnote 11 had elements of these activities

¹⁵ For example, the Foresight project had 12 participants, the Consensus Conference had 16, and the IB dialogue had 24.

¹⁶ For example, the Synthetic Biology dialogue included detailed written responses to participants from the CEOs of the two Research Councils.

- 2.9 Engagement exercises need to be commissioned by a body with competence for the subjects in which public participants are interested – if regulatory questions are of primary interest, public engagement by research funders will have limited value.
- 2.10 The role of shared or separate uncertainties in causing conflict in any context is usually under-estimated because major stakeholders may be reluctant to admit any absence of control. Uncertainty has many forms. It can be caused by a lack of data and information. It can stem from different interpretations of data or difference in the value placed on different data. There can also be uncertainty about others' intentions, or about circumstances beyond any stakeholder's control. Whatever its source, uncertainty generates fear and anxiety. This can cause hostility towards others and create more uncertainty about others' intentions and values. Progress towards resolution of other issues is always difficult and sometimes impossible until uncertainties are specified and reduced where possible, or managed where not.

Working with stakeholders

As described above, although the focus in the initiatives covered in this paper is on public engagement, stakeholders are an important part of the consideration.

- 2.11 The desire to include and work with NGOs to develop, design and deliver public engagement has been common to many of the initiatives covered below, but this has not been without problems. Different NGOs represent a wide diversity of views (pro and anti-GM, for example), so several NGOs may need to be involved. More practically, many NGOs have to work with scarce resources that may not stretch to upstream issues where the social and ethical implications are not clear and the topic is not yet a priority for them. Arguably, GM is no longer an upstream issue.
- 2.12 Time is needed to build appropriate stakeholder relationships to provide credible foundations for public engagement, leading to better quality processes and greater acceptance of the results. A diverse group of stakeholder formally involved through advisory or oversight groups had worked well, as had specific investment in building stakeholder relationships (individually and as a group) early on¹⁷.
- 2.13 Relevant stakeholders include internal colleagues, and associated agencies, as well as external bodies. Planning for public engagement could include identifying key stakeholders, including those directly responsible for the policy area under discussion, those with an interest (current or future), and those who may need to respond to associated issues (e.g. regulatory bodies).
- 2.14 The involvement of scientists and other experts in providing information to the public engagement activities needs to be carefully managed. Face to face workshops and interactions between the public and scientific experts work better than filmed or video presentations, although video ethnographies showing scientific methods have worked well. Scientific experts taking part in public engagement processes need advice and guidance on their role, and briefing on how public engagement works and what it is for.

Practical issues

The evaluations provide many lessons for the design and delivery of public engagement activities.

- 2.15 Time is needed to enable public participants to take in and understand the basic information they have to deal with on complex technological subjects such as GM, and then to

¹⁷ This worked well in the Citizen Foresight on the Future of Food and Agriculture, and the Industrial Biotechnology dialogue.

formulate views and conclusions on subjects they may never have thought about before. Reconvened meetings, with some but not too much time in between meetings, worked well to achieve this.

- 2.16 Sufficient resources need to be allocated to the engagement process at the start. Having to get additional resources during the process can cause tensions as well as delays.
- 2.17 For discursive dialogue, there is a balance to be struck between effective, high quality dialogue processes that have the potential for timely policy influence, and participant control of the agenda.
Clarity about specific aims and objectives, the rationale for the design of the process and openness to changing the design of the process to reflect participants' concerns and priorities can help manage this balance.
- 2.18 Whatever the convening process, there needs to be a single person in a senior role, who understands process issues, is perceived to be impartial, and can respond rapidly and authoritatively to comment and criticism from any direction.

Outcomes

Each public engagement process of the sort outlined here will have immediate and longer-term outcomes, in terms of spreading public awareness and understanding as well as policy influence (where that is the purpose).

- 2.19 Public participants report many benefits from taking part in deliberative dialogue initiatives, where they have a chance to learn new information and come to conclusions that are reported to others, and most are keen to be involved again. This interested group is a resource that could be valuable in future.
- 2.20 Although public participants may enter public engagement activities initially with no strong interest in the topic, strong views often emerged once they engaged with new information and discussion with other participants.
- 2.21 Attitudinal research regularly highlights a desire for more authoritative/trustable information on controversial areas of science. The experience of public engagement on GM suggests that more information leads to stronger and more polarised views (both pro- and anti-GM), rather than to a universally more positive view of GM.¹⁸

This undermines assumptions in the 'deficit model' of public understanding of science that suggests that more information necessarily brings greater trust and acceptance of scientific and technological development. When considering how views change through public engagement, it is worth noting that the number of participants directly involved in all reviewed public engagement exercises has generally been relatively small and always a small proportion of the national population.

3. Considering options for future public and stakeholder engagement on GM

- 3.1 One approach used by Sciencewise when considering possible forms of public and stakeholder engagement is to use the *Transmit-Collaborate-Receive* model¹⁹ developed to help Government departments analyse their engagement requirements. This model identifies the predominant mode of engagement that best matches the purpose or purposes

¹⁸ Eurobarometer Survey, see p18

¹⁹ <http://interactive.bis.gov.uk/scienceandsociety/site/all/files/2010/10/PE-conversational-tool-Final-251010.pdf>

envisioned. In reality, all engagement is likely to include elements of each mode, but illustrative examples on engagement predominating in one mode are provided.

3.1.1 The *Transmit* mode is relevant when the motivation is to inspire, inform, change, educate, build capacity and involvement, or influence the decisions of others. As discussed in 3.2, influencing decisions of others is not a trivial matter. Predominantly transmit mode engagement includes information campaigns, newsletters, media engagement or websites.

This mode is appropriate when there is very little room for others to influence the Government's policy or practice because one or more of the following conditions is true:

- Quick, decisive action is required e.g. a temporary solution is required.
- There is a high level of certainty and little controversy with regard to the Government's position on the issue and/or what it wants to achieve.
- The Government has all the knowledge/power/autonomy to make something happen alone.
- Unpopular actions have to be taken and there are no alternative options (e.g. the Government has a clear/strong existing position on an issue, which is unpopular).
- When there are other important issues to be dealt with other than the one in dispute (e.g. there are other priority issues that have more important outcomes at stake and/or require greater resources/attention).
- A body wishes build support for a given technology or policy, in advance of any announcements.
- To explain the rationale behind a chosen policy, counter misconceptions about it and build support for it.
- A convening body, such as Government, is not convinced of the value or feasibility of other public engagement modes, or feels previous attempts at engagement have been damaging
- Government considers it has a clear democratic mandate to act on an issue.

3.1.2 The *Collaborate* mode is relevant when the objective is to consider, create or decide something together. This mode is appropriate when there is a need for deep understanding of difficult decisions: involvement and buy in to the process by key stakeholders both ensures decisions are well informed and reduces opposition to them. Predominantly collaborate mode engagement includes consensus workshops, negotiation or mediation.

It is appropriate when:

- The Government's position affects a number of others quite substantially and it needs to understand their interests in order to give robust advice or take difficult decisions.
- The issue is complex and the Government itself contains a range of views, with no clear consensus position.
- Other key stakeholders are also trying to influence decisions, perhaps in other directions, and a collective voice, if it can be achieved, will be more powerful than individual voices.
- Those the Government wants to influence are equally or more powerful or influential and the Government needs to work closely with them over time rather than send them information or advice from afar.
- There is need to build relationships with key stakeholders for later use.

3.1.3 The *Receive* mode is relevant when the motivation is to use the views, skills, experience, and knowledge of others, including the public, to inform decisions. Predominantly receive mode engagement includes polling, attitudinal surveys, feedback forms and citizens juries.

It is appropriate when:

- Public views on an issue, and any recent changes in them, need to be understood in advance of policy decisions being taken.
- Public views on an issue need to be measured in one or more contexts.
- Public knowledge, perspectives and values can add to the evidence being considered in decision-making
- Public reactions to a reasonably developed policy need to be gauged, informing its subsequent presentation.
- A wide range of perspectives is required to ensure a holistic approach to decision-making.

3.2 Using this model our judgment is that GM includes issues that would make appropriate both the *Collaborate* and *Receive* types of engagement, and the methods associated with them, depending on the purposes of engagement around specific issues. We do not rule out the use of *Transmit* mode, and attitudinal surveys regularly highlight a desire amongst members of the public for more information. Public bodies may wish to satisfy that desire. However, experience of previous engagement suggests that public and stakeholder views are not reliably or predictably changed by the provision of more information (one plausible motivation for a purely transmit mode).

We suggest this mode is unlikely to qualitatively change the nature of debate on the issue and is most likely to be relevant subsequent to the use of the other modes, as part of a *Collaborate* or *Receive* process, or as a consequence of their failure.

- 3.3 We can envisage that the purposes for public engagement on any GM issue could range from the following:



To discover current stakeholder and public attitudes to GM (using <i>Receive</i> methods)	To describe the issues, uncertainties and possible areas of common ground to help policy-makers craft policy that would command as much support as possible (mainly <i>Receive</i> but with some elements of <i>Collaborate</i>)	To facilitate dialogue among stakeholders and the public, with the aim of narrowing areas of difference and disagreement to help policy-makers craft policy and consult the public on the options that emerge (some <i>Collaborate</i> leading to <i>Receive</i>)	To mediate regulatory negotiation among government and stakeholders, and consult the public on the options and possible consequences of what results (<i>Collaborate</i> leading to <i>Receive</i>)
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- 3.4 Whether the predominant mode of engagement on any single issue is *Collaborate* or *Receive*, the overall flow of public and stakeholder engagement could be as follows:

1. Interested body initiates exercise by bringing together Government and key stakeholders in a collaborative planning process, including face-to-face workshops, to agree how GM should be discussed, including:
 - what issues are salient and how they should be framed;
 - who should be involved in discussing what; and
 - what uncertainties need to be resolved prior to, or through the process of, further engagement;
 culminating in:
 - a Forward Process Plan.
2. From out of this planning process there also needs to emerge a Steering Group with a dedicated Secretariat and resourcing for the Forward Process Plan.
3. The first task for the Steering Group will be to work up the details of the Forward Process Plan, including an initial communication programme setting out plans and inviting involvement on different issues through different engagement methods depending on the nature of the issues and the purpose(s) of engagement on them.

- 3.5 Given the degree of conflict over GM, and past experiences of public engagement on the subject, the nature of any and all future engagement on GM will need to be negotiated with key stakeholders if they are to perceive it as credible and sustainable. We therefore recommend that firm plans should be decided subsequent to such discussions and to the planning process and workshops suggested above. It should be recognised that, depending on the framing and purpose of the engagement, some stakeholders may be unwilling to take part. This will, in turn, affect which engagement modes are possible or desirable.

- 3.6 We also emphasise that the planning process, including the planning workshops, is long enough to review in depth the scope of the process and to identify a sequence of Task Groups to address specific issues, such as uncertainties or possible regulatory frameworks, to build stakeholder confidence in the framing and salience of the process.²⁰

4. Additional points and principles

The Subgroup has discussed a range of further points and principles that should be kept in mind during any engagement processes that address GM.

- 4.1 As a sponsor of public engagement, Government faces a difficult balancing act between the need to ensure stakeholder confidence in an independent convenor and the need for decision makers to be active participants in the process.
- 4.2 Whatever the role it adopts, the Government should declare in advance what its commitment to openness and listening is and report back on how it has used the results of any engagement.
- 4.3 The process of designing public and stakeholder engagement should pay attention not just to past experience of engagement on GM, but also to the wider governance processes around such exercises.
- 4.4 It is essential that the definition of what issues are included or out of scope is discussed during process planning and framing; a unilateral approach to framing will undermine stakeholder confidence.
- 4.5 Any public and stakeholder engagement process should include regular evaluation exercises and a willingness to adapt in the light of new knowledge or public or stakeholder needs and interests.
- 4.6 It is clear that any future engagement process has the potential to receive significant media attention and thus raise the public profile of GM and related issues. Negative press coverage could represent a threat to the engagement, or even harm the credibility of the policy-making process. The risk of negative coverage is likely to be enhanced should the engagement lack a clear and widely understood purpose, not be planned or commissioned transparently, or not command the confidence of a broad enough range of stakeholders. Any engagement must be able to clearly articulate an answer to each of these.

²⁰ This approach was used in the British Nuclear Fuel Ltd (BNFL) National Stakeholder Dialogue conducted by The Environment Council between 1998-2004. This was the longest, most wide ranging and thorough process of its kind undertaken in Europe in the nuclear sector.

Annex A: Characteristics of GM as an engagement issue

The purposes of this table are to set out the characteristics common to most issues considered for stakeholder or public engagement, to assess what makes the GM issue particular or unique, and to describe the implications for engagement.

Characteristic	Assessment of GM	Implications for engagement
Stakeholders: numbers interested/ engaged	GM elicits views from a wide range and high number of stakeholders effectively multiplied by nuanced views within stakeholder groups.	Stakeholder engagement may mean coalescing and representation of stakeholder groups to make engagement manageable. Public dialogue affected by need to gain support for materials from diverse stakeholder groups.
Frames: numbers/ agreement on	Stakeholders approach GM from many angles and with many different interests, from enthusiasm for the scientific and commercial possibilities to concern about the possible impacts on organic farming, biodiversity, consumer interests, health, agricultural economics, global trade issues and many others. Nuanced views also increase number of possible frames. Agreement fairly solid within yes/no frames i.e. the reasons people currently support or oppose GM may vary, but they tend to be on one side or the other. This could change with different framings.	The complexity of GM stems in part from the number of ways the issues can be framed – i.e. ‘what GM is about’. Stakeholder engagement would need to negotiate framing and terms of reference as pre-condition for success. Public engagement complicated by the same factor: any results of limited credibility unless valid framing and support materials agreed by stakeholders.
Context: stability/evolution of policy environment	There has been perceived uncertainty about GM policy. And, like all uncertainty, this has allowed rumour, speculation and perceived opportunities to influence what is ‘up for grabs’. This can create great opportunities for conflict but also for constructive dialogue as there is also much to lose.	Starting with a blank sheet is not credible so either stakeholder or public engagement will require some indication of current thinking plus clear identification of where influence is possible.
Stakes: what is at risk/benefit for stakeholders/ public	Stakes high on all sides – e.g. <ul style="list-style-type: none"> • Biotech investment /profit loss • Organic farming investment/ status loss • Biodiversity loss • Consumer choice While the issue is mature, the stakes are still fresh because benefits/disbenefits still not fully understood.	High stakes will make it difficult for parties to enter engagement, though opposing stakeholders have more to lose than supporter stakeholders, especially if latter believe tide is running their way. Engagement may work better if/when opposers believe best option is to shape via regulation because outright opposition unlikely to work.

		Public engagement unlikely to generate much excitement unless to endorse stakes negotiated by stakeholders.
Uncertainty: among experts/public	Uncertainty is major element of complexity with many aspects of the issue hotly contested even among experts. There are different views on and interpretation of <i>data</i> , <i>values</i> and <i>intentions</i> (three prime types of uncertainty) means cross-domain uncertainty conflict is pervasive (i.e. people refuting arguments in one domain by citing uncertainty in another).	Neither serious stakeholder nor public engagement will be possible until key uncertainties have been reduced or working assumptions agreed. Identification and management of uncertainty would be a natural first stage in stakeholder engagement. It will be difficult to agree materials for public engagement without similar process among key stakeholders.
Awareness: current public awareness/likely ability of stakeholders to generate further interest	Sophisticated stakeholder understanding of many aspects. Public awareness more narrowly focused on health/environmental aspects and currently low to dormant. Issue generates extremely high media attention and consequently public awareness easily raised. Further direct action by stakeholders likely depending on how issues evolve.	High profile issue for many stakeholders means high entry threshold to dialogue – they will need to be convinced they have more to gain than lose through dialogue with ‘the enemy’. Public engagement probably limited to attitudinal research on specific aspects or value/priority trade-offs (but may be difficult to get stakeholder support for framing)
Feelings: breadth/intensity	People generally feel more strongly about potential losses than potential gains. GM touches many things that people care about losing: <ul style="list-style-type: none">• What we eat• Our freedom to choose what we eat• What is ‘natural’ (always evokes visceral feelings)• Personal and ethical values• Concerns about environment• Concerns about irreversible loss• Concerns about public risks for purely commercial gain.	Very strong feelings among some stakeholders on both sides of the debate about the integrity and motivations of their opponents may limit their willingness to enter dialogue. Relatively low public interest, compared to late 90s, means feelings less high unless provoked.
Maturity: age/polarisation	Established issue with entrenched stakeholder positions. Public less aware and less polarised currently	As above, may make some stakeholders reluctant to enter engagement. Public engagement not so affected though agreeing materials may be.
Proximity:	In policy terms, GM agriculture in the	Stakeholders will calculate

the issue's closeness to market/personal impacts	UK is moving beyond the purely research stage but is not yet an embedded feature of our lives like, for example, nuclear power. This means that stakeholders on both sides have all to play for. On the business side, for example, there are huge commercial (biotech) incentives to 'win the argument for GM', but those opposed still have realistic chances of stopping further development or market entry.	whether they have more to gain or lose by entering engagement. Current stand-off benefits opponents while frustrating supporters. Refusal to enter engagement could result in unilateral decisions which opponents then unable to influence.
Power: types/differences and role of power	Commercial/financial power vs. ability to raise media interest/command public sympathy. <ul style="list-style-type: none"> • Sector dominated by multinational companies, which are often perceived to have high influence on governments/ supply chains etc; but • Issue agenda often set by opposed stakeholder groups with ability to generate media interest 	Commercial/financial power imbalance perhaps less than commonly perceived due to media sympathy for anti-GM case. Power varieties and differences should not inhibit engagement but may affect trust, perceptions etc
Trust: degrees of trust and mistrust	Opposed stakeholders mistrust government (perceived to be influenced more by commercial than public interest). Public lack of trust in government over food issues (e.g. BSE/Foot and mouth) easily exploited by media/stakeholders	High levels of mistrust may indicate need for confidence building measures by convener of stakeholder engagement, probably around status of end results. A focus on reducing uncertainty and discussing issues as objectively as possible would also help. May be difficult to find a convener trusted by all.
Relationships: among stakeholders and with potential conveners	Some mutual respect among opposing scientists; very poor between stakeholders further apart on yes/no spectrum.	Poor prospects for success but probably not unworkable given confidence building measures (see above).

Annex B: Examples of public engagement on GM and GM-related issues

1. Introduction

The Sciencewise-ERC Steering Group GM sub-group agreed on 10 February 2011 that it would be useful to review previous public engagement activities on GM and GM-related issues, and to summarise the lessons learned.

The aim of this review was to focus on some key public engagement activities in this field, and provide a very concise and practical summary of what has happened and what can be learned from evaluations and other reviews of this work. It was not expected that the review would be comprehensive, or that it would provide a detailed or theoretical analysis.

The key issues and lessons to emerge from the evaluations and other reviews of public engagement initiatives covered in this are contained in the main paper. Although specific criticisms of methods were made in the evaluations reviewed, none of these initiatives was so flawed that the credibility of the results was undermined. There is therefore a valuable set of data from these earlier initiatives that can be built on in terms of public views and values.

In terms of the public engagement methods used, it is interesting to note that many of these initiatives, especially the early ones, were driven at least as much by methodological experiment as seeking the most appropriate method for the topic of GM (e.g. consensus conferences, citizen foresight, the ethical matrix were all used). There is therefore also a valuable foundation of practical experience of different public engagement methods to build on in future planning.

This annex is in four parts:

- A summary of the public views as measured by the reviewed exercises (section 2)
- A table summarising public engagement activities (section 3)
- A table summarising stakeholder engagement activities (section 4)
- A table summarising public opinion polls and attitudes surveys (section 5)

2. Summary of public views as measured by the reviewed exercises

The key issues for the public involved in the public engagement activities on GM and GM-related issues were, in summary, as follows:

- GM was seen as 'unnatural' and therefore controls, safety, testing, caution, unease and avoidance of risk (especially to the environment and food safety) were key issues.
- The 'need' for GM was questioned and was seen as not having been demonstrated, especially given the potential risks and the availability of other options to solve specific problems.
- The risks to the environment and biodiversity from GM crops were very widespread concerns, even among those who had fewer worries about the 'food safety' aspects of GM.
- There were suspicions that the development of GM was being led largely by industry and other commercial interests purely pursuing a profit motive, and seeking to advance scientific and technological development for its own sake, rather than to meet needs and serve the public good.
- Robust and independent regulation and control were core and repeated concerns although without stifling development for the public interest (e.g. medical). There was very little trust in voluntary or self-regulation systems to monitor and control the development of these technologies.
- Clear, meaningful, accessible, impartial and comprehensive labelling and independent information were consistently highlighted as essential.
- There was not overwhelming intrinsic opposition to GM. Opposition focused more on specific uses and products and the need for strong control and regulation (including international / global regulation).
- There were seen to be special issues around the use of GM in the developing world, although there were mixed views on the need for and value of GM in that context.
- Government, rather than the private sector, was seen as appropriate to lead development and ensure robust regulation of these technologies to maximise social benefits and ensure public control. There was little support for the early commercialisation of GM.

- In spite of demands for Government to take a lead in regulation, there was widespread distrust of government and multi-national companies, especially around the willingness and capacity of government either to listen to public worries or to control developments being made by private companies.
- Research funding decisions and scientific developments needed to take account of social values, ethical issues, potential impacts and the significance of the work
- Patenting arrangements were questioned. There was a sense that these needed to be sufficient to provide return on investment without being too broad; and needed strong legislation to monitor and enforce
- Further and continuing public and stakeholder engagement was needed at numerous different stages as the technology progresses and not just 'end of pipe'.
- The public are supportive of the national interest, including in the UK's global economic position, especially around Britain being a leader in new science and technology leading to new jobs
- Medical developments resulting from new technologies were greeted with more enthusiasm than others (e.g. food).

The key issues to emerge from the opinion polls described here mirrored the findings on the issues above but also identified some different issues, depending on the focus of the poll and the questions asked. It would be interesting for a fuller review to analyse in more detail the framing and wording of polling questions used. Points included:

- There was a relatively high level of knowledge and awareness of GM and the issues surrounding it, compared to other food technologies, although there was a lack of knowledge about the availability of GM food, and potential long term risks. There were also relatively high levels of interest in the subject.
- The public saw GM as 'fundamentally unnatural' and, overall, they were wary, uneasy and uncertain about food technologies, and were unconvinced of the benefits.
- Until very recently, opposition to GM has always been greater than support (opposition usually more than double) throughout the polls. For example: in 2003, 13% support compared to 36% opposition; in 2008, 18% agreed that the advantages of GM outweighed the dangers, while 31% disagreed; also in 2008, 19% agreed Britain should grow GM to compete with the rest of the world, 41% disagreed. However, the Public Attitudes Survey 2011 showed that respondents thought the benefits of GM crops outweighed the risks: 33% said benefits outweighed the risks; 27% said the risks outweighed the benefits - a +6% balance in favour of GM. This was the lowest net benefit score of all the contentious issues tested in the survey, lower than nuclear (+16%) and animal experimentation (+19%).

- Knowledge and awareness affected opinions. For example, the Eurobarometer (2010) found that those who had more knowledge of GM before the survey were less positive about the technology (in terms of future development of GM foods and food safety) than those who knew less.
- The latest Eurobarometer on biotechnology (2010) shows that the UK public are more positive about GM and gene transfer technologies than the EU average on almost every issue (details below).
- Women and older age groups tended to be more negative about GM than other groups; although younger age groups, while less concerned about food technologies generally, are the least positive about GM.
- Those who were positive about GM cited benefits for society that outweighed the risks, and trust in the motivations of producers and regulators. Those who were not positive cited health and environmental risks, risks of tampering with nature, long term safety, the ethics of the process of genetic modification, unintended consequences and scepticism about the motivation of producers and regulators. There was no consensus on where trusted information might come from.
- Recent surveys provide more detail of public views on the boundaries to acceptability of GM, particular in relation to horizontal and vertical gene transfer in plants (e.g. Eurobarometer 2010). Vertical gene transfer (e.g. from an ancestor plant) was largely acceptable; horizontal gene transfer (e.g. from a bacterium or animal) was far less so.

The extent to which similar concerns and attitudes recur in the polls and surveys reviewed suggest there is a good foundation of knowledge about public views on which to base planning for future public engagement.

However, polls and surveys are not predictive. They simply provide a snapshot of views at a particular moment in time and in answer to specific questions. For example, FSA polls in 2000 to 2002 showed very low levels of concern about the safety of food with GM ingredients: concern dropped from 27% being concerned in 2000 to 23% in 2002. And there was a decrease in concern about GM food generally from 43% in 2000 to 36% in 2002. From these figures, the significantly negative public reactions to GM during the *GM Nation?* debate later in 2002 could not have been predicted.

3. Public engagement activities

The table below presents the public engagement initiatives on GM and GM-related issues in roughly chronological order, earliest first. The initiatives covered are, in summary:

- UK National Consensus Conference on Plant Biotechnology, 1994
- The Citizen Foresight on the Future of Food and Agriculture (Citizen GMO UK), 1998
- Bioremediation technologies public and stakeholder dialogue, 2001
- BBSRC public communications activities around GM, 1995 - 2002
- GM Nation?, 2002 - 2004
- Consumer views on GM food, 2002 - 3 (Food Standards Agency)
- Industrial biotechnology dialogue, 2008 - 2009
- Future Foods, 2009
- Public dialogue on synthetic biology, 2009 (Royal Academy of Engineering)
- Synthetic biology public dialogue, 2009 (EPSRC / BBSRC)

Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
UK National Consensus Conference on Plant Biotechnology <ul style="list-style-type: none"> • Timescale: 1994 • Budget: approx £86,000, funded by BBSRC • Commissioned by: BBSRC and the Science Museum • Aim: To contribute to informed public debate about science and technology, and to contribute a lay perspective to public policy-making and 	<p>Key stages:</p> <ul style="list-style-type: none"> • Planning between BBSRC and Science Museum began late 1993 • Panel recruited and started work September 1994 • Consensus conference held in public over three days in November 1994 <p>Key activities:</p> <ul style="list-style-type: none"> • Discussions between BBSRC and Science Museum about potential to develop the Danish model of the consensus conference, to contribute to the developing field of the public understanding of science • Identified field of biotechnology as an area where scientific and industrial significance is combined with social and political 	<p>The final report from the panel included the following:</p> <ul style="list-style-type: none"> • Conference conclusion was "New technology is welcome, provided it is properly regulated and controlled". • "Overall, safety is a prime consideration" • "The impact of plant biotechnology on the environment is extremely difficult to predict. This difficulty was reflected by disagreement between the experts whom we chose to consult." • "Clear, meaningful labelling is required" on products produced by genetic engineering; information for consumers needs to be "impartial and responsible". 	<ul style="list-style-type: none"> • "The organisation of a consensus conference is an exercise in the management of anxiety"(p77) • These types of engagement depend for their success on their perceived credibility. "It is a good principle for organisers that they should do nothing that might damage their consensus conference's credibility in the eyes of sceptical onlookers." Aim should be, and be seen to be, to facilitate "an open and unconstrained enquiry by a genuinely independent lay panel", so needs to be transparent (i.e. open to scrutiny by third parties). • Lay members were very aware of the sensitivities around issues of fairness, balance and bias. They were constantly asking questions about the procedures of

<p>decision making about science and technology, through the mechanism of a consensus conference.</p> <p>Subject chosen by BBSRC and Science Museum</p> <ul style="list-style-type: none"> • Evaluation / analysis sources: <p><i>Public Participation in Science. The role of consensus conferences in Europe</i>, edited by Simon Joss and John Durant. Science Museum, 1995. ISBN 0 901805 85 8 (Several chapters)</p> <p><i>UK National Consensus Conference on Plant Biotechnology 1994. Final report of the lay panel</i>. From the archive of the National Centre for Biotechnology Education (NCBE): www.ncbe.reading.ac.uk/ncbe/gmfood/conference.html</p> <p>'Consensus conference - "worth every penny"', by Professor Tom Blundell in <i>BBSRC Business</i> newsletter, January 1995</p> <p>'United Kingdom: From "Public Understanding" to "Public Involvement", Chapter 10 of <i>Participatory Technology</i></p>	<p>sensitivity; then focused on plant biotechnology.</p> <ul style="list-style-type: none"> • Established steering committee of six people from academic social science, consumer affairs, biotechnology industry, journalism and parliamentary affairs, chaired by John Durant of Science Museum • Full time project manager and professional facilitator appointed (to work with the panel) • Advertised in regional newspapers to recruit the lay panel; 341 people responded • Applicants then sampled to achieve a typical cross-section of the public by age, gender, socio-economic status and educational level; then screened to ensure no existing close involvement with plant biotechnology • 16 panel members appointed (8 women and 8 men) • Panel sent initial pack of information prepared by the NCBE, University of Reading • Panel attended two preparatory residential weekends in September and October 1994 • Agenda for first weekend set by steering committee, then agenda and choice of speakers passed to the panel for the rest of the process • Panel identified seven questions, for each of which they sought information and took evidence. The questions were on risks / benefits, impact on consumers, impact on environment, moral / ethical issues, patenting, international development and regulation. 	<ul style="list-style-type: none"> • "The panel felt that there is a moral obligation on producers to label foods which incorporate these genes", i.e. genetic material transferred from one species to another, and "sections of the community will intuitively feel that plant biotechnology is morally wrong" • There needs to be a re-examination of several areas of patenting: "Current patenting procedure appears to be both a risky and inadequate method of dealing with the issues raised by plant biotechnology" and "It is therefore important to ensure that patents are not granted which offer too broad a scope. ... If patenting is to continue then protective legislation must have teeth." • There needs to be consideration of how plant biotechnology might be used in the developing world: "public funding and partnership are keywords in the global issues" • "The work of multi-national companies should be scrutinised after they have been given approval by a regulatory authority to commence commercial production and operation. This should ensure respect for local farmers and their crops, and the setting up of local research projects for their needs" • "Regulatory control in the UK is among the most stringent; however there is still room for improvement. ... An independent ombudsman for monitoring investigative action should be appointed." • "Effective international control, while difficult to achieve, would be ideal"; "an international bonding and registration system should be introduced" • "The procedures of modern biotechnology 	<p>the conference, identity and backgrounds of the experts. They were highly politically literate in those terms.</p> <ul style="list-style-type: none"> • As a result, the panel insisted on no-one from the organisers being present while they were compiling their final report. They accepted help from an editor and secretary who had not been involved up to that point. • Factors for success were, firstly, that it was run competently and impartially, as a serious contribution to the public debate and, secondly, that there must be a willingness on the part of other agencies and institutions to accept consensus conferences as legitimate contributions to the political process. • Role of panel needs to be clear: environmental lobby cast doubt on the panel's credibility. Panel was clear: "The whole idea of consensus is to reach agreement as to the way the general public, of whom the panel were 'representative', would wish the research to proceed and, if necessary, be controlled." Not to come to decisions or make technical judgements. • Consensus is not easy to achieve • Not enough time overall. The time needed to write the report was insufficient and reduced discussion significantly on some issues. And there should have been more preparatory time, possibly one additional weekend. • There were real benefits for participants: they gained new skills and enjoyed taking part. • The evaluator concluded that "In terms of its actual organisation and the involvement offered, it was judged by the majority of
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<p><i>Assessment. European Perspectives</i>, by S. Joss and S. Bellucci, 2002. Published by University of Westminster and Swiss Centre for Technology Assessment. ISBN 0 85374 803 9</p>	<ul style="list-style-type: none"> • Consensus conference took place over three days in central London in November 1994 • Conference was chaired by Peter Evans, BBC radio science presenter, and attended by audiences of 200 - 300 people each day, including media • 1.5 days of evidence from 22 expert witnesses with a wide range of backgrounds, and cross-examination by the panel • On the afternoon of the second day, the Panel retired to write their report • The panel presented and debated their report on the third and final morning of the conference • Formal responses were given by two MPs (from different parties), a representative of the United Nations Environment Programme, and others • The panel report was then widely disseminated. The Science Museum printed and distributed several thousand copies, POST did a briefing for MPs on the conference. There was extensive media coverage including national newspapers, TV and radio. 	<p>must have new regulations which are fair to primary producers, developers and end users ... Government should be encouraging controlled research in the public sector to maximise benefits to all, rather than leaving it to the private sector whose interest will lie with the profits."</p> <p>"Biotechnology could change the world, but in order for it to be used effectively - maximising benefits and minimising risks - we also need to adapt social and economic structures to take account of the changes it might produce."</p>	<p>participants to have been successful, though a number of specific criticisms were made" (Joss 2002, p147).</p> <ul style="list-style-type: none"> • The evaluator identifies two main disadvantages under which the conference operated. The first was a conceptual link to the 'deficit model' (so the process design was based on the assumption that lack of public appreciation of and trust in science could be remedied with appropriate educative measures). The second was that the conference was outside the (formal) policy-making process. (Joss 2002, p146) • There were also accusations that two committee members had tried to exclude anti-biotechnology voices as experts briefing the panel and taking part in the conference, and a more general pro-biotechnology stance in the commissioning bodies. The panel was sensitive to these issues, and sought to distance themselves from the facilitator and organisers (see above), and explicitly stated its independence at the beginning of their final report. • The evaluator stated that "The conference had no visible, direct impact on public policy- and decision-making on plant biotechnology, although it attracted wide interest among those involved in relevant policy-making, including politicians, civil servants and experts ... The conference's main impact was more indirect, on the conceptual - methodological level in that it contributed to a wider debate within the scientific community, academia, amongst policy- and decision-makers and social commentators" (Joss 2002, p144).

Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
<p>The Citizen Foresight on the Future of Food and Agriculture (Citizen GMO UK)</p> <ul style="list-style-type: none"> Timescale: 1998 Budget: unknown Commissioned by: Genetics Forum, and run by the University of East London's Centre for Governance, Innovation and Science Aim: The aim of the citizens' panel was to consider the future of agriculture and food production from their viewpoint as citizens. Evaluation / analysis sources: United Kingdom: From "Public Understanding" to "Public Involvement", Chapter 10 of <i>Participatory Technology Assessment. European Perspectives</i>, by S. Joss and S. Bellucci, 2002. Published by University of Westminster and Swiss Centre for Technology Assessment. ISBN 0 85374 803 9 Potential sources for further information: 	<p>Key stages:</p> <ul style="list-style-type: none"> Recruitment of citizens' panel from early spring 1998 Ten panel meetings during spring 1998 Media event to present the panel's report in summer 1998 Panel report launched in January 1999 at an event of the Parliamentary Environment Group and report disseminated to other parts of government Final report published in March 1999 <p>Key activities:</p> <ul style="list-style-type: none"> Recruitment of panel: 2,000 names were selected at random from the electoral register in Brighton (where the panel was to be held). Participants were offered £150 to take part. About 200 people responded to the invitation letter (with no information about the subject to be discussed), and a short questionnaire to find out level of education, newspapers read, recent employment etc. 12 people were selected. A project manager was appointed to run the whole initiative. A stakeholder panel of seven members was appointed to advise the project manager and involve the relevant stakeholder interests in the initiative: the Consumers Association, the John Innes Centre, the National Farmers Union, Sainsbury's, the Soil Association, the Transport and General Workers' Union and Whole Earth Foods. 	<ul style="list-style-type: none"> There is no information in the source used on the public's conclusions on the issues. The only information on public views found is provided below. The initial brainstorming session identified an extensive list of options for the future of agriculture including gene modification, chemical pesticides and organic farming, local food processing, packaging use and importing food products. The second brainstorming session on assessment criteria against which to consider the options led to an equally extensive list including taste, shelf-life and nutritional content of food, effects on the natural and human environment, producer diversity and the ethics of working conditions. 	<ul style="list-style-type: none"> There was no formal evaluation, but Simon Joss (who evaluated the consensus conference above) has reviewed the process. His conclusions are as follows: The aim was to define the issues for the citizens panel very broadly: around the future of agriculture and food production rather than just genetic modification. However, in practice, "this initiative was essentially about assessing public perceptions on GM food". (p 153) "Overall, there was no visible impact on policy-making. Of the various government departments, the Department of the Environment (whose minister met the citizens' panel) reacted the most positively, according to the project manager, saying that the panel's call for more transparent and open regulation was in line with the Department's position in favour of stakeholder involvement. The OST was apparently relieved that the panel had not rejected GM food research outright. The Ministry of Agriculture, Fisheries and Food was said to have shown no interest in the final report." (p152) The reasons Joss gives for the lack of policy impact included that this was an initiative of the Genetics Forum, and "may well have been perceived from the outside as part of the Genetics Forum's campaigning activities." (p153) The citizens themselves were initially wary that there was a hidden agenda although, after discussion, they endorsed the proposed process. Another reason for lack of policy impact was seen to be "the fact that the citizen foresight was not linked to the relevant policy-making processes", and that "there was no public

<p>Dr Andy Stirling, University of Sussex, was an adviser to the project on the methodological design, especially the initial brainstorming and the resulting multifactor analysis method.</p> <p>Dr Tom Wakeford, now University of Newcastle, was on the management committee of Genetics Forum and proposed the approach to assessing public perceptions on GM food used here. He was commissioned to develop an alternative method from the initial plans for a public opinion survey, and acted as project manager and process facilitator.</p>	<ul style="list-style-type: none"> • An expert panel of 11 members was established to give feedback on and to the citizens' panel. This expert panel included expertise in biotechnology research, farming, regulation and social sciences. These experts were selected by the stakeholder panel. • Seven expert witnesses were identified to give presentations to the citizens' panel and answer the panel's questions. The first four witnesses were selected by the stakeholder panel; the citizens' panel then requested three additional witnesses on pesticide residues in foodstuffs. • The citizens' panel met for 10 weekly 3-hour meetings over a 15 week period in spring 1998. The meetings were held in evenings to minimise disruption to panel members' work / lives. • The first citizens' panel meeting brainstormed options for the future of agriculture, and the second meeting brainstormed criteria against which they wanted the options to be evaluated. • The expert panel was then asked to review the citizens' panel options and criteria, to establish the extent to which there was common ground among the experts. Disagreements were noted and fed back to the citizens' panel, and used as background in subsequent meetings. • The following citizens' panel meetings consisted of one witness presenting information to the panel, and then questions and discussion. • Following evidence from the last witness at meeting 8, the panel began to prepare their findings and report; meeting 9 continued the drafting and the 10th meeting made 		<p>access to the proceedings".</p> <ul style="list-style-type: none"> • However, there was some evidence that the citizens' panel report did have some impact on the members of the stakeholder panel and their organisations, as they committed themselves to providing written responses to the report. The effects on internal policy-making as a result are not known. • According to the evaluator, this 'citizen foresight' approach "arguably represents an improvement of the citizens' jury method, on which it was based, in that the citizens' panel was given more opportunity to define the agenda, formulate questions and write the conclusions" (participant control of the agenda is often taken to be good practice according to some academic evaluation criteria). Also, the approach was designed to fit in better with participants' everyday life (evening sessions rather than several full days). • However, "by closing the process off to the wider public and only allowing media access at its conclusions, a connection with wider public sphere discourses was less apparent than in the case of publicly held citizens' conferences" (p154).
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	<p>final revisions on the final draft.</p> <ul style="list-style-type: none"> • A media event in London was organised and funded by the Genetics Forum, at which the citizens' forum and stakeholder forum met for the first time. The final report of the citizens' panel was published and the stakeholder panellists were invited to give their reactions (not having seen the report in advance). • The citizens' panel report was launched in January 1999 at an event of the Parliamentary Environment Group. • A meeting with the Minister of State for the Environment was organised to discuss the findings with the citizens' panel and Genetics Forum. • Several government departments were sent the report at this stage. • A final report was published in March 1999. That report included the citizens' panel report, the stakeholder panel's responses and a description of the method. 		
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
Bioremediation technologies public and stakeholder dialogue <ul style="list-style-type: none"> • Timescale: 2001 • Budget: unknown • Commissioned by: BBSRC • Aim: To explore ways to 	<p>Key stages:</p> <ul style="list-style-type: none"> • One year study involving five focus groups and a final reconvened workshop <p>Key activities:</p> <ul style="list-style-type: none"> • Methodology was intended to map the issues raised by the use of bioremediation, explore issues as defined by the stakeholder groups, and to explore the contribution of the Ethical Matrix 	Case study in <i>Ethical Matrix</i> identifies the following as the messages from the focus groups: <ul style="list-style-type: none"> • Very precautionary approach needed to the use of GMOs for bioremediation • The 'need' for GMO use was discussed and "participants perceived only a limited requirement for GMO bioremediation applications for specific persistent pollutants." 	Case study in <i>Ethical Matrix</i> identifies the following as the lessons on the methods: <ul style="list-style-type: none"> • Over 85% of participants felt the ethical matrix positively aided the discussions, with other participants expressing a neutral view on its use • The ethical matrix clarified the issues, both conflicts and concords, in order to allow policy-makers a greater confidence in their decision-making and to facilitate defensible biotechnology assessment procedures.

<p>improve communication and engagement with stakeholders (including the public)</p> <p>To examine the use of the Ethical Matrix as a tool to aid the management of issues raised in the research and technology development process</p> <p>To explore public and stakeholder views of issues on the issues of bioremediation</p> <p>Evaluation / analysis sources:</p> <p><i>Ethical Matrix. Manual,</i> by Ben Mepham, Matthias Kaiser, Eric Thorstensen, Sandy Tomkins, Kate Millar. Published by LEI, The Hague. February 2005</p> <p><i>Exploring issues raised by Bioremediation Technologies: Stakeholder dialogue and the use of the Ethical Matrix.</i> Presentation by Dr Kate Millar to the Science Communication Conference, May 2002</p>	<ul style="list-style-type: none"> Bioremediation was defined as "the use of micro-organisms and plants to detect, degrade or remove environmental pollutants from soil, water or air". Included use of bacteria, plants and micro-organisms including GM plants and micro-organisms. The Ethical Matrix is an analytical tool developed by Professor Ben Mepham to "help decision-makers reach sound judgements or decisions about the ethical acceptability and/or optimal regulatory controls for existing or prospective technologies in the field of food and agriculture". It applies a set of three principles (wellbeing, autonomy and justice / fairness) to a set of interest groups, resulting in a matrix for deliberation and reflection. Five focus groups: <ul style="list-style-type: none"> an NGO group (of 5 participants) a national women's organisation (7 participants) an industry and regulator group (11) two general public groups (8 each) Pre-meeting briefing documents on bioremediation and the Ethical Matrix Presentations within the groups to introduce the technology and the methodology Discussion within the groups. Participants mapped the potential impacts (positive and negative) of the technologies, and then considered whether the application of the technology might infringe or respect the principles of the matrix. Participants also considered the types of formal and informal policies that might enhance respect for the ethical principles for the specific interest group. 	<p>Kate Millar presentation identifies the following messages from the public:</p> <ul style="list-style-type: none"> Questioned the need to explore / invest in GM technology, as there were numerous naturally occurring organisms that could be harnessed No intrinsic objections to the use of GM technologies; majority wished to explore the acceptability of each option on a case by case basis All the groups considered the difficulties of trading off safety uncertainties against the potential environmental benefits these technologies offer The NGO group was concerned that industrial polluters would continue to pollute on the grounds that these biological methods could be applied to clean-up contamination at a later stage. The final workshop concluded that: <ul style="list-style-type: none"> There needed to be a parallel assessment process alongside research and technology development programmes, that the life cycle of a technology needed to be understood, and that the public bodies responsible at various stages needed to be identified to ensure that wider social and ethical issues are dealt with in a coherent manner. A clear view of 'joined up' technology management was needed Issues should be addressed as the technologies develop rather than dealt with as 'end of pipe' application issues. 	<ul style="list-style-type: none"> Rather than being restrictive, feedback indicated that the framework was well received by the study participants. "All participants who commented also felt that it was important that research bodies and funders are involved in broad stakeholder engagement programmes. A number of participants commented on the need to initiate early engagement programmes in order to maintain confidence in the research funding strategies and research management." Over 60% of all participants commented on the value of the day, exercise or process. <p>Conclusions (from Kate Millar presentation) include:</p> <ul style="list-style-type: none"> Specific areas of concern that can be incorporated into research programmes Issues that encourage collaboration across Research Council initiatives Responsibilities to ensure joined up governance of biotechnology development and application Concepts of need appear to modulate research acceptability Early engagement fosters a greater sense of 'ownership' of technology and outcomes.
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	<ul style="list-style-type: none"> Final workshop, with representatives of each focus group plus additional participants 		
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
<p>BBSRC public communications activities around GM</p> <ul style="list-style-type: none"> Timescale: 1995 - 2002 Budget: unknown Commissioned by: BBSRC Aim: Various Evaluation / analysis sources: Information provided direct by BBSRC (Monica Winstanley, Head of External Relations) 	<p>Key stages:</p> <ul style="list-style-type: none"> 1995 - 2002 <p>Key activities:</p> <ul style="list-style-type: none"> 1995: New Technologies in Food and Farming. Display developed jointly between BBSRC and the Women's Farming Union (WFU) and presented at seven agricultural shows during 1995 1996: Food for our Future. BBSRC co-hosted with the Food and Drink Federation (FDF) and the Science Museum a national review conference on Food and Modern Biotechnology, and co-sponsored the Biotechnology in Agriculture and Food - Coming to the Market conference with the Centre for Agricultural Strategy. 1996: Biotechnology and the Food Chain. Interactive exhibition, at which the public could meet and talk with experts in regulatory, commercial and ethical aspects, presented at the Royal Show 1996: BBSRC sponsored the WFU Annual General Meeting where researchers spoke on GM, food choice and 	<p>The issues raised in the public engagement activities were not recorded or reported in detail.</p>	<p>There were no formal evaluations of these activities. However, feedback from BBSRC was that the public were primarily interested in issues around regulation and commercialisation. These, being outside of BBSRC's remit, were hard for BBSRC to respond to and continued public engagement on the research was thus seen as less valuable.</p>

	<p>perception including attitudes to GM</p> <ul style="list-style-type: none">• 1997-8: Future Foods. BBSRC, MAFF and FDF co-sponsored an interactive exhibition which subsequently toured five other venues (after the Science Museum) in Northern Ireland, Scotland and Wales.• 1997: Want to know more about GM foods? Touring display developed with WFU which toured eight agricultural shows• 1998: Ingeneious. Interactive display on the science, applications, regulations and issues arising from GM. Information provided and visitors able to record their own views. Launched at the Royal Show then toured other venues including Edinburgh International Science Festival in 1999.• 1999: Science Week. Four science, engineering and technology week activities sponsored by BBSRC involved demonstrations, seminars and public discussions around GM.• 1999: GM Crops and the Countryside. Display at the Royal Society Summer Science Exhibition.• 2000: Gene Flow. BBSRC web-based consultation on the BBSRC-NERC funding initiative for research into gene flow in plants and micro-organisms. Outreach publicity included media releases and direct mailings to environmental campaign groups and consumer groups.• 2002: Food and the Future. BBSRC, Times Higher and British Nutrition Foundation jointly supported a public meeting on food technology at the Royal Institution.		
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	Plus various publications on food, biotechnology and GM.		
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
GM Nation? <ul style="list-style-type: none"> Timescale: 2002 - 2004 Budget: originally £250,000; doubled in February 2003 to £500,000. Final costs were £511,500 for the public debate programme (including analysis of results), plus £138,500 support costs (including Steering Board and planning meetings, website, final report); total costs therefore £650,000 Commissioned by: Secretary of State for the Environment Aims: <ul style="list-style-type: none"> To promote an innovative, effective and deliberative programme of debate on GM issues, framed by the public, against the background of the possible commercial production of GM crops in the UK and the options for possibly 	<p>Key stages:</p> <ul style="list-style-type: none"> Launch announcement in July 2002 Final report of the dialogue published September 2003 Publication of government response to the dialogue March 2004 <p>Main activities:</p> <ul style="list-style-type: none"> Independent Public Debate Steering Board (PDSB) 9 large focus groups (8 with public, 1 with stakeholders) to frame the issues for the public debate 6 Tier 1 open public events: major national meetings organised by the PDSB executive, with over 1,000 participants About 40 Tier 2 public events: meetings organised by local councils and national organisations and supported by the PDSB executive with between 30 - 200 participants Over 600 (about 629) Tier 3 public events: local meetings organised by community groups 10 'narrow but deep' group meetings : reconvened focus groups with 77 citizens selected to provide demographic representation; each group met twice with 	<p>The DTI report on the findings of the debate concluded that the seven key messages from the public were:</p> <ol style="list-style-type: none"> 1. People were generally uneasy about GM both in terms of the technology (environmental impacts, safe to eat) and more generally: views varied in intensity but those who felt there were more risks than benefits outweighed the reverse in every section of respondents to the debate. 2. The more people engage in GM issues, the harder their attitudes and more intense their concerns. Contrary to some expectations, more knowledge seemed to increase concern about the level of knowledge about the long term effects of GM. 3. There was little support for early commercialisation. Further trials and tests, firm regulation and demonstrated benefits plus clear answers to risks were sought. 4. There was widespread distrust of government and multi-national companies. There was a strong and wide degree of suspicion of the motives, intentions and behaviour of those taking decisions about GM. Suspicion focused on Government having made a decision already, with inadequate knowledge, and the motivation of multinational companies to profit alongside their perceived power to 	<p>From evaluation report and papers, issues with the implementation of the debate process included:</p> <ul style="list-style-type: none"> • There were problems with governance leading to public cynicism of likely influence of the debate (e.g. role and activities of PDSB and government). The evaluator recommended a fully independent executive for such a complex process. • Participants found the events were well-run, enjoyable and allowed people to have their say, but there was not sufficient time for discussions. There were complaints about resource availability and short notice for events. Local (Tier 3) meetings more popular (and trusted) than regional events. The extent of deliberation in the process overall was limited. • The participants not representative of UK population (e.g. they had higher educational levels). • Evaluation polls showed that public opinion is not a unitary whole, but is fragmented, with ambivalence co-existing with outright opposition. This led the evaluators to question the interpretation of the results of the <i>GM Nation?</i> debate. • The information system for the dialogue was variable. The elicitation of ways publics frame GM-related issues was good. However, the production of stimulus

Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
<p>proceeding with this.</p> <ul style="list-style-type: none"> • Through the debate, provide meaningful information to Government about the nature and spectrum of the public's views, particularly at grass roots level, to inform decision-making. <p>Evaluation / analysis sources:</p> <p><i>A Deliberative Future? An independent evaluation of the GM Nation? Public Debate about the Possible Commercialisation of Transgenic Crops in Britain, 2003</i>, by the Understanding Risk team (UEA with Cardiff and Brunel universities and IFR Norwich), Feb 04. Authors led by Tom Horlick-Jones.</p> <p><i>GM Nation? The findings of the public debate</i>. DTI, September 2003.</p> <p><i>The GM Debate. Risk, politics and public engagement</i>, by Tom Horlick-Jones et al, Routledge, London 2007. ISBN 978-0-415-39322-5</p>	<p>time between meetings</p> <ul style="list-style-type: none"> • Estimated total of 20,000 individuals taking part in events • 36,557 individuals completed the feedback questionnaire in the debate toolkit (available online and at meetings) • The debate website received over 2.9 million hits and 24,609 unique visitors between 1 June and 16 July • Over 1,200 letters and emails were received 	<p>promote their own interests over the wider public interest.</p> <p>5. There was a broad desire to know more and for further research to be done. 'Facts' were sought to resolve the disputes between different parties, and wanted confidence in the independence and integrity of information about GM. Felt no-one knows enough and more research needed.</p> <p>6. Developing countries have special needs. Different sections of the respondents disagreed over whether there may or may not be benefits to developing countries. Here there were felt to be better ways to promote development than GM.</p> <p>7. The debate was welcomed and valued: "Although there was a widespread suspicion that the debate's results would be ignored by government, people in all parts of the debate were glad that it happened." (p8)</p>	<p>materials ("bland and unsatisfactory") and of the final report were cause for concern. The production of final report was "over-hasty and under-resourced".</p> <ul style="list-style-type: none"> • The debate was insufficiently resourced in terms of time, money and expertise. Need to access additional budget half way through created tensions and delays. • There was a failure to engage the broad mass of hitherto disengaged members of the lay public • Beyond the formal evaluation, <i>GM Nation?</i> has come to be seen in some circles as a disastrous public engagement exercise, hijacked by a polarised debate in various ways. Avoiding the same experience has become a priority for public policy-makers since. However, others see <i>GM Nation?</i> as a success in that it did have a significant impact on public policy, and did engage very large numbers of members of the public.

<p>Industrial Biotechnology dialogue</p> <ul style="list-style-type: none"> • Timescale: 2008 - 2009 (4 months) • Budget: £110,000 • Commissioned by: Commissioned by the Industrial Biotechnology Innovation and Growth Team (IB-IGT) within the Department for Business, Enterprise and Regulatory Reform (BERR), now the Department for Business, Innovation and Skills (BIS); with Sciencewise-ERC • Aim: To establish public views, aspirations and concerns regarding the use and potential development of Industrial Biotechnology (IB). • Evaluation / analysis sources: <p><i>Public perceptions of Industrial Biotechnology.</i> Opinion Leader for BERR and Sciencewise. February 2009.</p> <p><i>Evaluation of BERR's public dialogue on perceptions of industrial biotechnology. Final report,</i> by Kathryn</p> 	<ul style="list-style-type: none"> • Key stages: <ul style="list-style-type: none"> • Main dialogue activities took place in 2008 • Final project report published in February 2009 • Evaluation report published June 2009 • Key activities: <ul style="list-style-type: none"> • Biotechnology uses biological systems of living organisms, including genetically modified organisms, to modify products or processes for new uses. • A multi-stakeholder Project Advisory Group was convened, made up of Government, industry and NGO representatives. The group met to discuss the objectives for the work and oversee the information public participants would need in order to begin to debate the issues. • Two citizens' group meetings were held, in Manchester and London, with 24 people taking part in each (total 48 participants). At this stage, the groups met for an evening and one full day. Participants were given basic information about IB and had time to read, question and discuss what biotechnology is, how it works and the potential of new IB applications. • The first session ended with participants identifying the questions and knowledge gaps that they felt should be addressed at the next meeting. • The Project Advisory Group met to discuss the outcomes of the citizens' group meetings and offered guidance on the agenda for the next meetings. 	<p>From the project report, the key messages from the public were around the following issues:</p> <ul style="list-style-type: none"> • Public perceptions were informed by attitudinal and contextual factors including concern about the economic climate, climate change, levels of understanding about science and technology and levels of trust in government and industry • There is some uncertainty and fear of the unknown which is compounded by "a pervading mistrust of government and industry who are not felt to be working in the public interest. 'Profit' or anything associated with industry are viewed with great suspicion and there is little faith that the Government will effectively resource the control and monitor industry." • "People are supportive of 'the national interest'", and "protective of the UK's position in relation to global economies and interests". • Participants were excited about the potential for alternatives to fossil fuels (once understood issues), Britain being a leader in new science and technology especially given potential impacts on jobs. • IB was "perceived as potentially offering 'hope' to some of the key challenges the world faces, provided the implications are properly managed and IB is adopted on a larger scale." • "Processes which are efficient, produce little or no waste and use sustainable or renewable feedstocks are very much welcomed." • "There was particular excitement around medical advancements which could bring 	<p>The evaluation report identifies benefits for those involved including:</p> <ul style="list-style-type: none"> • Policy-makers valued the role of the dialogue in bringing different interests in the policy-making process together, including the private sector meeting with the public. • Participants gained from the process: 100% of public participants said they had learnt something they didn't know before. 29% said they wanted to learn more. In addition, 49% of public participants at the first event and 100% of those at the second event said they had changed their views as a result of taking part • The dialogue stimulated interest in IB among some participants that continued after the events, and they found out more and discussed what they had learnt within their own social circles • Participants trusted that policy-makers were listening to their views. More than half thought the Government would take the public's views into account. Just over half said that being involved had boosted their trust in the Government's decision about these issues • The project enabled experts to hear public views, fears and aspirations first-hand. It also provided opportunities for scientists to develop communication skills and to try out messages directly with the public, therefore gaining instant feedback. • The experience helped some expert speakers overcome fears of public hostility, to the extent that they were more willing to take part in similar events in the future. <p>The main lessons identified by the evaluation</p>
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<p>Rathouse Social Research, June 2009</p>	<ul style="list-style-type: none"> • 24 participants were reconvened from the first meetings (12 from each location) to take part in a two-day deliberative workshop. • Participants heard evidence from 18 different experts in policy, bioplastics and polymers, speciality chemicals and bio-refineries. Experts came from a mix of academic bodies, industry, government bodies and NGOs. • Participants had the opportunity to ask questions of the experts before going into their own discussions to develop their conclusions. • The two-day meeting ended with an interactive session where participants presented their views to interested stakeholders, the IB-IGT, BIS and the Sciencewise-ERC. <p>The evaluation report concluded that there were impacts from the project including:</p> <ul style="list-style-type: none"> • The results informed the IB-IGT action plan for the industry to 2021, and led to a specific recommendation for further public and stakeholder engagement in the future • The dialogue provided hard evidence of public views and the values that underpinned those views, which provided insights to guide future work on IB and enabled BIS to make better informed decisions on policy relating to IB • The dialogue led to BIS establishing a group with Non Governmental Organisations (NGOs) to look further at IB. The dialogue process created a mandate and space for this work, and started to build new 	<p>many benefits 'for the greater good'".</p> <ul style="list-style-type: none"> • "The main concern running through deliberations on the different aspects and applications of IB was the use of GM in any application. ... Of key concern was the natural/unnatural dichotomy which many taking part struggled to reconcile". • There were also "questions surrounding just how 'green' IB really is. Participants in the research sought to understand the balance and scale of its impact not just on climate change but also on the physical environment and ecosystems." 	<p>report were:</p> <ul style="list-style-type: none"> • A diverse group of interests was represented on the Project Advisory Group. The group provided information sources, suggested expert speakers, oversaw the accuracy of the information produced for the public and provided a good breadth of viewpoints on IB. As a result the information was seen to be authoritative and credible • Specialist stakeholder engagement expertise was brought in at an early stage to support and develop the Project Advisory Group • Participants were recruited to broadly reflect the composition of the general public in terms of gender, age, ethnicity, socio-economic group and/or education, and work status. This approach to recruitment was seen to be sufficient to provide a diverse range of views and therefore enhanced the credibility of the project results with policy-makers • The information communicated to the public participants was provided in engaging ways. The range of methods helped to encourage and maintain participant interest and engagement throughout • In order to discuss complex scientific issues effectively, public participants need sufficient background information and sufficient time to explore issues in appropriate depth. In this case, the two-stage citizens' jury approach allowed participants time to digest information, to think and talk about the issues and to come to conclusions • It is important for the negative as well as positive implications of a new technology to be clearly articulated for the public. Without
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	<p>relationships around policy development</p> <ul style="list-style-type: none"> • Government's decision to open up dialogue with the public increased transparency around a potentially highly contentious subject. It also helped policy-makers understand where they could use public dialogue in the future • The dialogue helped policy-makers understand the level of public knowledge on the subject, and therefore to better plan future education work, formulate messages and develop future communications strategies. In the short term, the dialogue provided an opportunity to spread awareness and understanding about IB 		<p>this, public trust in the process can be reduced, and the findings can be of less use to policy-makers who want to know public views of negative arguments.</p> <ul style="list-style-type: none"> • New ways need to be found to engage NGOs who may not see the topic as an immediate priority. It can be particularly important to include NGOs among those who provide input directly to the public participants, to ensure there is an appropriate balance of perspectives. • It takes time to develop the individual relationships that will encourage the participation of key stakeholders in these sorts of public dialogue projects • Public participants often trust information provided by independent scientists more than information from Government or industry. In this case, the experts involved represented a mix of academic bodies, policy-makers and the IB-IGT. • It can be particularly valuable for policy-makers to see and hear public discussions first-hand, especially where decisions need to be made in tight timescales and in intensive processes of this sort.
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
Consumer views on GM food <ul style="list-style-type: none"> • Timescale: 2002 - 2003 • Budget: £110,000 • Commissioned by: Food Standards Agency 	<p>Activities were as follows:</p> <ul style="list-style-type: none"> • Surveys. Questions on GM food in the Agency's annual consumer attitudes surveys (2000, 2001 and 2002). Questions included concerns about the safety of GM food (spontaneous and prompted). • Focus groups that investigated people's views of GM food in March and April 2002, 	<p>Overall trends and views, as summarised in the FSA report, were (p2-3):</p> <ul style="list-style-type: none"> • Choice. Consumers wanted to be able to make an informed choice between GM and non-GM food. They also felt that it is essential that labelling is clear and effective – possibly by using a logo to allow GM ingredients to be clearly identified. 	<p>There is only information on lessons from some of the processes and methods used. These include:</p> <p>Citizens' jury:</p> <ul style="list-style-type: none"> • The members of the citizens' jury all enjoyed the process and were confident about the process including that they had heard sufficient and informative evidence from a varied and balanced range of

<ul style="list-style-type: none"> Aim: Independent assessment of people's views, especially those whose voices are not often heard, on the acceptability of GM food and how this relates to consumer choice. Developed as an input from the FSA to the Government's <i>GM Nation?</i> dialogue <p>Evaluation / analysis sources:</p> <p><i>Consumer views of GM Food. The Food Standards Agency's contribution to the public dialogue.</i> FSA, London, July 2003.</p>	<p>covering food safety, attitudes to GM food, understanding of GM and information known and needed.</p> <p>A citizens' jury of 15 people from Slough that met in a three-day event to investigate the question 'Should GM foods be available to buy in the UK?' Opinion Leader Research were commissioned to run the jury and report. Session introduced by Professor Kathy Sykes. Witnesses presented evidence (and were questioned by the jury) from a wide range of organisations including Institute of Food Research, Genewatch, US Food and Drug Administration, Friends of the Earth, Sainsbury's, New Scientist, Consumers' Association, Aventis Crop Science and Agricultural Biotechnology Council, and Somerset County Council. All witness presentations were published on the FSA website as they took place, the citizens' jury proceedings were broadcast live on the internet and all evidence presented to the jury was also published on the FSA website. Issues considered included effects on human health, potential changes to the environment, opportunities and threats to UK farming and the economy, potential benefits and disadvantages to different consumers, and issues on current and future labelling of GM food. Three jurors presented their findings to senior staff of the FSA, watched by over 1,000 viewers on the live Internet broadcast.</p> <p>Four discussion groups in Scotland with young adults in tertiary education and (separately) low income consumers. These were commissioned by Food Standards Agency Scotland (FSAS) and run by the Scottish Civic Forum. 50 people took part. An initial session used electronic communications to qualitatively assess people's existing knowledge on GM, and</p>	<p>Benefits. Although some people considered that GM could bring benefits in terms of nutrition, quality and price, others questioned whether GM food was necessary given the choice of food currently available. Some people felt that the UK could be left behind technologically if GM was developed in the rest of the world.</p> <p>Information and education. Most people involved in the activities acknowledged that there is little public understanding about GM food. They welcomed the presentation of basic facts and considered it important that information should be unbiased and accessible.</p> <p>Confidence in safety measures. Consumers considered that further information on the safety assessment carried out on GM food needed to be made publicly available and they wanted to know more about the regulatory bodies responsible for safety.</p> <p>There continued to be concerns about who to trust where there is uncertainty. The BSE crisis had left some people with a distrust of scientists and Government.</p> <p>Some people also raised concerns about how far genetic modification might be taken in the future, particularly regarding GM animals and the acceptability of transferring genes from animals into plants.</p> <p>Monitoring of health effects. There was recognition that GM food has been consumed outside the EU for some years with no suggestion of any health problems. But there were concerns regarding the potential long-term health effects of eating GM food.</p> <p>Impact on the environment and</p>	<p>witnesses.</p> <ul style="list-style-type: none"> All 12 of the citizens' jury members thought GM a very important issue and that citizens' juries were a good way of involving the public in this sort of issue. <p>Four discussion groups in Scotland:</p> <ul style="list-style-type: none"> It was more difficult than anticipated to attract participants to the discussion groups. There was one strongly hostile response to invitations, but otherwise most agencies contacted to promote the events either did so enthusiastically or did not see the topic as sufficiently interesting to promote. Strong efforts were made to promote the events, and offers were made to fund travel, childcare, and organise minibuses for groups. Despite this, there were difficulties attracting interest to the initial events, so modifications were made. The 50 people that did attend (the target number), said they found the groups interesting and challenging, and reported being much better informed about the topic as a result. People "welcomed the impartial and informative format of the event that they had attended". (p21)
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	<p>their initial views on consumer choice. There were also facilitated full plenary sessions of the whole group, and small group breakout sessions. Information was provided through distribution of the FSA booklet, an introductory briefing from Dr Donald Bruce (working on the ethics of technology), and FSA staff attended to answer technical questions.</p> <ul style="list-style-type: none"> • A national schools' debating competition, the finalists of which debated the motion 'This house would eat genetically modified foods'. The Agency sponsored the Durham Union Society Schools Debating Competition which had been running for 14 years, and provided a bursary to enable seven schools who would not otherwise have taken part to attend. The FSA set the motion which was debated by four teams. • School video. The FSA commissioned a professional film maker to work alongside a diverse group of students from a North London secondary school to produce a short video on GM foods. Using the technical and editorial support from the film maker, the students were asked to represent the views of their peers on the topic. The FSA supplied their booklet on GM food, and students also used materials from Consumers Association, the BBC, Friends of the Earth and Greenpeace websites. The students also conducted a survey of 53 of their peers. • An open meeting of the Advisory Committee on Novel Foods and Processes. The second meeting of the Committee, on 13 November 2002, enabled the public to ask the Committee questions from the floor (some submitted in advance). There was then a discussion of the implications of research into horizontal 	<p>biodiversity. These issues represented the area of most concern in all the activities and also worried people who were generally receptive to eating GM food.</p> <p>A particular worry was that once GM crops were released into the environment, there could be no turning back and that, in turn, could restrict choice between GM and non GM food through cross-contamination.</p> <p>• Impact on developing countries. Throughout these activities the issue of developing countries came up regularly. Again, there was a very wide range of views as to perceived benefits in relation to economic effects and negative impacts with regard to sustainability.</p> <p>Some other specific findings from the different activities included the following, not covered in the summary above:</p> <ul style="list-style-type: none"> • A majority (9 of the 15) members of the citizens' jury concluded that GM food should be available to buy in the UK; a "sizeable minority" (6) felt that GM should not be available (p15). • The citizens' jury agreed unanimously on some wider issues: <ul style="list-style-type: none"> • more time is needed to understand the long term implications of GM crops before farmers start to grow them in the UK • there is very little information available to the public on GM, and they need to know more about what GM is, what tests have been done on safety, and about the regulating bodies and their responsibilities • there should always be a choice between GM and non-GM, so labelling is extremely important • there are ethical issues about how far this scientific process could be taken; there is particular concern about genetically 	
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	<p>gene transfer, and allergenicity and its importance in the approval process for novel foods. The Minutes of the Committee form part of the overall FSA report on these activities.</p> <p>Throughout, the GM Public Debate Steering Board was informed of the FSA activities.</p>	<p>modifying animals as well as crossing barriers between animals and plants.</p> <ul style="list-style-type: none"> • The discussion groups in Scotland found that, although GM was not a topic people initially had a strong interest in, there were strong views once the issue was raised. Issues raised included: <ul style="list-style-type: none"> • wide range of views on safety, and particular concern about lack of evidence and the need for long term testing • wide range of views on choice, including dangers for those with particular health problems, the potential for it to be impossible to avoid GM, and therefore strong support for labelling. • benefits were identified including reducing allergies and pesticide use, and to science and research in the UK; GM was not perceived to offer benefits to Scottish farmers, and there were mixed views on the benefits for farmers in the Third World. • concerns identified included gene transfer, cross pollination and unwanted side effects, and that GM was 'unnatural'; also concerns that "greed was driving this issue, with it benefiting producers over consumers" (p21), and the long term effects and where the technology might go next • strong support for finding out more, "in an unbiased and accessible format" (p21), and a general distrust of government on the issue. • The schools debate concluded: <ul style="list-style-type: none"> • after the floor debate, the motion ('This house would eat genetically modified foods') was passed by the majority of students • key themes from the schools debate were the impact of GM food and crops on consumers, the environment, farmers and developing countries. The proposition considered that GM foods should be 	
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		<p>controlled in the same way as other foods, that GM crops and food could benefit society and that people should be free to make an informed choice. The opposition highlighted the potential health risks from GM foods, the threat to biodiversity from GM crops, and developing countries' lack of need for GM food aid or crops. (p22)</p> <ul style="list-style-type: none"> The survey for the school video found more than double the number of negative responses to positive ones. For example: <ul style="list-style-type: none"> • 24 did not think GM food is safe; 12 did • 29 did not agree with the genetic modification of food; 10 did • 27 said they would never eat genetically modified food; 19 said they would. • Far more saw GM foods as part of the future (31) than did not (11) or were not sure (11). 	
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
Future Foods <ul style="list-style-type: none"> • Timescale: 2009 • Budget: unknown • Commissioned by: Science Museum, at the Dana Centre • Aim: Debate • Evaluation / analysis sources: www.danacentre.org.uk/events/2009/01/22/482 	<ul style="list-style-type: none"> Single evening event at the Dana Centre, London in January 2009 Speakers included Rodomiro Ortiz, International Maize and Wheat Improvement Centre; Tim Lang, Professor of Food Policy, City University, London; Bob Watson, Defra Chief Scientific Adviser Facilitated by Ian Sample, Science Correspondent, The Guardian Comments / debate continued on Dana Centre website (still available in March 2011). Linked to Antenna exhibition at the Science Museum, with website links on Pro GM and No GM. Still open in March 2011: www.sciencemuseum.org.uk/antenna/future-foods 	No information available	No evaluation found

	efoods		
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
<p>Public dialogue on synthetic biology</p> <ul style="list-style-type: none"> • Timescale: 2009 • Budget: unknown • Commissioned by: Royal Academy of Engineering (RAEng) • Aim: To explore uninformed and informed perceptions of and attitudes to synthetic biology in the UK. <p>The objectives of the project were to:</p> <ul style="list-style-type: none"> • determine public awareness of synthetic biology • explore public perceptions of synthetic biology • explore uninformed and informed public attitudes to synthetic biology • identify particular hopes, expectations and concerns relating to the development of the technology 	<p>Key stages:</p> <ul style="list-style-type: none"> • Exploratory dialogue activity with 16 members of the public attending two evening meetings at the RAEng offices in London in March and April 2009. Members of the public taking part in this strand were referred to as 'participants'. • Telephone omnibus survey in April 2009 of 1,000 adults in the UK. Members of the public taking part in the survey were referred to as 'respondents'. <p>Key activities:</p> <ul style="list-style-type: none"> • Synthetic biology was defined as "an emerging multidisciplinary research area that is underpinned by both engineering and science. It aims to design and engineer biologically based parts, novel devices and systems as well as redesigning existing, natural biological systems. • The dialogue was designed to complement the Academy's inquiry into synthetic biology, published in May 2009, which recommended "an active and ongoing public engagement programme must be established which creates platforms for various stakeholders and publics to share their views on both the potential benefits of synthetic biology and their concerns as the technology develops". • The dialogue activity involved 16 members of the public attending two evening meetings of three hours each at the 	<ul style="list-style-type: none"> • Awareness of synthetic biology in the UK was low: none of the 16 participants had heard of it; nor had two thirds of the survey respondents. • Creating life was seen as 'very futuristic', 'exciting' and 'more exciting than destroying life' by most of the dialogue participants. 63% of survey respondents agreed with the statement 'creating new man-made micro-organisms that will produce medicines or biofuels should be supported', with a third of those (33%) agreeing strongly. • Survey respondents revealed an apparent difference in attitude between the creation and modification of micro-organisms. The dialogue participants indicated that there was more support for the creation of completely artificial organisms, partially because these were perceived to have less chance of survival in the event of an accidental release. • Where support for the notion of creating new life was shown, it was in the context of micro-organisms which could be designed to produce useful products. Dialogue discussions indicated that one factor for this support could be that these organisms were not seen to be 'alive'. With regard to creating or modifying higher-life forms and humans by synthetic biology, the dialogue participants were not at all supportive. About four in ten (39%) respondents agreed with the statement 'The idea of creating man-made micro-organisms is worrying'. Thus while there was a majority positive response to the concepts of creating and 	No formal evaluation found

<ul style="list-style-type: none"> identify issues that merit further research and/or dialogue activity <p>Evaluation / analysis sources:</p> <p><i>Synthetic Biology: public dialogue on synthetic biology</i>, by Suzanne King and Tara Webster, People, Science and Policy Ltd. Published by Royal Academy of Engineering in June 2009. ISBN: 1-903496-46-2.</p> <p>This report is a mixture of project report and a methodological summary.</p>	<p>RAEng. offices in London.</p> <ul style="list-style-type: none"> The participants in the dialogue were recruited from the Greater London area, and the final group was selected to be as diverse as possible in terms of age, social class and ethnicity, given the small number involved. The aim was not to find a representative sample but to find a group of people to begin exploring attitudes with. The final group was 9 men and 7 women. The first meeting, in March 2009, introduced ideas of scientific research and explored initial attitudes to synthetic biology. There were presentations from two expert speakers who then joined the public participants' discussions (in two small groups) of the social and ethical implications. An internet forum was set up between this and the following meeting to encourage continuing reflections. 12 participants used the forum; six posted a comment or question and one posted further references. The second meeting began with participants completing a questionnaire on attitudes to scientific research, then most of the rest of the session was in breakout groups to discuss case studies illustrating the science, potential applications and industrialisation of synthetic biology products, and to identify hopes, expectations and concerns. There was also a telephone omnibus survey of 1,000 adults in the UK, with three questions and three attitude statements. This quantitative survey was designed to provide a representative early insight of awareness and attitudes to synthetic biology, at a national level, as well as to 	<p>modifying microorganisms to produce medicines and biofuels, there was still some concern over the technology.</p> <ul style="list-style-type: none"> The dialogue participants were largely supportive of the idea of micro-organisms being engineered to live in controlled conditions, such as vats to create products like drugs or biofuel, and able to accept the risks associated with the possibility of accidental release. However, some were extremely resistant to the concept of these organisms being deliberately released into the environment for bioremediation purposes, because of the unknown consequences. Participants wanted regulation but were concerned that regulations should not stifle development. Concerns were also raised as to whether the Government could control synthetic biology and especially whether it could keep up with the speed of development. Despite some hostility towards the idea of patenting, there was a belief that investors are entitled to a return on their time and money. However, there was a sense that there should be a balance between returns on investment and social responsibility. The majority of participants prioritised the development of biofuels over medical uses, as this application was deemed to impact on more people. The application with the least support was development of synthetic biology for bioremediation because it involved deliberate release into the environment. Control, safety, regulation and testing of both synthetic biology production methods and their products were seen as paramount. 	
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	<p>provide context to, and verify, some of the dialogue findings.</p>	<ul style="list-style-type: none"> • Generally, it was expected that the media would react negatively and participants recommended that scientists work to raise public awareness. They also thought it was important for other members of the public to keep an open mind and not be unduly swayed by media reports. • Government funding was thought to be important, not only because participants believed that this was a field worthy of further development, but also because this would give the Government influence over developments. • Overall, there were two main dimensions on which participants views depended: <ul style="list-style-type: none"> • trust in synthetic biologists to be in control of the re-designed / created micro-organisms • the degree to which they felt the outputs would be beneficial. 	
Name and basic data	Main activities and reports	Lessons from public views	Lessons from methods used
Synthetic biology dialogue <ul style="list-style-type: none"> • Timescale: 2009 - 2010 • Budget: £295,000 for the dialogue; plus £30,000 for follow on work to embed the results. Evaluation £35,000 • Commissioned by: EPSRC and BBSRC with Sciencewise-ERC • Aim: 	<p>Key stages:</p> <ul style="list-style-type: none"> • 2006 - 2008: internal BBSRC and Research Council discussions on public engagement around synthetic biology • 2009: Steering Group for the dialogue project established • Summer 2009: tenders for the dialogue and evaluation invited; contractors appointed. • January 2010: Workshops with the public started; three sets of workshops were held (second set in February; third set in March), followed by a reconvened final workshop in May 2010 	<p>The evaluation report identified some issues raised by those public participants as particularly important for the final report. There were concerns that science does not listen to the public and that the public should be more involved. Specific ideas that were identified as needing to be strengthened in the final report were global responsibility, who would profit from new technology and how benefits could be democratised, and security. (Interim evaluation p20)</p> <p>The final report published by BBSRC and EPSRC, summarising the findings from the dialogue, outlined the main messages from the public as follows:</p>	<ul style="list-style-type: none"> • A large number of small groups initially, and effective sampling, enabled a valuable range of views to emerge and helped mitigate the risk of a minority of groups where participants did not engage fully with the issues • Participants in the reconvened workshop were interested in selection processes, about the contractors and about how the process was initiated. Early information on these issues may help build trust earlier. • Video ethnography (short films made by scientists about how they work) was highly effective and had a strong impact, however videos of presentations were less effective

<p>To allow the diverse perspectives of a range of UK residents to be articulated clearly and in public in order that future policies can better reflect these views, concerns and aspirations.</p> <p>Evaluation / analysis sources:</p> <p><i>Synthetic biology dialogue. Interim evaluation report</i>, by Laura Grant and Bella Williams, 29 July 2010</p> <p><i>Synthetic Biology Dialogue. Overview</i>, published by BBSRC, EPSRC and Sciencewise-ERC. February 2011</p> <p><i>Synthetic biology dialogue. Follow up evaluation report</i>, by Laura Grant and Clare Gardiner, March 2011.</p>	<ul style="list-style-type: none"> • June 2010: Report of dialogue launched • October - December 2010: meetings with government and parliamentary event • February 2011: Embedding workshop to reflect on the messages and lessons from the process with science professionals <p>Key activities:</p> <ul style="list-style-type: none"> • In 2006, BBSRC led a cross-council working group to establish Synthetic Biology Networks to embed social science in scientific research; the first working group meetings were held in 2007. • Synthetic biology had been identified as an issue that raised ethical and other social issues, including some similar to those raised by genetic modification (GM); other internal discussions concluded that public engagement was necessary and public dialogue suggested. • During 2009, discussions continued between BBSRC and EPSRC, and they approached Sciencewise-ERC for funding and advice. • A Steering Group was established to provide advice on public dialogue on synthetic biology. It included experts from the Royal Academy of Engineering, Sciencewise-ERC, government, EPSRC and BBSRC. Their role was to scope the dialogue and examine what success might look like. Several meetings were held before the invitations to tender were distributed (including a full day facilitated workshop to tighten the remit of the group), and then the group met again in May and July 2010 to discuss the findings from the dialogue and their implications. 	<ul style="list-style-type: none"> • There was conditional support for synthetic biology: there was great enthusiasm for the potential of synthetic biology, but fears about control, who benefits, health and environmental impacts, misuse and regulation. • Overall, six key themes emerged, as outlined below. <p>1 The Technology</p> <ul style="list-style-type: none"> • A tension exists over the application of engineering principles to biological systems. There is unease about living in a 'synthetic' world where evolution was 'speeded up' and biological parts produced on an industrial scale. • Creating life is considered acceptable when balanced with the benefits of synthetic biology and that this is done with humility. <p>2 Leadership and Funding</p> <ul style="list-style-type: none"> • Research Councils are seen to have a key role. However, there is concern that funding of 'good science' focuses on technical excellence and could sideline ethical issues. The grants process needs reviewing with more effective checks and balances on applications. • The public want the opportunity to feed in their aspirations and concerns at an early stage and for Research Councils to make the science accessible. • It is fundamental that Research Councils appoint the right leaders, in the right place and for the right reasons in relation to synthetic biology development. <p>3 Responsibility</p>	<ul style="list-style-type: none"> • Public influence on workshop design is a valuable aspiration, although needs can be anticipated to some extent to aid planning • Public and expert participants valued face-to-face interactions highly • A greater focus on engaging ways to communicate the scientific principles at the core of synthetic biology may have empowered public participants still further • The focus group approach built trust between participants, but starting in groups of people with similar backgrounds may have reinforced socially stereotypical attitudes and therefore may have limited the expression of some views • The reconvened workshop was an effective means of checking the dialogue findings with public participants, although only a relatively small number were able to be involved in this case • Research Councils and others should remain realistic about the advantages and limitations of dialogue. Articulating these limits in balanced communications about the dialogue will help avoid any criticism of the method undermining the findings (for example from perspectives that value quantitative over qualitative approaches). • Participants felt the process was worthwhile and many were keen to remain involved in dialogue about synthetic biology • The extent to which participants feel their views are listened to affects their perception of the process • Experts found their experiences worthwhile. In particular, scientists were pleased that
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	<ul style="list-style-type: none"> An Oversight Group was established to widen the expertise available to the project. This group included some Steering Group members and also others including NGOs. This group included differing strong views on the issues and the dialogue design. The contractor carried out 41 telephone interviews with synthetic biology stakeholders, to guide the contractors about the topic. Interviewees included scientists and engineers, social scientists and ethicists, religious and faith representatives, Government, regulators, funders, industry, NGOs and consumer groups. The input from these interviews fed into the development of information materials for use with the public. Sixteen groups of ten participants each was recruited across four locations in England, Scotland and Wales. Each group had specific separate demographic characteristics (e.g. women, socio-economic group AB, aged 18-34 etc). The public dialogue process was, in summary: <ul style="list-style-type: none"> Workshop 1: The impacts of science ad technology on everyday life, and introducing synthetic biology. 2.5 hours, with all 16 groups meeting separately. Workshop 2: Perceptions of synthetic biology, how science gets done, and regulation and funding. Full day session, bringing together four of the original small groups in four locations (so 40 participants in each location). Methods used included expert presentations, electronic polling, actors (in roles such as scientist / engineer, industry, NGO, social science), video 	<ul style="list-style-type: none"> There is a disconnect for scientists / engineers between the unremarkable nature of their own work and the transformative nature of the field as a whole. This highlights the need for scientists to think more carefully about the significance of their work, their motivations for research and to develop greater responsibility. People expect that some work in synthetic biology will go wrong, so scientists / regulators should not claim to know everything. Scientists need more support in understanding potential impacts and in being more open about early research findings. <p>4 Innovation</p> <ul style="list-style-type: none"> There is a need for an alternative to the 'pipeline' model of innovation where ideas are created in a lab, embedded in products and distributed to consumers. The public should be involved throughout, not just at the end. The innovation process needs to be more 'thoughtful'. Research Council leaders, learned societies, universities and Government should ensure research and new developments are informed by social values, not just led by technology. <p>5 Regulation</p> <ul style="list-style-type: none"> Robust and independent regulation is key; the public did not trust a voluntary or self regulation system. There were concerns over the ability of the current framework to deal with novel organisms. 	<p>the public were broadly supportive of their research</p> <ul style="list-style-type: none"> Social scientists valued participating in a process they might usually critique and the opportunity to see some of the methods in action Experts were conscious of their capacity to introduce bias and some might have appreciated more support or advice on this ahead of the workshops A tool such as a short film giving an insight into how dialogue works could be a useful briefing aid for expert participants Encouraging experts to prepare plenary input beforehand could limit the risk of spontaneous misleading remarks The roles of experts and observers during workshops (especially experts attending in the capacity of observers) needs to be clear A less pressured timescale and/or more effective planning overall may have allowed exploration of further ways to include industry and NGO voices (as well as through the actors) Management and Oversight did not always run smoothly, although impacts on the dialogue workshops themselves were modest The Oversight Group needed longer to build trust. It would be useful to explore ways that this group could have had greater ownership over the dialogue principles, which were passed on to the Oversight Group from the Steering Group Diversity in the membership of the OG was seen as a strength, but extra time and
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	<p>ethnography (about scientists at work)</p> <ul style="list-style-type: none"> • Workshop 3: Potential applications (medical, energy, environmental, crop / food), social and ethical issues, the boundaries of research. Also full day, and also with expert presentations, video presentations and electronic polling. • A reconvened workshop was held in May 2010, to consider draft findings from the project. Eight public participants, two from each location, were involved. The contractor presented the findings and there were then opportunities for comment and discussion. • The project report was published on the BBSRC and Sciencewise-ERC websites, and BBSRC distributed hard copies to over 200 stakeholders. • The report was launched at an event in London in June 2010 • Dialogue findings were taken to the relevant committees in BBSRC (Bioscience in Society Panel) and EPSRC (Societal Issues Panel) in Summer 2010 • The CEOs of BBSRC and EPSRC met in October 2010 to discuss the dialogue. A joint letter stating their planned responses to the recommendations was also sent to participants and stakeholders that month. • The CEOs of the EPSRC and BBSRC sent a letter to the Chief Scientific Advisor outlining the public concerns around regulation raised during the dialogue • A Parliamentary Scientific Committee meeting that focused on the dialogue was held in December 2010 in Westminster 	<ul style="list-style-type: none"> • International co-ordination and regulation to control technology development and access in global markets is a major challenge. Controls need to mitigate deliberate misuse, such as bioterrorism. <h2>6 The Future</h2> <ul style="list-style-type: none"> • The report had begun to identify key public aspirations and concerns around synthetic biology and had asked questions of those developing the field. Research Councils now had a duty to continue engaging with participants and explain how some of the conditions they have placed on the research have been met. 	<p>resource is required to make any such process inclusive</p> <ul style="list-style-type: none"> • More planning and direction from the Research Councils on how the process would be managed and the respective roles in decisions would be valuable in future • Committees tend to be conservative, how does this link with innovation? • Oversight Group members dedicated considerable time to the dialogue, which was valuable • It is important to capture and share learning among Research Councils and others about the oversight aspect of the dialogue. • Although there was reticence about identifying actual policy influence, the evaluation showed that the following outcomes emerged following the dialogue: <ol style="list-style-type: none"> 1 Providing impetus for Research Councils to take the public concerns about synthetic biology to regulators via discussions with the Chief Scientific Advisor 2 Catalysing and informing EPSRC's work on responsible innovation by linking to the dialogue through the Societal Issues Panel 3 BBSRC reviewing their approach to ethics in grants as a direct result of the dialogue, which in turn has created opportunities for the public engagement team to collaborate with colleagues that work on research funding • After the end of the dialogue, EPSRC continued to pursue the regulatory aspects and work around responsible innovation which resonates with many of the issues with synthetic biology and GM: a £60,000
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	<ul style="list-style-type: none">An embedding workshop for the synthetic biology community was held in Bristol in February 2011. The aim of the workshop was to further explore the messages from the dialogue, share best practice in public engagement with synthetic biology and begin to develop an action plan to embed dialogue into the business of synthetic biology research.		project was announced early in 2011 for a six month scoping study.
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4. Stakeholder engagement initiatives

Only two stakeholder engagement initiatives were identified during this brief review, both run by The Environment Council:

- GM workshop for Sainsbury's, 1997
- National stakeholder dialogue on GM, 1999 - 2002

Name and basic data	Main activities and reports	Lessons from stakeholder views	Lessons from methods used
GM workshop for Sainsbury's Timescale: 1997 Budget: unknown Commissioned by: Sainsbury's Aim: Exploring issues around GM, particularly around where to start a dialogue on GM Information from: Suzannah Lansdell and Andrew Acland, who worked with The Environment Council on these dialogues.	<ul style="list-style-type: none"> • A one-day workshop • Independent convenors and facilitation by The Environment Council (TEC) for Sainsbury's • Participants included biotech companies, retailers, consumer groups and NGOs 	None available	No evaluation. Feedback from SL and AA: <ul style="list-style-type: none"> • Realisation for Sainsbury's that this was not a simple subject • How difficult it was to bring together the huge range of stakeholders into what this was aspiring to be (i.e. a national dialogue), especially as they were very reticent about meeting in the same room together. This was at a time when GM was a very high profile issue.
National stakeholder dialogue on GM Timescale: 1999 - 2002	<ul style="list-style-type: none"> • Four meetings arranged between Monsanto and environment and consumer groups in September 1999 	<ul style="list-style-type: none"> • Feedback from environmental groups was that there needed to be a moratorium on the introduction of GMOs before there could be dialogue. 	No evaluation, but feedback from other sources suggests the following: <ul style="list-style-type: none"> • Media coverage (<i>Big Issue</i>, January 2000)

<p>Budget: unknown</p> <p>Funded by: Monsanto</p> <p>Aim: Exploratory talks to consider the viability of a National Dialogue on GM issues.</p> <p>Information from:</p> <p>'Labour sues for peace on GM foods', by Geoffrey Lean. <i>Independent on Sunday</i>, 10 October 1999</p> <p>Monsanto Talks in Crisis', by Andy Rowell, <i>The Big Issue</i>, January 2000</p> <p>Suzannah Lansdell and Andrew Acland, who worked with The Environment Council on these dialogues.</p>	<ul style="list-style-type: none"> • Independent convenors and facilitation by The Environment Council (TEC) • Cabinet Office Minister indicated (October 1999) in a letter to TEC that the Government was prepared to commit itself to a dialogue and supported and welcomed it. Government involvement initially welcomed by environmental groups including the Soil Association. • TEC said that the "new dialogue is designed to find common ground for the basis of a different way of making decisions, in which opposing parties define the problem, reach agreement, and then implement the solution, rather than the Government making a decision, announcing it, and then having to defend it". • Planned to hold exploratory meetings during October - November 1999, with the aim of holding a large scale meeting in Spring 2000. • Initial explorations involved a wide range of groups from Government departments, NGOs and consumer groups, biotech and retailers. • In January 2000, it was reported that 16 campaign groups had withdrawn from the process, including the Food Commission, Friends of the Earth, GenetiX Forum, GeneWatch UK, Greenpeace, The Pesticides Trust, The Vegetarian Society and the Women's Environment Network 	<ul style="list-style-type: none"> • GeneWatch said "It's the wrong discussion. People want to talk about food and sustainable agriculture, not GMOs." 	<p>suggested that "multinationals are now using dialogue as a new form of public relations", as a "cynical PR exercise". These suspicions led to no confidence in the process from environmental and other campaign groups.</p> <ul style="list-style-type: none"> • The process became untenable as a multi-stakeholder dialogue as key groups withdrew. The issue was so live that there was more to be gained (for them) from being outside the process, and continuing with a dialogue while 'business as usual' continued was too difficult for many parties.
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5. Opinion polls and other public attitudes surveys / research on GM and GM-related issues

Five opinion polls and surveys have been identified for this review; these either focus exclusively on, or cover, GM and GM-related issues:

- GM Food and Crops opinion poll, 2002 and 2003 (part of *GM Nation?* evaluation)
- Food technologies, 2008 (Food Standards Agency)
- Exploring attitudes to GM food, 2009 (Food Standards Agency)
- Biotechnology, Special Eurobarometer, 2010 (European Commission)
- Public Attitudes to Science, 2011 (Department for Business, Innovation and Skills)

Name and basic data	Main activities and reports	Public views
GM Food and Crops public opinion poll Timescale: One poll in 2002 and one in 2003 Budget: unknown Commissioned by: Centre for Environmental Risk, University of East Anglia, with Cardiff University and the Institute for Food Research Aim: To assess wider public opinion on GM issues as part of the evaluation of <i>GM Nation?</i> Information from: <i>The GM Debate. Risk, politics and public engagement</i> , by Tom Horlick-Jones et al, Routledge, London 2007. ISBN 978-0-415-39322-5	<ul style="list-style-type: none"> • Two polls carried out by MORI as part of the <i>GM Nation?</i> evaluation; in 2002 and 2003 • The 2003 poll reached 1,363 individuals 	<ul style="list-style-type: none"> • In 2003, 40% found GM food fairly or very unacceptable. 27% thought GM food fairly or very acceptable and 27% said that GM food was neither acceptable nor unacceptable. • The evaluators compared poll results from 1996 to 2003, and found that both opposition and support had fallen; more people had become more uncertain: those who neither opposed nor supported GM food rose from 16% in 1996 to 39% in 2003. • However, they concluded that public opinion about GM food seemed to be skewed towards opposition: while about one third in 2003 (29%) indicated that GM food should be opposed, only 9% said that GM food should be promoted. • In addition, in 2003, while 13% supported GM food, 36% opposed it and 39% neither opposed nor supported it. (p103) • The poll in 2003 also found a relatively high degree of interest in the issue of GM food. Although 30% said they were not very interested and 10% were not at all interested, a majority (56%) said they were fairly or very interested in the issue. (p104) • 94% felt that all food containing GM material should be labelled (p104) • 79% agreed that biotechnology companies should be made liable for any damage caused by GM products. (p104) • Confidence in the Government's regulation of GM food dropped between 2002 and 2003. In 2002, 41% disagreed with the statement that 'the British Government adequately regulates GM food'; this rose to 55% disagreeing in 2003. (p107) • "Overall, our survey findings suggest that current UK 'public opinion' is not a unitary whole, but fragmented with considerable ambivalence existing alongside outright opposition. Such ambivalence means that while many people are prepared to endorse potential future benefits

		of GM food and crops, there also exist widespread concerns about the technology." (p 98)
Name and basic data	Main activities and reports	Public views
<p>Public attitudes to Emerging Food Technologies</p> <p>Timescale: 2008 - 2009</p> <p>Budget: £24,220</p> <p>Commissioned by: Food Standards Agency</p> <p>Aim: To consolidate knowledge of public opinion on emerging food technologies, and to identify any gaps in the research that the FSA may need or want to fill.</p> <p>Information from: <i>An Evidence Review of Public Attitudes to Emerging Food Technologies - Executive Summary</i>, by Brook Lyndhurst. Published by FSA, March 2009</p>	<ul style="list-style-type: none"> The review was to build on existing in-house work by the FSA and focus in particular on Genetically Modified (GM) foods, novel food processes, food irradiation, nanotechnologies, animal cloning, functional foods and synthetic biology. The evidence review was conducted as outlined below: <ul style="list-style-type: none"> Search for relevant materials through online sources, generating over 400 references that met the agreed criteria Prioritised sources to identify those to be reviewed formally Reviewed and analysed 105 articles Discussions with a range of people working in the field to ensure that the most relevant materials had been found, and that any research in the pipeline was also identified. 	<p>of GM food and crops, there also exist widespread concerns about the technology." (p 98)</p> <p>Public views</p> <ul style="list-style-type: none"> There was a large body of evidence on public attitudes to GM foods, but evidence on other technologies was more limited. "Overall, the public was found to be wary, uneasy and uncertain about emerging food technologies ... where technologies have many applications food is often seen as the least acceptable (e.g. GM, cloning) and people often seem unconvinced of benefits" "Awareness of emerging food technologies is generally low ... The exceptions to this are GM and cloning which most people have heard of, at least in the UK ... awareness certainly does not mean that people feel confidence in their knowledge about these technologies." The factors seen as most important in shaping people's views were: <ul style="list-style-type: none"> weighing up risks and benefits, especially whether people feel they have any control over their exposure to risks general attitudes such as towards science, health, nutrition, cultural values and world outlook emotion, especially around language of 'naturalness' prior knowledge and information; more information can have both positive and negative effects in terms of views, and certain sources are trusted more than others trust, with media, government and industry being least trusted; friends and family and health professionals being most trusted. Values, attitudes, beliefs and experience were seen as better predictors of attitudes than socio-demographics, although women were generally more concerned, less positive and less likely to perceive fewer benefits in these technologies than men Attitudes had changed little between 1999 - 2008 (the period of the study), although there had been some cycles of volatility. But overall, most people had remained neutral, undecided and slightly wary. The researchers concluded "We would highlight the relationship between - on the one hand - rational, scientific, factual, evidence-based perceptions and understandings; and emotional, irrational, ethical, values-based perceptions on the other. In the context of public attitudes towards novel food technologies both perspectives are real and valid - there is no right or wrong <i>per se</i>. Any organisations wishing to pursue public engagement around novel food technologies will need to respect this reality and adopt a neutral stance."

<p>Food technologies</p> <ul style="list-style-type: none"> • Timescale: 2008 • Budget: £89,590 • Commissioned by: Food Standards Agency • Aim: To support the FSA evidence base in relation to food technologies • Information from: <i>Food technologies. Findings from the 2008 British Social Attitudes survey</i>, by Elizabeth Clery and Rossy Bailey, National Centre for Social Research. Published by the FSA in March 2010 	<ul style="list-style-type: none"> • The annual British Social Attitudes (BSA) survey covers British social, economic, political and moral values. It is run by the National Centre for Social Research (NatCen), which publishes the findings annually. • The FSA commissioned a module of questions in the 2008 BSA survey to measure public attitudes to food technologies, including GM food among others. • FSA questions were used in two of the four approaches to the survey: a Computer Assisted Personal Interviewing (CAPI) interview (which was used with 2,250 people), and a self-completion booklet (used by 1,986 people). • The interviewing was mainly carried out between June and September 2008. 	<ul style="list-style-type: none"> • There was considerable diversity in public knowledge, attitudes, behaviour and decision-making processes in relation to food in general and good technologies in particular. In particular, women and older age groups had particularly negative attitudes and views. However, other attitudes (e.g. to science and taxation) were also important. Public attitudes to food technologies needed to be considered within a broad attitudinal and behavioural context and not simply within a vacuum. Perhaps surprisingly: "The fact that younger age groups tend to be less concerned about food technologies but are the least positive about GM foods ... may also warrant further investigation" (p103). • Objectively-measured levels of public knowledge of innovative food technologies varied considerably. On a seven item knowledge test, 19% of respondents answered correctly on less than three items, 45% answered three or four items correctly, and 36% answered five or more correctly. Items on GM foods and microwaving were mostly likely to be answered correctly. • Over half (54%) agreed that research and development in food technology should be supported, even if a lot of money would need to be spent. However, only one-tenth of these (11%) strongly agreed. Public were much more supportive of research and development in medicine (87% support). <p>In terms of GM foods:</p> <ul style="list-style-type: none"> • Few held strong attitudes to GM foods, with those who did express a definite view (albeit not necessarily a strong one) tending to regard this technology negatively rather than positively: 18% agreed that the advantages of GM foods outweigh any dangers, while 31% disagreed. • Attitudes to GM foods in particular situations were not always consistent, with views about their production and availability in Britain clearly being influenced by factors other than overall assessments of the worth of this technology. Only half as many respondents agreed that Britain should grow GM foods to compete with the rest of the world (19%) as disagreed (41% disagreed). However, attitudes were "often not strong or well-formed" (p87). • Attitudes varied markedly among the public, with women, older age groups and those with greater concerns and less knowledge about food technologies in general being more likely to express a negative view. Less educated and socio-economically disadvantaged groups were much less likely to have an opinion about this topic. • Since the late 1990s, support for GM foods had not increased markedly, with the most notable change being an increase in the proportion not holding a definite view, between 1999 and 2003. In more recent years, this trend has continued, with evidence of a slight increase in public support for GM foods. However, 40% agreed it was important to them to check whether foods contain GM ingredients, compared to 18% who disagreed. • "Overall, public attitudes to GM food can be characterised by a lack of conviction, with only minorities holding particular views on this issue, the balance of which tend to oppose this
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		technological innovation in the abstract, or their production or widespread availability in Britain in practice." (p87)
Name and basic data	Main activities and reports	Public views

Exploring attitudes to GM food

- Timescale:** 2009
- Budget:** £90,645.50
- Commissioned by:** Food Standards Agency
- Aim:** Qualitative study designed to build on previous FSA work (see above). The study aimed to:
 - explore why people hold particular views to GM food
 - better understand how people's attitudes to GM food are formed
 - explore how people weigh up the risks and benefits associated with GM food
 - better understand what causes people to be indifferent to GM food
 - explore the circumstances in which people change their views.
- Information from:**
Exploring attitudes to GM food. Final report.

Main activities and reports

- Three stage process:
 - 30 in depth interviews with BSA survey respondents in two geographical areas to explore what shapes attitudes to GM food
 - Two deliberative workshops with interview participants to further understand what shapes attitudes and the impact of information about GM food
 - Six follow-up telephone interviews to explore participants' experience of the research process.

Public views

- There was a common perception that GM was widely available but there was little knowledge about labelling requirements for GM food (p5)
- Positive attitudes to GM foods were articulated in terms of the perceived benefits of GM food for society, that benefits outweighed the risks, and trust in the motivations of producers and regulators. These views were underpinned by a positive attitude to science, in which science was perceived to improve the quality of life, risk was an inevitable part of scientific progress and regulators could be trusted to ensure that risks were carefully assessed.
- Negative attitudes were driven by concern about perceived health and environmental risks and unintended consequences relating to GM food, and scepticism about the motivations of producers and regulators. These attitudes were articulated in terms of lack of confidence in the long term safety of GM food, concerns about the quality of GM products and the ethics of the process of genetic modification. These were linked to sceptical or cautious views of science, risks were less acceptable and the motives and effectiveness of regulation of new food technologies was questioned.
- Those who were undecided cited a lack of personal knowledge, or lack of evidence about GM; others not holding a view talked about GM food as a 'private' issue for individual consumers, or it just was a low priority for them personally. The middle ground view was also related to the perception that the decision to buy GM good was driven by pragmatic considerations (e.g. cost), and by the belief that GM food would only be available to eat if it was safe.
- The provision of information in the workshops increased the awareness of the potential benefits of GM food among those who were initially undecided, resulting in more positive views. The source of arguments was as important as the content for the public in weighing up arguments: campaigning environmental groups were seen to have vested political interests, and the food industry was seen to have vested economic interests. There was no consensus on who would constitute a neutral source of information.
- Overall, attitudes became more positive over the course of the research. Those who were initially positive indicated they were more convinced as a result of the information provided; those who were more negative or undecided said the process had increased their awareness of the benefits and dispelled their sense of GM as an unknown entity. However, there was no change in overall attitudes. "Overall, perspectives on GM food from across the attitudinal spectrum became more qualified and nuanced as people had become more aware of the complexity of the debates on the subject." (p7).

National Centre for Social Research. Published by FSA, November 2009		<ul style="list-style-type: none"> • Lessons for future research on attitudes included: <ul style="list-style-type: none"> • Engaging people with low levels of interest / ambivalent views requires clear communication about the aims of the research during recruitment, and practical strategies such as use of incentives, convenience etc • Encouraging participation from those with sceptical views required transparency about the research process, the value of their views and evidence of the robustness of the research • Research design on complex scientific issues needs sufficient homogeneity in terms of educational background but also diversity in attitudes in order to generate discussion • Deliberative research on complex issues requires grappling with the tension between providing balanced information and ensuring that the practical and intellectual demands on research participants are reasonable. • Policy implications from the research included: <ul style="list-style-type: none"> • There was some public trust in official sources of information and communication but a wish to know more about the interests of different sources in the GM debate • People wanted more information about the extent to which GM food is available, the potential long-term societal and personal impacts, and the potential consequences for animal welfare. There was also a demand for clear and accessible information from a range of different places, including supermarkets. There was a lack of information about labelling and the current system was seen as confusing. There was widespread support for the labelling of all GM products, including where GM is used as a processing aid or in animal feed. The principles of transparency and consumer choice were clearly a priority for people holding different attitudes and this shaped their view on labelling and regulation.
Name and basic data	Main activities and reports	Public views
Biotechnology. Eurobarometer 2010 <ul style="list-style-type: none"> • Timescale: Fieldwork January - February 2010; report published October 2010 • Budget: unknown • Commissioned by: 	<ul style="list-style-type: none"> • Public opinion survey across 32 European countries: the 27 member states of the EU, plus five other European countries - two candidate countries and the three European Free Trade Area (EFTA) countries. • Total of 26,671 interviews; 1,311 in the UK • Methodology was face-to-face interviews in people's homes 	<p>The survey covers much more than GM (e.g. nanotechnology, animal cloning), and this summary focuses only on those issues that specifically mention GM, or are directly related to it. The key relevant points identified in the Executive Summary are that Europeans:</p> <ul style="list-style-type: none"> • are divided in their optimism about biotechnology and genetic engineering; • do not see benefits of genetically modified food, consider genetically modified foods to be probably unsafe or even harmful and are not in favour of development of genetically modified food; • do not see the benefits of horizontal gene transfer, have strong reservations about safety, feel that special labelling of food products is necessary, and do not feel that it should be encouraged; • accept the potential benefits of vertical gene transfer, have some reservations about safety

<p>European Commission's Directorate General (DG) for Research</p> <ul style="list-style-type: none"> • Aims: Public opinion survey across Europe on biotechnology • Information from: <i>Biotechnology</i>. Special Eurobarometer 341 . Wave 73.1. Conducted by TNS Opinion and Social, Belgium for European Commission, 2010. 	<ul style="list-style-type: none"> • Defined biotechnology as "any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use." This is the definition used by the UN Convention on Biological Diversity (CBD). Ancient animal and plant crossbreeding is seen to have changed with genetic engineering which was "modifying living matter in a targeted way beyond traditional breeding techniques" including genetic modification / manipulation (GM) (p4) 	<p>and the potential impact on the environment, feel marginally that it should be encouraged but that special labelling of food products is necessary;</p> <ul style="list-style-type: none"> • believe that government should take responsibility for ensuring that benefits are for all, but are not convinced that governments will act accordingly. <p>More detailed analysis is given below, including explanations of horizontal and vertical gene transfer.</p> <ul style="list-style-type: none"> • A slim majority (53%) believed biotechnology and genetic engineering as a whole would have a positive effect on their way of life in the next 20 years. 20% thought effects would be negative, 7% thought no effects, and 20% did not know. The UK was close to the EU average with 56% positive, 16% negative, 7% no effect and 21% don't know. • Men were more likely to be positive about biotechnology and genetic engineering: 58% men positive compared to 48% women. Women were more likely to say they didn't know: 24% women said they did not know, compared to 16% men. • 84% had heard of genetically modified foods. Again the UK was close to the EU average with 89% having heard of GM foods. • Of those who had heard of GM food, 66% had talked about GM food before and 38% had searched for information on GM food. Here the UK response showed quite a lot fewer than the EU average, with 57% saying they talked about GM food before and 26% saying they had searched for information. <p>"The survey reveals an overall suspicion of GM foods among the European public" (p18). However, the UK tends to be more positive about the technology than the EU average. More details below.</p> <ul style="list-style-type: none"> • 70% agreed that GM food is fundamentally unnatural; only 20% disagreed. In the UK, 65% agreed, and 23% disagreed. • 61% agreed GM food made them feel uneasy; 29% disagreed. The UK was quite a bit more positive about the technology than the EU average: 49% agreed GM food made them uneasy and 39% disagreed. • 31% agreed that GM food was good for their national economy; but 50% disagreed. Here, the UK was much more positive about the technology than the EU average: 42% agreed that GM food was good for the national economy and fewer (36%) disagreed. • 54% agreed that GM food was not good for them or their family; 30% disagreed. Again the UK was more positive: fewer (42%) agreed and more (36%) disagreed. • Only 22% agreed that GM food was safe for their and their family's health; 59% disagreed. Here too the UK was much more positive than the EU average: 33% agreed GM food was
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	<p>safe although more (39%) disagreed. Awareness was an important factor here: across Europe, 63% of those who had heard of GM before the survey voiced concerns about the health effects, compared to 44% of those who had not heard of it before (p29)</p> <ul style="list-style-type: none"> • Only 21% agreed that GM food is safe for future generations; 58% disagreed. Yet again, the UK was more positive about the technology: here 31% agreed and 39% disagreed. • 23% agreed that GM food does no harm to the environment but 53% disagreed; 24% didn't know. The UK was slightly more positive on this issue: although still only 25% agreed that GM food does no harm to the environment, fewer (45%) disagreed but more (30%) didn't know. • 57% thought GM food benefits some people but puts others at risk; only 25% disagreed. Here the UK was very similar to the EU average: 55% agreed and 21% disagreed. • 43% overall agreed that GM food helps people in developing countries, and 37% disagreed. The UK was much more positive: 59% agreed and only 24% disagreed. • Only 23% agreed that the development of GM food should be encouraged; 61% disagreed. The UK was significantly more positive: 35% agreed that the development of GM food should be encouraged, and less than half (45%) disagreed. Although still more respondents in the UK were against the development of GM food than supported it, the balance of opinion is much closer than the EU average. • Again, awareness clearly affects people's views. 64% of European residents who had heard of GM food before the survey thought its development should <i>not</i> be encouraged, only 45% of those who had not heard of it thought that. Here, increased knowledge of GM food seems to have increased negativity toward future development. <p>The Eurobarometer included a series of questions on gene transfer, which provides valuable information about public views on boundaries to acceptability, rather than simply positive or negative responses to the technology.</p> <p>'Horizontal' gene transfer is where genetic material is transferred from another, <i>unrelated</i> organism (e.g. a gene from a bacterium or animal introduced into an apple tree, to make it resistant to mildew and scab); 'vertical' gene transfer involved genetic material transferred from a related organism, or an ancestor (e.g. a gene from wild / crab apples introduced into an apple tree to make it resistant to mildew and scab). Both are considered forms of genetic engineering.</p> <ul style="list-style-type: none"> • A large majority (72%) considered horizontal gene transfer to be fundamentally unnatural; only 20% disagreed. The UK was very similar: 70% considered this unnatural; 21% disagreed.
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	<ul style="list-style-type: none"> • 58% were uneasy about horizontal gene transfer; 34% were not uneasy. The UK was similar again: 58% uneasy, 35% not uneasy. • 43% agreed, and 45% disagreed, that horizontal gene transfer is a good idea. The UK was more positive to this technology than the EU average: 52% agreed and 39% disagreed. • Only 30% agreed that eating apples produced using this technology will be safe; 50% disagreed. In the UK, 35% agreed and 39% disagreed. • 43% agreed that horizontal gene transfer will harm the environment, 35% disagreed and 22% had no opinion. The UK is close to the EU average here, with 41% believing this will harm the environment, 36% disagreed and 23% having no opinion. More women (46%) than men (40%) agreed this will harm the environment. • A large majority (83%) across Europe felt that products with horizontal gene transfer would be like GM food and should be labelled; only 10% thought this was not needed. The UK felt even more strongly in favour of labelling: 87% said labelling was needed; only 8% said it was not needed. <p>The findings on 'vertical' gene transfer were quite different, and less negative:</p> <ul style="list-style-type: none"> • 63% agreed that vertical gene transfer will be useful; only 25% disagreed. The UK was even more positive: 73% agreed this will be useful and only 18% disagreed. • 40% of Europeans believed that vertical gene transfer will be risky, compared to 45% who disagreed. The UK is close to the EU average: 40% agreed this will be risky; 47% disagreed. • 30% agreed that vertical gene transfer will harm the environment, but 50% disagreed. The UK here was slightly more positive: only 27% agreed this will harm the environment, and 54% disagreed. • Nevertheless, 52% of Europeans thought that vertical gene transfer is fundamentally unnatural, and 39% disagreed. In the UK, the balance of opinion is closer, with fewer than half (48%) who felt this technology is unnatural, and 44% who disagreed. • 40% said that vertical gene transfer made them feel uneasy, and 51% disagreed. Again the UK is more positive about the technology: only 34% said this made them feel uneasy, and 44% disagreed. • More EU respondents felt vertical gene transfer should be encouraged than not: 47% agreed it should be encouraged; 38% disagreed. In the UK even more agreed with encouraging this technology: 54% agreed it should be encouraged, and 33% disagreed. • 72% of Europeans felt food produced using this technology should be labelled; only 20% did not think this was necessary. In the UK, the views were very similar: 75% agreed this food
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		<p>should be labelled, and 19% disagreed.</p> <p>In terms of regulation and controls:</p> <ul style="list-style-type: none"> • 76% of Europeans felt decisions about biotechnology should be regulated by government. The UK feels this slightly more strongly than the EU average: 81% felt government should take this role. <p>Overall:</p> <ul style="list-style-type: none"> • There were strong feelings about biotechnology: 5% felt extremely strongly and 24% felt very strongly; a further 45% felt somewhat strongly. Only 20% did not feel at all strongly, and 6% did not know. The UK is very close to the EU average in terms of strength of feeling on the issue: 5% felt extremely strongly, 23% very strongly, and 45% somewhat strongly; 19% did not feel at all strongly, and 8% did not know. <p>In summary (quoted from survey Conclusion):</p> <ul style="list-style-type: none"> • The survey shows that, overall, Europeans do not see the benefits of genetically modified food and consider these to be unsafe or even harmful. Europeans are not in favour of the development of genetically modified food. (p 206) • Europeans do not see the benefits of horizontal gene transfer and have strong reservations about its safety. There is clear consensus that special labelling of food products is necessary and that it should not be encouraged. (p206) • On the other hand, respondents accept the potential benefits of vertical gene transfer. Notwithstanding some reservations about its safety and the potential impact on the environment, the tendency is that it should be encouraged although special labelling of food products is considered necessary. (p206-7) • Looking at the overall control and influence of biotechnology, Europeans firmly believe that governments should take responsibility to ensure benefits for all but they are not at all convinced that governments will act accordingly. (p208)
Name and basic data	Main activities and reports	Public views
Public Attitudes to Science 2011 <ul style="list-style-type: none"> • Timescale: Research October to December 2010; report published 	Three stage methodology: <ul style="list-style-type: none"> • Review of literature on attitudes to science in the UK and internationally (published as a separate report) 	The survey covered much more than just GM. The points below also give a little background to the specific findings on GM. <ul style="list-style-type: none"> • 79% agreed that "on the whole, science will make our lives easier". However, fewer (54%) agreed that "the benefits of science are greater than any harmful effect" and 28% were neutral, suggesting that "people do have concerns about the potential harmful effects of

<p>May 2011</p> <ul style="list-style-type: none"> • Budget: unknown • Commissioned by: Department for Business, Innovation and Skills (BIS) • Aims: To explore: <ul style="list-style-type: none"> • what the public thinks about science, scientists, science policy and science regulation in the UK, and why they think this way • how people engage with science and their views on public consultation • the perceived impact of science on society, in term of its impact on entertainment and culture, and on the economy • perceptions of science as a school subject and a career choice • whether, and how, public attitudes have evolved since previous PAS studies. • Information from: <i>Public Attitudes to Science 2011. Ipsos MORI Social Research Institute, for BIS. Full and summary</i> 	<ul style="list-style-type: none"> • Face-to-face survey of 2,103 adults aged 16+, plus four sets of deliberative workshops with members of the general public • Cluster analysis of the survey data, followed by four discussion groups with members of the public to explore the emerging clusters qualitatively. 	<p>science" (p24). "Some scientific developments are more contentious than others, with GM crops, the use of animals in research and nuclear power among the most contentious of the issues explored" (p15).</p> <ul style="list-style-type: none"> • Concerns expressed included advancement of technology being too fast, recent scientific advances too focussed on commercial gain rather than for the good of society, perceived lack of regulation to combat vested interests in science, global inequalities, and labour saving devices putting people out of work. • There was a relatively high level of knowledge about regulation on one aspect of GM: 71% correctly identified as true the statement that "you need a licence before you can plant genetically modified crops in the UK" (p45). • In addition, there were concerns about going against nature in discussions around GM crops among other things; 56% in the survey agreed that "people shouldn't tamper with nature", although this was much lower than in 2008 when 70% agreed. GM crops, nuclear power and animal experimentation were the issues identified as being particularly contentious. • The benefits of GM crops were seen overall to outweigh the risks: 33% in the survey said the benefits of GM crops outweighed the risks and 27% said the risks outweighed the benefit - a +6% net score in favour of GM. This was the lowest net benefit score of all nine contentious issues tested by the survey, lower than nuclear (+16%) and animal experimentation (+19%). • Differences by ethnicity emerged. Black people were more likely than average to think the risks outweighed the benefits of GM crops (41% said the risks outweighed the benefits, compared to the average of 27%). This was seen to reflect a more reserved attitude towards science from this group. • In general, those who felt informed about science tended to have more positive attitudes towards science and scientists. However, on issues such as GM and animal experimentation, "the people who feel more informed about these more contentious topics tend to be more polarised in their views of the risks and benefits - this group is more likely than average to think the benefits outweigh the risks <u>and</u> more likely than average to think the risks outweigh the benefits." (p34). The report concludes that "a better informed public is less likely to remain neutral on various science issues"; it quotes other research that concludes that "knowledge makes the difference between attitudes and non-attitudes, and not the difference between positive or negative attitudes". • A segmentation model was used to analyse data based on identifying six clusters of respondents. The third largest cluster (18%) were classed as 'Late Adopters' (p77-80). These are mentioned in this summary because this group had the strongest views on GM. Late Adopters were described as those whose interest in science began after school but were now strongly interested in science and in becoming more involved in public consultation on science. They were also characterised by their relatively strong environmental and ethical concerns, and were more likely to be women, and younger (16-34 year olds). This group:
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<p>reports, published May 2011.</p>	<ul style="list-style-type: none"> • were more likely to think the risks outweighed the benefits of GM crops: 35% compared to 27% overall • GM (and use of animals in research) was raised spontaneously in the workshop with this group, and participants felt that they should be getting more information on GM crops in particular (p79) • were more likely to want "scientists to spend more time than they do discussing the social and ethical implications of their work with the general public" (80% compared to 65% overall), and to think that "scientists should be rewarded for communicating their work to the public (69% compared to 44% overall) • they are less likely to get their science information from print newspapers (26% compared to 38% overall), and are more likely to have internet access than average. They are also more likely than average to download information or stream programmes and to visit social networking sites such as Facebook or Twitter (46% compared to 38% overall); engagement with this group was therefore suggesting as potentially benefiting from an online element. <p>These reports also include valuable data on public attitudes to public consultation:</p> <ul style="list-style-type: none"> • There was a high degree of cynicism: half (50%) agreed public consultation events "are just public relations activities and don't make any difference to policy", and almost half (47%) thought they "are unrepresentative of public opinion". This cynicism is in line with the previous two studies, so is consistent since 2005. However, the findings also show that the public don't know much about public consultation, so "their cynicism may just reflect a negative attitude towards something they do not understand, and anything associated with Government in general" (report, p49). Young people (aged 16-24) tended to be less cynical and more ambivalent about consultation. • In addition, respondents did not feel that the public had much power over decision-making: under two in 10 (14%) thought they "could influence Government policy on science and technology if I wanted to"; seven in 10 (68%) disagreed. • However, there was enthusiasm for more public engagement. Two-thirds (66%) agreed that "scientists should listen more to what ordinary people think", and only just under one fifth (17%) thought that "the public is sufficiently involved in decisions about science and technology". • When asked directly how involved they would like to be involved in public consultation on science issues, half (50%) wanted to know that the public is being consulted, but not necessarily be consulted themselves. Around three in 10 either wanted more of a say (21%), or wanted to be become actively involved (7%), or were already actively involved (2%). Only 17% were not interested in public consultation on science issues, as long as scientists were doing their jobs. • The benefits of public consultation identified most often unprompted were personal benefits
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		<p>(15% said it enabled the public to make more informed decisions about their lives, and 13% said it enabled the public to judge science issues for themselves). Close behind (and therefore the third most frequently cited benefit) was 'better decision making', identified by 12% as a benefit of public consultation.</p> <ul style="list-style-type: none">• 73% thought "The Government should act in accordance with public concerns about science and technology"; this figure has fallen by 6% since 2008. 64% said that "experts and not the public should advise the Government about the implications of scientific developments", and almost half (45%) agreed that "politicians should put scientific evidence above public opinion when making decisions".
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Annex C: Food the Use of Genetic Modification – a brief account

1. The Food Standards Agency (FSA) was asked to lead a public dialogue on food and the use of genetic modification (GM) on behalf of the Government. This was supported by Sciencewise-ERC, the UK national centre on public dialogue in policy-making involving science and technology issues.
2. The FSA set up an independent steering group to shape and manage the public dialogue in November 2009. The steering group was responsible for deciding how the work would be carried out. The project aims and objectives, and the steering group's terms of reference can be found at the FSA's project site, below.
3. Following the resignations of two members of the steering group in May 2010, Ministers in the new Coalition Government were asked by the FSA if they wished the project to continue.
4. At the British Science Festival in September 2010, David Willetts, Minister for Universities and Science, announced that the project would not continue in its current form. Stressing that it is vital to engage people of all ages on scientific issues, he announced that Government would instead take the opportunity to step back and review past dialogues on GM and other areas of science. This would ensure Government understands how best to engage the public over such issues.

Further information can be found at the following websites:

<http://www.food.gov.uk/gmfoods/gm/gmdialogue/>

<http://www.sciencewise-erc.org.uk/cms/food-the-use-of-genetic-modification-a-public-dialogue>