Public Perceptions of Agricultural Biotechnologies in Europe

Final Report of the PABE research project

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List of acronyms used

AEBC	Agriculture and Environment Biotechnology Commission
ATTAC	Association pour une taxation des transactions financières pour l'aide aux citoyens
BSE	Bovine spongiform encephalopathy
CSEC	Centre for the Study of Environmental Change (Lancaster University)
DNA	Deoxyribonucleic acid
EC	European Commission (Commission of European Communities)
ESRC	Economic and Social Research Council (UK)
EU	European Union
GM	genetically modified
GMO	genetically modified organism
INRA	Institut National de la Recherche Agronomique (France)
Or, in the context of the Eurobarometer:	
INRA	International Research Associates
NGO	non governmental organisation
OECD	Organisation for Economic Co-operation and Development
PABE	Public Perceptions of Agricultural Biotechnologies in Europe (project)
R&D	research and development
RDNA	recombinant DNA
UK	United Kingdom
USA	United States of America
WTO	World Trade Organisation

EXECUTIVE SUMMARY

The research presented here reveals that stakeholders in the GM debate misunderstand public responses to GMOs, and that this represents one of the key underlying causes for the current impasse in the GM debate.

Characterisations of public responses to GMOs in decision-making circles are typically framed either in terms of a lack of knowledge - prompting moves to educate the public - or of 'non-scientific' 'ethical' concerns - resulting in the appointment of expert ethical advisers or public consultations about the social acceptability of GMOs. This report argues that these dominant characterisations of the public, and the policies which derive from them, do not capture the full nature of public concerns, nor do they recognise the social, cultural and institutional factors shaping those concerns. The research reported here reveals a more complex picture, in which the distinctions often made between 'real risk' and 'perceived risk', between 'risk' and 'ethical' concerns, or between 'scientific' and 'non-scientific' concerns, are blurred. Our research not only highlights the dynamics of societal concerns but also traces them back to the problems inherent in official views of the public and its perceptions of technological risk.

Promoters of agricultural biotechnologies are concerned that the public controversy is impeding the development and commercialisation of a new technological field considered to be of strategic economic importance for Europe. At the same time, critics who believe that GMOs involve unacceptable impacts on the environment, health and society, continue to feel that their concerns have not been addressed. During the last few years agricultural biotechnologies have been the subject of numerous inquiries, consultation exercises and public debates - and the number continues to grow - yet most protagonists, on both sides, remain dissatisfied. Thus, the need to understand public responses to biotechnology has never been more pressing. But understanding the response of policy makers to perceived public concerns is also essential.

Two types of results about public perceptions of GMOs are presented:

- **Perceptions of GMOs among ordinary citizens** were studied using focus groups held in five EU Member States: France, Germany, Italy, Spain and the United Kingdom (a total of 55 sessions).
- **Perceptions of public responses to GMOs among stakeholders** (actors engaged in the GMO controversy) were studied using interviews, participant observation and document analysis.

The comparison of these two types of results sheds new light on the subject of public perceptions of GMOs. *It reveals the persistence of a number of entrenched views about the public shared by numerous policy actors which are not supported by our analysis of the views of ordinary citizens as expressed in the focus groups*. This has important policy implications, because these mistaken interpretations of public perceptions play an influential role in shaping the communication strategies and policies of decision-makers in government and business, as well as in consumer and environmental NGOs. Thus, policies continue to fail to respond adequately to public demands, and therefore fail to resolve or advance the debate. New policies and strategies - even if they are innovative and sincerely seek to integrate public views - are likely to fail if they continue to be based on these entrenched views.

In these circumstances, it seems to us that the most positive contribution from this research on public perceptions of GMOs is to reveal and analyse the gulf found between stakeholder views of the public, and public views as expressed in our focus groups.

We conclude by identifying as a priority the need for a broad based cultural change in policy thinking about public perceptions of science, technology, and risks. Policy makers should be prepared to consider that the source of the problem is not only to be found in the behaviour of the public but also in the behaviour of institutions responsible for creating and managing innovations and risk. This seems to us the most urgent imperative for the development of a more constructive and satisfactory debate on agricultural biotechnologies in Europe.

Key Findings

1. Overwhelming similarity of focus group findings across countries, groups, and time

Similarity of focus group results between countries

Contrary to our expectations, there was an overwhelming similarity in the focus group results from the five countries studied, despite national differences in the amount of media coverage and the intensity of the public debate. There were some national differences in the emphasis placed on particular views, and in the examples used to support those views, *but underlying those differences, we found a broad similarity in the repertoire of arguments mobilised by focus group participants in all five countries.*

Similarity of focus group results within countries

Contrary to our expectations, few significant differences were observed between the 11 focus groups conducted in each country, despite the fact that recruitment was deliberately designed to produce groups thought likely to have very different views on this subject. There were differences in the style of language used, and in lifestyle choices made by participants, *but underlying those differences, we found a broad similarity in the repertoire of arguments mobilised by all the focus group participants.*

Similarity of focus group results over time

No fundamental evolution in the repertoire of arguments used by focus group participants was identified over time (from September 1998 to October 1999) despite the fact that, in some countries (especially the UK and France), the intensity of the public debate sharply increased during this period.

No direct relationship between public perceptions and public controversy

The similarity of focus group results across countries, between groups and over time, challenges the often heard hypothesis of a direct relationship between public perceptions and the intensity of public controversy on the subject.

2. Identification of underlying factors that shape public responses to GMOs

The similarity of focus group results obtained within and between the five countries suggests that the underlying socio-cultural factors identified through this research reflect commonly shared salient dimensions of the experience of ordinary people which are important in shaping their responses to agricultural biotechnologies. Indeed the results from this study give important clues as to what *are* these salient dimensions of public experience.

Moreover, the salient factors of public responses identified from our analysis of focus group discussions with ordinary citizens are not the factors usually thought to be determinant by many stakeholders. We identify and describe 10 "myths" about public responses to GMOs which are widely held by stakeholders, and demonstrate how the focus group results contradict or qualify these widely held views.

3. Dominant stakeholder views about public responses to GMOs:

Myth 1: The primordial cause of the problem is that lay people are ignorant about scientific facts

Myth 2: People are either 'for' or 'against' GMOs

Myth 3: Consumers accept medical GMOs but refuse GMOs used in food and agriculture

Myth 4: European consumers are behaving selfishly towards the poor in the Third World

Myth 5: Consumers want labelling in order to exercise their freedom of choice

Myth 6: The public thinks - wrongly - that GMOs are unnatural

Myth 7: It's the fault of the BSE crisis: since then, citizens no longer trust regulatory institutions

Myth 8: The public demands 'zero risk' - and this is not reasonable

Myth 9: Public opposition to GMOs is due to "other - ethical or political - factors"

Myth 10: The public is a malleable victim of distorting sensationalist media

4. The focus group results challenged these 10 myths in the following ways:

Although ordinary citizens are largely ignorant of the scientific technicalities of genetic manipulation, and of developments in research, regulation and commercialisation related to GMOs, *this lack of knowledge does not explain their response to agricultural biotechnologies*. The concerns expressed by the focus group participants were not, in the main, based on erroneous beliefs about GMOs. Key questions raised in the group discussions were:

- Why do we need GMOs? What are the benefits?
- Who will benefit from their use?
- Who decided that they should be developed and how?
- Why were we not better informed about their use in our food, *before* their arrival on the market?
- Why are we not given an effective choice about whether or not to buy and consume these products?
- Do regulatory authorities have sufficient powers and resources to effectively counter-balance large companies who wish to develop these products?
- Can controls imposed by regulatory authorities be applied effectively?
- Have the risks been seriously assessed? By whom? How?
- Have potential long-term consequences been assessed? How?
- How have irreducible uncertainties and unavoidable domains of ignorance been taken into account in decision-making?
- What plans exist for remedial action if and when unforeseen harmful impacts occur?
- Who will be responsible in case of unforeseen harm? How will they be held to account?

Participants' perceptions of GMOs were based on empirical knowledge, not on subjective or emotional responses; but the *kind of knowledge* mobilised by the lay public to evaluate GMOs is very different to the kind of knowledge assumed to be relevant by scientists and promoters of GMOs. Scientists and policy makers tend to assume that ordinary citizens need to have specialised knowledge about gene modification techniques in order to form a rational opinion about GMOs. However, when supporting their arguments about GMOs, the focus group participants used three different types of lay knowledge:

- Non-specialist knowledge about the behaviour of insects, plants and animals (e.g. "bees fly from field to field"), which it seemed to them was often ignored or obscured in specialised scientific discussions.
- Knowledge about human fallibility, derived from their daily experience, which had taught them that formal rules and regulations, though well intended, would not, in the real world, be fully applied.
- Knowledge about the past behaviour of institutions responsible for the development and regulation of technological innovations and risks.

This third type of knowledge was the most predominant. Thus, *the concerns expressed in the focus groups were mostly based on empirical lay knowledge about the past behaviour of institutions responsible for the development and regulation of technological innovations and risks, supported by numerous commonly shared experiences*, which were considered to be unsatisfactory in many ways. In this context, BSE was not regarded as an exception. Rather, focus group participants portrayed BSE as *an exemplary case* demonstrating the normal behaviour of such institutions. Many other examples of past mismanagement were also brought up, which, in the eyes of the participants, shared very similar characteristics and demonstrated the lack of trustworthiness of these institutions. Moreover the participants felt that policy makers had not learnt from these experiences, in that they had not addressed any of the problems that they felt had been demonstrated by the BSE affair. They therefore expected these institutions to continue to behave in the same way with respect to GMOs, and other issues.

Participants did not, overall, express entrenched opinions 'for' or 'against' GMOs. Their responses were more nuanced and sophisticated. *Ambivalence* was the overwhelming feeling expressed, since participants recognised both positive and negative dimensions of developments in agricultural biotechnology.

Participants discriminated between different types of GMOs, *but this could not be reduced to a simple distinction between applications in agriculture and food, and applications in the medical field*. Medical applications were more favourably perceived, *but this was not solely, or predominantly, based on an appreciation of personal benefits*. Many other factors relating to access to information, risk assessment procedures and regulation were felt to be, overall, more satisfactory in the medical field.

Participants found some of the benefits claimed for GMOs (improving health, reducing the use of pesticides, improving the efficiency of agriculture in developing countries) laudable, but were sceptical about whether they will be realised. Moreover, communication strategies by biotechnology firms which emphasise that GMOs could 'feed the world' were perceived very negatively, as a manipulative marketing ploy.

Participants wanted labelling of GM food products, *but this was not simply in order to be able to protect themselves against putative health risks*. Labelling was also felt to be important to allow consumers to boycott the products in order 'send a message' to manufacturers about a whole range of concerns other than health risks associated with GMOs; and to enable post-market monitoring of unintended harmful effects, and removal from the market if such harm was identified. Labelling would also demonstrate that "the [the promoters] have nothing to hide".

Participants did tend to describe GMOs as 'unnatural', *but this does not mean that they felt that all other agricultural innovations, including 'conventional' breeding were 'natural'*. Thus, it is for example mistaken to portray consumers who are concerned about GM food products as necessarily preferring products produced using chemical pesticides.

Participants *did not ask for 'zero risk'* or full certainty with respect to the impacts of GMOs, and were well aware that daily activities of ordinary lives are associated with numerous risks and benefits which have to be balanced against one another. Moreover, they took for granted that science could never accurately predict all future impacts of a new technology. Rather, *they felt strongly that inherent and unavoidable uncertainties should be acknowledged by expert institutions*, and be taken into account in

decision making. It was the *denial* of uncertainty by the institutions responsible which they found disconcerting and untrustworthy.

Participants, when discussing GMOs, raised many concerns raised which did not relate directly to risk as defined by scientific experts or regulations. But the wider ethical and socio-political considerations raised could not be simplistically distinguished from 'scientific' of 'risk' dimensions. The focus group results demonstrated how public responses to GMOs were shaped by underlying factors which blurred the boundaries between 'science' and 'politics', and also between 'risk' and 'ethics'.

The PABE focus groups were not designed to explore the reception of media messages by lay people, but our results confirm previous research in this field which demonstrates that the public is actively engaged in the interpretation and judgement of multiple forms of mediation and information, some of it involving the mass media, some not. Thus members of the public cannot be characterised as victims who simply absorb what is drummed into them by the media. Yet the fixation, by many stakeholders, on the role of the mass media as the key determinant of public views implies a passive and intellectually vacuous public; a public that is simply the *tabula rasa* upon which media discourses are inscribed.

5. Misconceptions about Trust

Trust - or rather lack of trust - has increasingly been identified as a key problem and issue to be addressed by policy makers involved in risk management. The results presented here suggest that trust is indeed an important dimension in public responses to proposed technologies and policies, but that the way in which trust is most often conceptualised in policy circles is misleading and unproductive. Restoring public trust in regulatory institutions tends to be seen as an issue to be resolved by improved communication strategies and is largely treated independently from other policy decisions. But the results presented here demonstrate that the issue of trust cuts across all the other socio-cultural factors identified, and that restoring trust would require not just better public relations strategies, but more profound changes in institutional culture and practice. In order to restore trust, institutions would need to demonstrate their capacity for adequate risk management of risks through consistent behaviour over a long period, and across different fields (not just GMOs), by, for example:

- Admitting past errors.
- Admitting that they don't always necessarily know best.
- Admitting uncertainty, and explaining how this has been taken into account in decision-making.
- Utilising input from all relevant sources (not just scientific experts).
- Being transparent about *how* decisions are made, including explaining how different interests, risks and benefits have been balanced against one another.
- Imposing heavy sanctions in cases where mismanagement or fraud is identified.
- Overall, demonstrating that views of the public are understood, valued, respected, and taken into account by decision-makers - even if they cannot all be satisfied.

1. Introduction

Until 1996, everything seemed largely set for the deployment of agricultural biotechnologies and genetically modified foods on European and world markets. By 1990, national and European bodies had elaborated regulatory policies and procedures to accompany this new industry, which required pre-market authorisations for contained use, field-testing, and placing on the market of GMOs[1]. This legislation aimed to harmonise European Union regulation and thereby facilitate the internal market. Many actors, notably from the industry and the European Commission (EC), also hoped that these regulations, which were framed by the precautionary principle, would address public concerns and prevent possible public opposition. However the public policies and industrial strategies for the development and management of agricultural biotechnologies failed to prevent the controversy that emerged in Europe when the first cargoes of genetically modified soya and maize arrived from the USA.

In response to perceived public disquiet, European Union governments and the EC have reviewed and modified their policies. At the EU level, no new authorisations for the marketing of GM products have been issued since April 1998, and a *de facto* moratorium was established by the European Council of Environment Ministers in June 1999. At the same time, leading national and international companies in the food sector have reversed their strategies on the use of the products of agricultural biotechnology. Large food distributors have pledged not to sell GM products, at least in their own brands, and food manufacturers have changed the composition of their products in order to remove GM ingredients. These commitments have resonated back up the food chain, with major international ramifications on food production and trade. Controversy over genetically modified crops and food is now seen as threatening the development and commercialisation of a whole new technology, one considered by its promoters to hold strategic economic importance for Europe, but also one that its critics argue threatens unpredictable and potentially catastrophic ecological harm. Current EU policy on GMOs is also seen as a potential source of trade conflict with the USA.

Since the proposal for the PABE project was first formulated (in December 1996), events in relation to agricultural biotechnologies have therefore moved at rapid pace and the issue has become the focus of significant political, legislative and legal developments in various parts of Europe. During the last few years, it has been the subject of numerous inquiries, consultation exercises and public debates - and the number continues to grow. Faced with this explosion of activity, the need to understand public responses to biotechnology has never been more pressing. But understanding the response of policy makers to perceived public disquiet is also essential. The PABE research project and the questions that it poses is therefore particularly timely and relevant to current policy challenges.

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[1] European Commission Directives 90/219 and 90/220. For a thorough analysis of the implementation of these Directives, see the results of successive European research projects co-ordinated by the Open University Biotechnology Policy Group (http://technology.open.ac.uk/cts/bpg.htm). See Table 4 for evolutions in the EU regulatory framework for GMOs during the period 1996-2000.

2. Framing the project

2.1 Objectives of the PABE study

Three objectives were stated as follows in our research proposal (Marris and Wynne, 1997, page 4):

1. To explore and describe the factors shaping the diversity of viewpoints about agricultural biotechnologies and related food-products *within* five different European Member States (UK, France, Italy, Germany, Spain).
2. To compare these factors and their influence on the diverse viewpoints about agricultural biotechnologies *between* these five Member States.
3. To describe the implications of these factors for policy making at national and European levels.

2.2 What did we do?

In order to address these objectives, the empirical research for this study consisted of two inter-linked components of fieldwork:

1. Perceptions of agricultural GMOs among *members of the public* were investigated using focus groups.
2. Perceptions, discourses and strategies of *key stakeholders* in the GMO debate were investigated through interviews, analysis of documents, and participant observation at GMO events. This analysis focused in particular on the stakeholders' perceptions of public perceptions of GMOs.

As in all research, a number of epistemological and methodological commitments were made by the research team. In this section we clarify our prior framing assumptions before moving on to the more practical description of our methods.

2.3 Clarifying motivations for research on public perceptions

As the public controversy surrounding GMOs has grown in intensity, decision-makers in the public and private sectors have become increasingly interested in funding and utilising social science research on public attitudes and/or perceptions. This includes, notably, the European Commission who funded the PABE project, among a number of others on similar topics. It is pertinent to recall here the framing of the research as expressed in the call for project proposals that we responded to (see Box 1)[2].

Box 1: Call for ELSA research proposals from the European Commission

"Research on ethical, legal and social aspects of the areas included in this programme will have the objectives to:

- Understand and take into account of public attitudes and diversity of viewpoints throughout the Community including producers, users, social partners, environmentalists, welfare groups, consumer groups, etc., to improve rationality and balance in the ongoing public dialogue.
- Fulfil a prospective role, anticipate emerging problems and provide early warnings to decision-makers and the public for new ethical/legal/social issues, particularly regarding new experiments, technologies, production systems and products;
- Investigate factors (cultural, economic, historic, religious, etc.) affecting public response and varying perceptions of ethical issues."

Source: EC, 1994

[2] For information on all projects funded under this call, see http://europa.eu.int/comm/research/life/elsa/proj.html

This report argues that, ironically, the common framing of the motivations for the promotion of such research is actually part of the problem. This has important policy implications, because (a) these framings are often taken up or shared by social science researchers and/or (b) they influence the way in which the results of such research are interpreted and utilised by decision-makers.

It is therefore important to clarify our framing assumptions and how they differ from dominant assumptions in policy circles. Thus, we will begin by making explicit that which will *not* be found in this report. This may seem like a strange place to start. But we feel that this is necessary because, in our interactions with policy makers and research authorities, we regularly encounter a number of deep-seated expectations about research on public perceptions and how it can contribute to policy making that we cannot fulfil.

List of things which will *not* be found in this report:

(i) Insights into how to simplistically improve the "social acceptability" of GMOs (or of any other technology, product, or decision) - without changing the nature of that which is "accepted".

(ii) Accurate predictions of the rise and fall of public controversies on GMOs (or other technologies).

(iii) Accurate predictions of public behaviour, such as, in the case of GMOs, purchasing of GM-foods.

(iv) An analysis of public perceptions of risk, as if *risk* (as defined by experts) were the only object public perceptions.

Below, we attempt to clarify why we cannot fulfil these commonly found expectations, and describe how we believe our research *can* contribute positively to policy making.

2.4 Improving "social acceptability"?

"Improving the social acceptability" of technology can be envisaged stereotypically either as rendering a proposed finished technology (or product, or decision) *accepted* by promoting change among the public *or* as rendering the technology *acceptable*, by promoting change in the technology development path. The first interpretation is the most commonly found, both in the expectations of those who promote (and fund) public perception research, and in the work of some social scientists in the field. We do not believe that social science research can or should aim simplistically to improve the social acceptability of technologies, if this means to facilitate the smooth (uncontroversial) social uptake of a technology without making any changes in the technology development path. Instead, we suggest that social science research could be used by decision-makers to circumvent or reduce public opposition to technologies, but only to the extent that decision-makers utilising the results take on board that it is perhaps not so much the misguided public which needs to be reformed, but the institutional practice and technological objects which this public is reacting against.

From our perspective (shared by Callon, 1981; Cambrosio and Limoges 1991; Rip, 1986), controversies are therefore not necessarily a bad thing, to be avoided at all cost. Instead, they can to some extent be seen as *societal technology assessment* which sometimes reveal fundamental limitations in the institutional processes involved in the development and promotion of technological innovations. Moreover, public perception research could perhaps help avert such controversies, but only if they are used to promote and implement societal technology appraisal earlier on in the development process.

Within this perspective a technology is not simply seen a technological artefact or product, which exits, already fully shaped, from scientific laboratories as an object to be "accepted" or "rejected" by society. Thus, technology is not simply "introduced into society". The development path of a technology is determined in part by actors involved in R&D activities (suppliers), but is embedded in a broader social context which includes (Grin et al., 1997): providers of finance (sponsors), policy makers and regulators (embedders), and users. Parties affected by the positive or negative

consequences of the technology (or the organisations representing them) also play a role (e.g. consumers, consumer organisations, environmental organisations, patient associations…). This is usually a more passive and delayed role, but the European GM-controversy is an example where their influence has been more proactive. All of these actors will and have influenced the development path of GMOs. Intentional implementation of technology appraisal procedures involving all of these actors earlier on in the process may have led to a more constructive debate, instead of the current impasse which does not satisfy any of the stakeholders (ESRC, 1999).

Thus, when assessing and promoting the "social acceptability of technology", all of these groups (which we collectively call "stakeholders") - not just the un-engaged public - need to be seen as important players. This explains why the research plan for this study incorporated an analysis of *stakeholder perceptions* as well as of perceptions of the public (defined here as ordinary citizens not actively engaged in the development path). Furthermore, all of these stakeholders were identified as key users of our research, and were invited to participate in workshops to discuss interactively the implications of our findings for their organisations.

2.5 Clarifying the relationship between public perceptions and public controversies

Decision-makers' interactions with the public occur predominantly through media coverage, consumer behaviour, voter behaviour, and NGO activity. It is therefore mostly these types of indicators which tend to define an issue as a public problem or controversy in public policy or commercial circles. This is of course legitimate since these kinds of indicators are indeed those which matter most for decision-makers in the public and private sectors, at least in the short term. But numerous empirical studies have shown that the intensity of a controversy does not depend on the number of people with negative opinions (as defined by opinion polls) nor does it depend on media coverage. The main driving force is mobilisation potential. This depends on, among other things, the amount of people willing and able to act, the availability or emergence of institutional arrangements and events to voice dissent, and the degree of support by organised actors (see section 5 for further discussion).

The problem is that results from studies the field of public perceptions are often expected, by users of this research, to reflect (or even predict) in a direct manner these indicators for the intensity of a public controversy. As researchers in this field, we have often been confronted with decision-makers objecting that our results do not coincide with public responses as reflected by journalists and NGO activists. But the relationship between the predominance of public concerns and the intensity of public controversy is not a simple one. It is important to emphasise that the aim of most public perception research, including that presented here, is to analyse viewpoints among ordinary members of the public i.e. those who are *not* actively engaged in current controversies. Results from these studies should not be expected to coincide closely with the framing of the issues reflected in media coverage and NGO lobbying activities.

In this context, it is important to remember what the situation was with respect to public controversies on GMOs when the PABE project was elaborated (between December 1996 and March 1997). Given the current intensity of public controversies in most EU Member States today, it is perhaps easy to forget that this was not the case at all in 1996 - nor was it widely anticipated in policy circles. In the PABE project proposal, we stated (Marris and Wynne, 1997, p. 5-6):

> Our hypothesis it that public concern about technological, health and environmental risks is heightened by lack of agency. When people feel that they cannot affect any change within their national political system, they may feel more at risk even whilst expressing less apparent concern. […] This hypothesis has important policy implications. For example, the lack of open opposition to agricultural biotechnologies in most European countries could be taken to indicate that there is little disquiet among the public, and that the step-by-step precautionary approach imposed through EU legislation and adopted by national regulatory authorities has adequately dealt with public anxieties. But evidence from workshops held in the UK with industrialists, regulators and NGOs indicated that the low level of activity by British environmental and consumer organisations was not associated with the acceptance of agricultural biotechnologies. On the contrary, many activists were very concerned about the environmental, social, economic and ethical issues involved, but felt that the current regulatory system did not allow any space for them or their views to be represented (Mayer et al., 1996).
> Other research confirms that public concerns are not absent just because they are not being expressed in public form (Macnaghten et al., 1995; Wynne, 1992). Apparent public silence can reflect a real concern obscured by fatalism - or lack of agency - about the (im)possibility of influencing relatively unfamiliar expert actors involved in the management of risks and technologies. These studies have shown that if people feel a lack of agency they are unlikely to feel it worth protesting, and that this lack of agency and representation is contributing to a more general phenomenon of public alienation from political institutions. This research provides the hypothesis that relatively quiet public responses to agricultural biotechnologies in Europe may be the result of institutional obstructions and a lack of clear focus for expression of attitudes, rather than authentic lack of concern.

Of course, a public controversy cannot emerge or be sustained in the absence of any public resentment about the issue at hand. But the opposite is not always true: the existence of public concerns does not always necessarily lead to the development of a public controversy. Thus, an issue which is of concern to members of the public is not necessarily brought onto the public agenda to become a public problem deserving attention from policy makers. The processes which set the agenda for public problems are much more complex (Cobb and Ross, 1997; Gilbert, 2001; Joly et al., 2001; Hilgartner and Bosk, 1988; Rosa and Dunlap, 1994).

Some sociologists (Cambrioso and Limoges, 1991; Limoges et al., 1993) argue that all social science research which conceive of the public as a naturalistic fact is *ipso facto* suspect. For them, the public, conceived as an undifferentiated category which pre-exists a controversy, does not exist. They suggest that analyses of socio-technical controversies should focus solely on the actors engaged in the debate. Such studies would explore, among other things, how each of these actors mobilises particular constructions of the public in order to profess that they are the ones who represent them best. Although we agree that this is an appropriate stance to take when analysing the dynamics of mobilisation in a socio-technical controversy, we suggest that public perceptions do indeed exist. Moreover these perceptions are real even if one cannot ascribe them simply to an entity called the public, because the public and public perceptions are essentially interactive: they are constructed together and in relation to representations of the public and of the issue by the various actors. Moreover, this interactive dimension includes also interaction with representations by social scientists.

Actors in the controversy who succeed in framing their actions and statements upon widely established public framings are perhaps more likely to be able to mobilise publics, more able to claim public representation, and more likely to have an influence on the public debate. Thus, contrary to commonly heard opinions among promoters of technologies, consumer or environmental NGOs cannot create a sustained controversy about any issue they choose. One often hears that NGOs (Greenpeace in particular) misrepresent the views of ordinary non-engaged citizens in order to spark off controversies out of nowhere, simply to suit their own interest, and that they are aided and abetted in this by the sensationalist media. But NGOs cannot mobilise the media single-handedly, and there are indeed a number of examples that demonstrate the failure of NGOs to raise a debate about issues that they consider of great importance.

Thus, we claim that the public *can* have perceptions about something which is not already being debated in the media and by NGOs. Public perception studies can therefore reveal particular public framings which do pre-exist the emergence of a specific controversy, among populations which are not

- and may never become - actively engaged with the particular issue (e.g. GMOs). This means that, when public perceptions research is conducted in a context where there is no significant public debate, it can help to identify the contours of the public debate - if and when it emerges. It cannot, however, *predict* the emergence - and even less the timing - of forthcoming controversies.

One the other hand, when conducted in a context where significant public controversy does exist, research of the kind reported here can help to identify and clarify significant divergences between the concerns of ordinary citizens and the way in which the debate is framed in public arenas. It can therefore identify misconceptions and/or misrepresentations about the public that are mobilised by the actors in the controversy (which includes NGOs and the media, but also public policy makers and company representatives). This was another reason for including a stakeholder analysis in the PABE research project. This analysis focused in particular on stakeholder views of the public (see results in section 6).

In sum, studies of public perceptions can contribute to a better understanding of public controversies, but they cannot do so without complementary studies on the social and institutional processes involved in agenda setting. Vice versa, results from studies of the social dynamics of public controversies should not be taken as a revealing or reflecting public perceptions. This applies also to analyses of media content: they are important for understanding the cultural context within which members of the public form and express their views and for analysing the trajectory of public debate, but they cannot be taken as equal to, nor even a proxy for, public views.

As we shall see (section 5), the intensity of public controversy on GMOs (defined in terms of NGO activity, media coverage, and policy responses) in the five countries in which data was collected for this project varied greatly at the outset of the project, and also varied significantly during its duration (1998-2000). Thus data on public perceptions was collected in regions and at times when the intensity of the public debate was very different. Although this was not the primary aim of the research design, it allowed us to explore, to a some extent, the interaction (or, as it happens, the relative *lack* of interaction) between public perceptions and public controversies.

2.6 Perceptions and behaviour

It is important to emphasise that the PABE project did not aim to analyse or predict behaviour, for example, purchasing of GM-foods or propensity for anti-GMO activism. But a common expectation found among users of research is that results from public perceptions studies should be mirrored in the public's *behaviour*, and when a difference is identified, there is a tendency to presume that it is the latter and not the former which reveals the *real* attitude. Thus, it is often stated that public perception studies should be validated in relation to measurements of actual public behaviour, and that failure to do so reveals methodological shortcomings of the research. Yet attempts at such validation have all tended to show that the two are not directly related.

Moreover, even when the differences between perceptions and behaviour revealed by social science research have been accepted as methodologically well grounded, this has often been associated with the belief that this so-called "dissonance" is due to the inconsistent (and thus irrational) nature of public responses. This interpretation is based on the hypothesis that the behaviour of a rational and well-informed actor would systematically and directly correspond with his or her opinions.

Whilst is true that the type of concerns revealed by research on public perceptions may not end up being expressed by consumer or political rejection, we do not believe that this invalidates the research; nor that it necessarily reveals inconsistencies in the belief system of the respondents. From our perspective it is too simplistic to attribute this supposed dissonance between perceptions and behaviour to inconsistent public responses, and to try to identify which is the "real" response. Efforts to construct authentically-representative interpretations of public attitudes and their shaping factors cannot be validated just by measuring them against supposedly true, objective public responses as one might hope for these to be expressed in public-domain behavioural validation. Explanations for research results that can appear contradictory when using one particular method may be found by utilising different research methods, and in particular those which encourage the expression of the

respondents frames of meaning. As discussed below, we believe that focus groups provide this advantage. Indeed we found that the interactive nature of focus groups encouraged participants to challenge one another when such apparent contradictions were expressed in the group, and even to reflect upon the difference between their own real life behaviour compared to what they were saying in the group session (see section 2.8, and in particular Box 3).

As mentioned above, it is also important to emphasise also that one cannot equate lack of action (lack of expressed "negative" behaviour with respect to the technology) with satisfaction or "social acceptability" of a technology, product or decision. Public perception research can, however, identify underlying concerns which are present even if and when consumers buy GM-food, and even if there is no visible opposition to GM technologies. Such research reveals that deep-felt concerns often persist, even though not expressed in any kind of action or behaviour, and these can accumulate across a variety of life-experiences, especially if they are ignored or distorted by official policy bodies. These invisible concerns can therefore have important long-term effects on public behaviour with respect to socio-technological innovations, because they help to shape people's understanding of the institutional and social processes involved in the creation and management of innovation and risk, which is then used to determine views about new technologies or issues. But as emphasised above, the link between results from public perceptions studies and the evolution of public controversies should not be assumed to be direct and linear.

For a company primarily interested in selling products in the current market context, or a government interested in public support within the short period of its election mandate, investigating these the underlying factors may seem of little use. But experience has shown that, in the longer term, these invisible public concerns can be translated into actual behaviour when a suitable occasion arises; and when this occurs, it can engender controversies in ways which are unpredictable and can appear (especially to the promoters the technology or policy at the centre of the controversy) disproportionate with the overt issue at hand. Furthermore, because such public reactions arise from cumulated resentment, derived from repeated experiences, they will usually be much harder to address at this stage. Public perception research could help decision makers to pre-empt this situation by identifying public concerns before they are expressed as negative public responses. But as emphasised above, this will only be the true if they are prepared to make changes in their policies (and therefore in the technology at stake), rather than relying simply on improved strategies for risk communication or consumer marketing.

2.7 Perceptions of *risk*?

Researchers interested in studying public perceptions cannot presume to know *a priori* what the object of any person's perception is: their meanings may legitimately differ from those of policy experts, or researchers. Researchers should therefore not presume to know what the meaning of public issues is to members of the public: this must first itself be researched. For example in daily public policy discourse and in some social science research it is presumed that the object of public perceptions is *risk*, and what is more, risk as defined by particular scientific institutions or disciplinary cultures. Hence issues, for example GMOs, tend to be predefined as "risk issues". In this way risk (defined in a particular way) is being inserted and imposed as the presumed object of public perceptions, that is, as the presumed meaning of *the* issue, without first exploring in an open-minded way whether or not this is the case.

Thus, we believe that researchers should take care to ensure, as far as possible, not to presume to know what it is that the public is responding to, when trying to understand their responses. Although this might sound an obvious point, it is surprising and disappointing to see how often it is ignored in practice. This is, for us, both a methodological and a theoretical orientation. It is founded on the theoretical understanding that perceptions are multidimensional and interactive, and was a key determinant in our decision to study *the underlying factors shaping viewpoints, rather than the viewpoints themselves* (see "objectives", section 2.1). Amongst the factors shaping perceptions, we might also expect to find out what the perception's *object* is. We were also interested in using methods

which would allow, as far as possible, an open-ended exploration of autonomous framings or meanings (see section 2.8).

Previous research on public perceptions of risk has revealed that the object of public responses can be any or all of the following (see for example Krimsky and Golding, 1992):

- Risk magnitudes, as described by scientific authorities, for example as death frequencies
- Risk qualities, eg. psychometric attributes described by Slovic et al. such as voluntariness, risk/benefit distribution, catastrophic potential, risk-trend, familiarity, visibility etc. (Slovic, 2000)
- Institutional (mis)management of those risks
- Dominant institutional definitions of the issue as imposed in official approaches (e.g. neglect of dimensions and variables which are salient to the public)
- Dominant definitions of the public as undifferentiated and stereotyped (e.g. as ignorant, prone to hysteria, instrumental only, individualistic) implicit – and often explicit - in expert discourses of the issues (and also in some research approaches)
- The technology as a whole social experience and projection

This underlines the reasons for our commitment to understanding public perceptions in relation to expert-institutional behaviour, including how those expert institutions understand public responses.

Box 2: "Uncertain World" study

The research questions and methodological design for the PABE project were informed by a previous study conducted by CSEC, entitled *Uncertain World: Genetically Modified Organisms, Food and Public Attitudes in Britain* (Grove-White et al., 1997). It was based on focus groups conducted in 1996 in the UK, thus before the GM debate exploded in that country.

At that stage there was no overt public controversy, but that did not mean that focus group participants were not able to articulate responses to GMOs. Ordinary citizens of the UK did not know much about GMOs as a technical matter, but this study revealed that the public respondents had copious knowledge which was grounded in experience and which they regarded as salient. This included knowledge about the behaviour of regulatory and promotional actors, and in particular their overconfidence in their own knowledge, and about the likely social trajectories of such innovations for agriculture and the global food chain. The point was not whether the public's views of such matters were correct – most of them are legitimately arguable either way - but that the focus group participants made these connections and associated meanings at all for assessing the new issue of GM agriculture and food.

The report stressed that expert institutions needed to recognise, respect and address the legitimate existence of these different meanings, rather than either to misunderstand and neglect them altogether – or, in cases where they were recognised, to dismiss them immediately as irrational.

When the study was first published, it generated little interest in policy circles, but has since been recognised as "The study which has provided the deepest insights into public attitudes towards GM food" (*ENDS R*eport 283, August 1998). And in March 1999 Sir Robert May, the UK Government's Chief Scientist wrote "I have now had a chance to read 'Uncertain World', which I wish I had indeed read earlier. It is in many ways a remarkably prescient document" (cited in ESRC, 1999, page 2).

2.8 Why use focus groups?

In this section, we describe the advantages and limitations of focus group methods for the study of public perceptions. Details of the methodological design used for the PABE focus groups are described in section 4.

Focus groups are sometimes also called "group depth interviews", or "focussed group discussions". They are structured but flexible group discussions exploring a specific set of issues of research interest. They normally bring together 3 to 12 individuals with a moderator who encourages interaction between the participants, promotes deeper exploration of questions and issues raised, and ensures that the discussion remains focused on the topic of interest.

Originally developed predominantly for market research studies to record public responses to specific policies or consumer products, the method has increasingly been developed and promoted for social science research (Barbour and Kitzinger 1999; Greenbaum, 1998; Morgan, 1988; Morgan and Krueger, 1997; Stewart and Shamdasani, 1990). However, Kitzinger and Barbour (1999, p.1) have warned, appropriately, that:

> social scientists are in danger of uncritically adopting market researchers' models of such research rather than adapting and expanding them, taking into account our own purposes and theoretical traditions.

These authors set out guidelines for a general approach and good practice advice which emphasises the need to use the technique reflexively and flexibly. These guidelines were followed for the PABE research, adapting them to the aims of our particular project.

According to Kitzinger and Barbour (1999, p.4) focus groups are:

> ideal for exploring people's experiences, opinions, wishes and concerns. The method is particularly useful for allowing participants to generate their own questions, frames and concepts and to pursue their own priorities on their own terms, in their own vocabulary. Focus groups also enable researchers to examine people's different perspectives as they operate within a social network. Crucially, group work explores how accounts are articulated, censured, opposed and changed through social interaction and how this relates to peer communication and group norms.

Stewart and Shamdasani (1990, p.13) emphasise similar qualities of this method. They point out that focus groups, in contrast to survey data and experimentation, provide data which arise in a more natural or authentic, indigenous form, because "they allow individuals to respond in their own words, using their own categorisations and perceived associations".

Focus groups have therefore become increasingly used by social science researchers interested in investigating the perspectives and language of members of what is often categorised as the general or lay public. A significant number of these studies has been devoted to the study of public perceptions of risk (or rather to topics which are generally considered to be "risk issues"). A few examples are given in Table 1.

PABE researchers had participated in some of these studies, and had also conducted research on public perceptions of risk using other methods. Some of these studies used questionnaire surveys (e.g. Pellizzoni and Ungaro, 2000; De Marchi, 1991; De Marchi et al., 2000; Hampel and Renn, 1999; Hampel et al., 1998; Lemkow, 1991; Marris et al., 1998). Members of the PABE team had also been involved in studies which intentionally used mixed-method designs in order to compare the results obtained using different approaches, including both qualitative and quantitative methods. In fact several of the focus group studies listed in Table 1 involved also questionnaire surveys or other methods such as in-depth interviews (e.g. Renn and Zwick, 1997; Walker et al., 1998 and the ULYSSES, VALSE and PRISP projects - see Table 1).

Table 1. Some focus group studies on public perceptions of risk

Topic	References	EC-funded project?	Participation of PABE researchers?
AIDS	Kitzinger, 1994	No	No
BSE	Reilly, 1999	No	No
Children's views of accidents	Green, 1997; Green and Hart, 1998	No	No
Energy technologies	Keck and Lattewitz, 1999	No	Yes
Environmental valuation	O'Connor and Tsang King Sang, 1998, http://alba.jrc.it/valse/	VALSE	Yes
Global climate change	Darier et al., 1999; De Marchi et al., 1998, http://alba.jrc.it/ulysses.html	ULYSSES	Yes
Hazardous installations	De Marchi and Functowicz, 1997; Horlick-Jones et al., 1998	PRISP	Yes
Hazardous installations	Irwin et al., 1999; Walker et al., 1998	No	Yes
New genetics (in health)	Kerr and Cunningham-Burley, 2000; Kerr et al., 1998a and b	No	No
Noise abatement	Keck, 2000	No	Yes
Nuclear technologies	Waterton and Wynne, 1999; Wynne et al., 1993	No	Yes
Sustainable development	Macnaghten et al., 1995	No	Yes

Based on this previous research experience, the team felt that focus groups provided the most appropriate method for this study. The main reason was that focus group methods are particularly useful for exploring the categories which participants use to order their experience, whereas quantitative questionnaire surveys are more likely to impose researchers' meanings of key terms such as "risk", "trust" or "knowledge" on the respondents. This seemed particularly important for a study about a topic which was not (at that time) high on the public agenda. Individual interviews share similar qualities, but focus groups add an important *interactive* dimension to other qualitative (and quantitative) methods (Kitzinger, 1994). The interactive nature of group work provides information not only on *what* people think, but can also be very useful to explore *how* they think and *why* they think as they do. In addition, when participants are encouraged to engage with each other and verbally formulate their ideas, it is possible to draw out and explore less direct, more implicit or tacit public views which had previously been unarticulated. Moreover, it is possible to explore interconnections between the issue as defined *a priori* by the researchers with beliefs and perceptions about other issues which are raised by the participants. In these ways, focus groups can also help to reveal the multi-layered and complex nature of public perceptions (see Box 3 for more about the interactive dimension of focus groups).

Box 3: The importance of interaction in the focus group method

"The group process however, is not only about consensus and the articulation of group norms and experiences. Differences between individuals within the group are equally important and, in any case, rarely disappear from view. Regardless of how they are selected, the research participants in any one group are never entirely homogenous. Participants do not just agree with each other they also misunderstand one another, question one another, try to persuade each other of the justice of their own point of view and sometimes they vehemently disagree.
During the course of the group the facilitator can explore such differences of opinion and encourage the participants to theorise about why such diversity exists. In our 'pre-existing groups' people were sometimes surprised to discover how differently they thought about some things especially when the group otherwise appeared homogeneous (e.g. by gender, race, and class). Such unexpected dissent led them to clarify why they thought as they did, often identifying aspects of their personal experience which had altered their opinions or specific occasions which had made them re-think their point of view. Had the data been collected by interviews the researcher might have been faced with 'arm-chair' theorising about the causes of such difference but in a focus group these can be explored 'in situ' with the help of the research participants.
The difference between participants also allows one to observe not only how people theorise their own point of view but how they do so in relation to other perspectives and how they put their ideas 'to work'. This process in itself clarifies what people are saying […] Diversity within a group ensures that people are forced to explain the reasoning behind their thinking. […]
Close attention to the ways in which participants tell stories *to one another* also prevents the researcher from assuming that she knows 'the meaning' of any particular anecdote or account. During the course of the group session the researcher witnesses how such stories actually operate in a given social setting, how they are mobilised in social interaction, what ideological work they are employed to achieve. […]
People's different assumptions are thrown into relief by the way in which they challenge one another, the questions they ask, the evidence people bring to bear on an issue, the sources they cite, and what arguments seem to sway the opinion of the other members of the group."

"We are none of us self-contained, isolated, static entities; we are part of complex and overlapping social, familial and collegiate networks. Our personal behaviour is not cut off from public discourses and our actions do not happen in a cultural vacuum […]. We learn about 'meanings' […] through talking with and observing other people, through conversation at home and at work; and we act (or fail to act) on that knowledge in a social context. When researchers want to explore people's understandings, or to influence them, it makes sense to employ methods which actively encourage examination of these social processes in action."

Source: Kitzinger, 1994, pp. 113-114 and 117

2.9 Some limitations of focus group methods

It is important to recall here that any choice of method has important consequences on the results obtained. Our choice was determined by our objective to study *underlying frameworks of meaning and interconnections* through which members of the public shape their views of GMOs. It should therefore not come as a surprise that our results focus essentially on such public meanings, and on the interconnections made by respondents between issues or topics which tend to be considered separately when using other methods. One of the findings from sociology of science is that a researcher observes and measures precisely what his or her instrument is capable of observing and measuring. While this observation is drawn from studies of the natural sciences, it applies of course also to the social sciences. It is therefore not surprising that results from focus group studies on public perceptions tend to reveal results which remain invisible or under-researched quantitative questionnaire surveys are used as the sole research method.

It is also important for researchers and users of their research to understand and recognise that the public is always to some extent constructed through the research process itself, and this is as true for focus groups as for survey or experimental methods. (See for example Davison et al. 1997 for how the public is constructed through survey of public opinions to biotechnologies.) The key point is whether and how this dimension is recognised and addressed.

The limited numbers of individuals participating in qualitative research studies (focus groups or interviews) is often seen as a barrier to generalisation from the results. There is, however, a balance to be struck between the representativity (in statistical terms) of the sample, and the advantages that focus groups bring in terms of the depth of the analysis and through the interactive dimension discussed above. This limitation can to some extent be overcome by ensuring the greatest possible diversity of participants between and/or within the groups, and by conducting additional focus groups until a saturation point is achieved, where the researcher decides that the groups do not reveal much which is new compared to the previous groups. This number will vary according to the subject of investigation, but experience suggests that 10 to 20 are often sufficient to achieve such saturation. Previous research also demonstrates that, despite the small number of participants, researchers using such methods have been able to make perceptive and highly relevant contributions to our understanding of the social dynamics of a wide range of pressing social issues.

Another type of critique often levelled at focus group methods concerns the very notion of group work: it is suggested that the impact of the group on the expression of individual points of view is a purely negative, inhibiting or distorting factor. However, as argued above (and developed further in Kitzinger, 1994; Barbour and Kitzinger, 1999), it is true that such interactions occur, but they need not be seen as a problem. Data collected during a confidential one-to-one interview may well be different to that collected in a group situation, but since people do not operate in a vacuum in real life, knowing what is (and is not) expressed in a group context provides data which may be more, not less, relevant to real life experiences. However, as Kitzinger (1994, p.106) warns:

> It would be naive, however, to assume that group data is by definition 'natural' in the sense that it would have occurred without the group having been convened for this purpose. It is important to recognise that although, at times, the focus groups may approximate to participant observation the focus groups are artificially set up situations.

This was indeed particularly true for the PABE study, since we expected our focus group participants to discuss and think about an issue - agricultural biotechnologies - about which they would not necessarily have any interest in otherwise. Indeed, the participants in the PABE focus groups were selected according to criteria which attempted to ensure that they were not directly engaged in or affected by the GM controversy (see section 4). In contrast, the groups conducted and discussed by Kitzinger were pre-existing and brought together participants who knew each other and were directly affected by the topic of the discussion. Again, although this may be seen as a problem, we believe that the interactive nature of focus groups provides a particularly valuable asset to enable researchers to capture the way in which participants use their existing knowledge and experience to make sense of a new issue, even before the issue becomes part of a public debate.

Another critique of focus group methods, related to that above, is that the researcher, especially if s/he facilitates the discussion, will be able to steer the discussion to obtain the desired results. Again, the point here is not whether such researcher-respondent interaction actually occurs - it inevitably does - but how this is recognised and dealt with by researchers. Indeed it has been recognised for a long time (since at least the 1920s) that natural science observation involves interference with the object(s) being studied (see for example Hacking, 1983). In social science this is even more sharply true. The questions we ask, and the way we ask them, inevitably affect the answers we receive from human actors, and may also affect their future behaviour. Moreover social research involves human actors who are actively, but often tacitly, constructing meanings and relations for themselves during the research process. In doing so they may draw upon the concepts and language of social science – an escapable condition that has been referred to by sociologist Anthony Giddens (1991) as "the double hermeneutic".

Qualitative research, such as in-depth interviews or focus groups, is also often criticised for leaving too much leeway to the researcher in interpreting the data. Thus it is sometimes claimed that researchers are free to select arbitrarily from the wide variety of positions expressed during a group discussion, and thus to spuriously confirm their expectations or personal convictions. Furthermore, quantitative results (especially when drawn from representative samples of the population) often seem to be more convincing to research users than analyses based on qualitative data (numbers speak louder

than words). It is however important to emphasise that, whatever the method used, *researchers always need to interpret* research findings. The fact that this is true for quantitative surveys also is however not often recognised by users of the research, even though it has long been recognised by the researchers themselves (e.g. Hampel and Renn, 1999; Pawson, 1989). The key point here is therefore the extent to which the researchers recognise this interpretative responsibility, make it explicit, and attempt to redress possible biases through independent validation. This problem is exacerbated by the fact, discussed above, that results from public perception studies cannot be validated by some independent measure such as expressed behaviour or observed intensity of controversy. Although this applies equally to quantitative data, it is more often levelled at qualitative research, and thus creates an additional barrier for researchers using qualitative methods when trying to convince policy users of the validity of their results.

2.10 Testing and validation of research findings

Subjective bias in research findings is always a possibility, in all research. But although the limitations discussed above are widely acknowledged in social science research, their implications are not always followed through. We suggest that the following methodological and research-policy points should be addressed:

(i) Acknowledge the interpretative element of all research

All research is necessarily interpretative. The key question is where (at which stage in the research), and how explicitly and reflexively, are such interpretative commitments made? For example, in quantitative surveys they tend to be embedded in the construction of survey questions, whereas for qualitative methods they tend to be more important at the stage when the data is analysed.

(ii) Acknowledge the interactive dimension of all research

In all research, there is an irreducible element of interaction between researchers and the objects of their research. In social sciences, and in public perception research, this is particularly true. Thus, the research finding will interfere with the human response it is supposed to be representing and testing itself against. This cannot be avoided but researchers, regardless of which methods they utilise, should acknowledge this interventionist role and the responsibilities that come with it.

(iii) Extended peer-review

Interpretative commitments made by researchers (which are attempted representation of the public) need to be validated and if necessary amended by peers and those which they aspire to represent. They cannot claim to come from data alone. Peer review can be conducted by researchers in the field through discussion within the research team, and by critical review by independent researchers. Extended peer-review needs to be conducted by members of the populations which are supposedly represented by the research findings, and by users of the research, including all stakeholders.

(iv) Mixed methods

Testing and validation can be conducted by comparison of results obtained using different methods. This can either be done intra-research team, by the use of mixed methods within the same study; or inter-research team by reviewing findings published by different teams using the same or different methods.

The methods used for testing and validation of the PABE focus group results are described in section 4.5.

2.11 Conclusions

All of the above discussion on framings of risk perception studies was founded on past experience of PABE team members in this field and provided the background to the PABE project. Based on this previous research, and more specifically on a study of public perceptions of GMOs conducted at

CSEC in 1996 (see Box 2), the PABE researchers decided to incorporate the following elements into the design of the PABE study:

- Methods used for the study of public perceptions of risk should allow, as far as possible, respondents to express, from their own perspective, their view on what the issue at stake actually is. This was a key determinant in our choice of focus groups as the method to study public perceptions (see section 2.8).
- Public perceptions research should be accompanied by research analysing the corresponding institutional constructions of risk, risk issues and public perceptions. This was the reason for including an analysis of both public perceptions (of GMOs) and stakeholder perceptions (of the public) in the PABE study (see especially section 6 for results).
- Testing and validation of research findings should come from both intra- and inter-research group confrontation, and extended peer-review. Methods and procedures for this were incorporated into the design of the PABE study (see section 4.5).
- Researchers should as far as possible, acknowledge and be reflexive about the dimensions of their research. This section has attempted to make our own research commitments transparent for the reader.
- Public perception studies would gain from being complemented with studies following the mobilisation (or not) of actors in socio-technical controversies. Although this was not included in the project design, some PABE researchers were also involved in such studies, either before or during the period of the PABE project (see references in section 5).
- In the public responses to biotechnology field there is scope for more research that involves multiple methods and collaboration in comparing methods, founding assumptions and results, between different researchers or research teams. This was not part of the design of the PABE study, but the research presented here can be seen as complementing other research carried out using different approaches. The results presented here will need to be compared and confronted with those obtained by other researchers, using similar or different methods and approaches. It is however important to realise that the issues raised by attempting to combine different approaches within or across disciplines are not trivial, because it involves identifying and analysing the underlying *framings* and *prior assumptions* of each research project. We have attempted to make this easier for the reader of this report by making our own prior assumptions explicit in section 2.

3. Methods used for the stakeholder analysis[3]

Three methods were utilised to investigate perceptions, discourses and strategies of *key stakeholders* in the GMO: interviews, analysis of documents, and participant observation. In each case, the analysis focused particularly on the stakeholders' perceptions of public perceptions of GMOs, i.e. on the stakeholders' views about the public and about public reactions to GMOs participants, rather than stakeholders' opinions about GMOs. The results are presented in section 6.

"Stakeholders" are defined here as employees or spokespersons of any institution which plays a role in the creation, regulation, testing and putting of the market of GMOs. In addition, any actor who expresses him or herself in public spheres and thus contributes to the public debate on GMOs is defined here as a stakeholder. Stakeholders therefore varied between the 5 countries studied, but generally included:

- Biotechnology and seed firms
- Food manufacturers
- Food distributors
- Politicians
- Government
- Members of advisory committees
- Scientific researchers
- Environmental NGOs
- Consumer NGOs
- Farmers' unions

3.1 Interviews

At least 20 open-ended in-depth interviews with stakeholders were conducted in each of the five countries. These included: biotechnology or seed firms, food manufacturers, (large) food distributors, civil servants in relevant ministries and regulatory bodies, members of expert advisory committees, research scientists, farmers' unions, environmental and consumer organisations (see National Reports for details).

3.2 Participant observation

The interview data was complemented with data collected through participant observation. This method consists in the presence of researchers at meetings or events which bring together a part or all of the stakeholders involved in the GM debate. The role of the researcher varies from a mere member of the audience (who express themselves or not) up to their active participation as a speaker or in the organisation of the event. But whatever their official role in the event, the researcher records his or her observations, following the same protocol (themes) as for interviews.

This method is useful and complementary to interviews, because it allows the researcher to observe how discourses and positions are mobilised in public spaces. On the one hand, when such events bring together actors who do not share the same positions, the researcher can observe and clarify (more easily than in single interviews) areas of disagreement. On the other hand, events that bring together actors with more similar positions can facilitate the identification and observation of shared cultures among certain professional groups.

The type of events used for participant observation varies greatly. Among other things, they depended, of course, on the type of events occurring within each country or region studied. They included, for example: governmental advisory committees and working groups; public consultation events or procedures organised by governments or industries; public debates and consultations organised by

[3] Note that although the Spanish and German teams conducted their focus groups in Catalonia and the State of Baden Württemberg, the stakeholder analysis was conducted at the national level.

NGOs; NGO meetings; mass demonstrations and direct actions; court trials… (see National Reports for details).

In addition, much of our research, including the PABE project, has been funded by (and/or organised in collaboration with) external organisations (national governments, European Commission, industry or NGOs). This provides extended opportunities for observing and discussing the views held by these actors about the objectives of public perception research, and thus their views of the public.

3.3 Analysis of documents

A great number of documents produced by stakeholder organisations was collected and analysed. These included: press releases, web sites, annual reports, public relations material, calls for research proposals, articles in magazines or newspapers, books, e-mail discussion lists… Again, the main object of attention was the *visions of the public* expressed by the authors through these documents.

3.4 Implicit and explicit visions of the public

These three methods (interviews, participant observation and analysis of documents) enabled us to collect explicit declarations about the public (described alternatively as "citizens", "consumers", "lay public"…). In interviews we addressed this question directly. During GMO events that we observed/participated in, actors often described explicitly and spontaneously their visions of the public - even, indeed, when this was not the official subject of the meeting. In documents, one also finds explicit representations of the public, especially in the form of results from opinion surveys or other research on public perceptions.

But our analysis also takes into account *implicit* visions of the public, in addition to such explicit declarations. These were identified and analysed by paying particular attention to, for example, the following questions: What does the protagonist consider to be the main message that has to be communicated? Who is considered to be the most important target for the communication? Who or what is expected to change in response to the communication?… This type of analysis of the content and means of communication actions reveals important elements about implicit visions of the public held by the protagonists (for an example, see page 83).

4. Focus group method for the analysis of public perceptions

In sections 2.8 to 2.10, we described focus group methods in general, our reasons for choosing this method, limitations of the method, and how results obtained from focus groups can be tested and validated. In this section, we describe the specific way in which the PABE focus groups were conducted.

For this research, focus groups consisted of a 2-hour group discussion facilitated by a researcher, with 6 to 11 ordinary citizens (i.e. non-stakeholders) who did not know each other previously. The method used, including the recruitment criteria, discussion protocols and analytical frameworks, was developed collectively by all five teams involved in the PABE project. The same protocols were used by each team, with minor regional variations to adapt to local contexts. The description which follows is based on the standard method and significant local variations from this protocol are indicated (further details are given in National Reports).

4.1 Staged design

The research was conducted in 3 stages:

- Pilot phase: 2 focus groups held in September-October 1998
- Phase I: 6 focus groups held in January-February 1999
- Phase II: 6 focus groups held in September-October 1999

The aim of this staged design was to allow for the development of the method as the study progressed. The pilot groups were used to test the usefulness of the discussion protocol. Following discussion among the PABE team, minor modifications were made to the protocol before conducting the Phase I focus groups.

Preliminary analysis of the Phase I focus groups was conducted and discussed among the PABE partners before proceeding to Phase II. At this stage, a number of key questions were identified for further investigation, and the discussion protocol was modified accordingly. In order to allow for more in-depth exploration of these themes in Phase II, we decided to spend more time with each group. Thus in Phase I, 6 groups of participants were recruited, and each of them met only once, for a 2-hour session; whereas in Phase II, 3 groups of participants were recruited and each of them met twice for 2-hour sessions (either on consecutive days or with a 7-day interval between the two sessions).

This meant that, each team recruited 11 groups of participants (see Tables 2 and 3) and conducted 14 discussion sessions, which meant that for the whole study 55 groups were recruited and 70 discussion sessions were conducted (a total of 140 hours of group discussions).

4.2 Discussion protocols

The discussion protocols aimed to focus the discussion on key themes, while maintaining, as far as possible, an open-ended structure to allow the participants to raise issues of importance to them. It was agreed that an English-language version would be used as a basic framework by all five teams, to be adapted by each national team according to the local contexts (including language, level of public discussions on GMOs, relevant local examples...). The English versions of the protocols are given in Annexes 3 and 4.

A key choice, which was debated between the partners and tested out in the pilot groups, was to provide rather little information about GMOs to the participants, and to provide this information in a progressive fashion during the session. The question addressed early on during the preparatory stages of the project (summer 1998) was whether it would be viable to use this approach in each of the five countries given that, as shown in section 5, the intensity of the GM public debate was very different in each one, and thus one could expected the level of pre-existing awareness of the existence and notion of GMOs to be rather low in some countries, especially Spain and Italy.

This choice was informed by our belief, discussed in section 2.5, that public perceptions can and do exist in the absence of public controversies, and that researchers should not define *a priori* what kind of knowledge or information is relevant for the shaping of public perceptions. The method used therefore attempted to investigate underlying or *pre-existing* perceptions of GMOs, based on whatever information, knowledge and experience the participants had gathered in their real-life experience, before participating in the focus group. The study did not seek to investigate responses to the provision of specific types of information. Instead, the participants were encouraged to draw upon whatever knowledge they considered to be pertinent, and in our analysis of the data we paid particular attention to the identification of the frames of reference, associations and experiences mobilised by the participants to present and defend their arguments.

In practice, as shown in section 5, the public controversy intensified in all five countries (though much less so in Germany) during the period in which the focus groups were conducted (September 1998 to November 1999). Thus pre-existing awareness of the GMO issue (as defined by scientists and policy makers) varied between the 3 phases of focus groups as well as between the 5 countries.

The conclusion from the pilot groups was that the proposed approach as indeed workable and only minor modifications were made to the protocol for the Phase I focus groups[4]. Thus, the Phase I protocol was designed as follows (see Annex 3 for details):

(i) For the first part of the session (approximately 30 minutes), participants were asked to talk about evolutions in agriculture and food in general. GMOs or agricultural biotechnologies were not mentioned by the facilitator. If and when participants brought up the subject, this was noted but not necessarily explored further at this stage.

(ii) The facilitator introduced the term "GMO" (or an appropriate local term) and asked the participants for their immediate images (approximately 10 minutes).

(iii) A short "dictionary definition" of GMOs was presented and used to promote discussion (approximately 10 minutes).

(iv) A number of specific examples of agricultural GMOs were progressively presented (approximately 40 minutes).

(v) Three stereotypical arguments about GMOs were presented (from a regulator, a company producing GMOs, and an environmental organisation). This occurred in the last half-hour of the discussion, and was used essentially to explore the participants' views about the stakeholders, rather than to promote discussion about the arguments *per se*.

During the recruitment, potential participants were told rather vaguely that the discussion would be about "your feelings about changes in food production and consumption these days". Biotechnology, genetic engineering, transgenic plants or food (etc.) were intentionally not mentioned. The main reason for not mentioning biotechnology at the recruitment stage was that some people might have been put off participating, thinking that the discussion would be too technical and inaccessible to them. Also, there might have been a bias towards people who were particularly interested in (and had a vested interest in) the subject and/or some participants might have prepared themselves by reading up on the subject before the meeting. Another reason for this choice was that this procedure allowed us to see whether and to what extent biotechnology came up as a spontaneous subject during the first part of the discussion, before it was introduced by the facilitator. We were however aware that when participants realised, during the focus group, that the central topic of the discussion was agricultural biotechnologies, they might feel that they had not been honestly informed and that they were being manipulated[5]. In the event, there was no sign that this was the case.

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[4] In Italy, the initial definition of GMOs was a little more detailed.

[5] This concern was particularly high among the German team, because of the fact that GMOs were already very controversial in their country. This team therefore decided to inform the participants at the recruitment stage that the topic of the discussion would be GMOs.

Participants were also told, early on during their recruitment, that the study was being conducted by a public sector research institute or university (the name was given), in order to emphasise that this was academic research rather than market research. This was again emphasised at the beginning of the discussion session, and the participants were also told that the study was funded by the European Commission. At the end of the sessions, participants were given a leaflet with brief details of the PABE study.

4.3 Analytical framework

Focus groups from each country were first were analysed independently by each local team, on the basis of a common analytical framework developed collectively by the PABE researchers. The results were then discussed and compared collectively by the whole PABE team. The analytical framework used is described below.

A set of key analytical themes thought to be important for understanding public views of agricultural biotechnology was identified by the research team and used as a common framework for the analysis of the Phase I focus groups. These themes were in effect a set of factors which we hypothesised might be influential in shaping perceptions to agricultural GMOs. They were identified from previous work by the PABE team and other researchers, and were outlined as follows in the PABE research proposal (Marris and Wynne, 1997, p. 2)[6]:

1. Agency, identity, and public participation in decision-making

Are risk perceptions in this field influenced by the degree of agency which people feel they have in their national decision-making processes? Is this sense of agency associated with different national "public participation cultures"?

2. Social psychological factors on perceptions

Are factors such as novelty, unfamiliarity, and felt lack of choice important in shaping risk perceptions in this field? And does this vary between countries?

3. Ethical dimensions

To what extent are risk perceptions in this field shaped by images of Nature and moral standards, for example over the sense of 'playing God' or in relation to the treatment of animals? And how does this vary between countries?

4. Perceptions of the agriculture-food system

Do differing images of the domestic agriculture-food system influence the extent to which people identify with or fell at risk from it? (for example, the perceived degree of intensification of agriculture, or degree of integration into international trade systems). Are current perceptions of risk in this field influenced by the perceived trajectory of the food system, and its projection into the future? (a sense of "we have gone far enough")

5. Perceptions of science

Are risk perceptions in this field influenced by the scientific character of genetic manipulation? Are risk perceptions in this field related to attitudes toward science and technology in general, and to trust in scientific experts? To what extent is science and technology associated with national identity, and does this have an influence on risk perceptions?

6. Risk assessment procedures

Scientific knowledge used for risk assessment invariably incorporates assumptions of a social kind, for example about real-world situations in which the risks will be experiences as contrasted with analytical models and controlled experiments. Are risk perceptions in this field influenced by the degree to which national risk assessment procedures for GMOs acknowledge the social dimensions of regulatory science?

7. National and European regulation

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[6] These themes were refined at the beginning of the project and during the preliminary analysis. Details can be found in PABE working documents: "Key analytical themes" (November 1998) and "Revised version of key analytical themes" (March 1999). We choose to reproduce here the exact formulation used in the research proposal, in order to be as transparent as possible about the way in which we framed our research questions and presented them to the research sponsors. Note that these research questions were largely informed by results from the "Uncertain World" study (Grove-White et al., 1997), described in Box 2.

How much to laypeople identify their national regulatory systems as autonomous and impermeable, or interconnected and porous with respect to risk? Are risk perceptions in this field influenced by the perception that regulations emanate from European institutions as opposed to national governments?

8. Experience of untrustworthy behaviour in related fields

Are risk perceptions in this field influenced by past public experiences of trustworthy or untrustworthy behaviour from those controlling the risks, in the same field or in related areas related to the agriculture-food system? (e.g. BSE)

The comparative analysis of the results from the Phase I focus groups identified seven analytical factors or themes that appeared to have a significant influence on participant's views. They also represented themes which appeared to be more or less common for all of the national studies, or where the researchers felt further exploration of potential differences between the five countries was necessary. These seven themes were used to frame the discussion protocol and the analysis of the Phase II groups[7], and to reanalyse the results from the Pilot and Phase I groups.

1. Lifestyle orientations, including related food cultures
2. Speed of change associated with food technologies
3. Perceived long term uncertainties
4. Food, health and nature
5. Perceived tension between social need and private interests
6. Scepticism towards key institutions
7. Sense of alienation, lack of agency, lack of control of the life-world

4.4 Recruitment

The selection criteria for each of the groups are summarised in Table 3. They were developed collaboratively by all researchers of the PABE team and the same criteria were used in each country, with minor regional variations, as indicated below (further details are given in National Reports).

As for most focus group research, it is important to emphasise that the samples were not - and could not possibly be - statistically representative of the populations studied. Statistical representativeness was not the aim of the recruitment method. The objective was, instead, to generate as much *diversity* as possible among the participants. The selection criteria used included demographic characteristics, in order to ensure social diversity, as well as topic-specific criteria, i.e. criteria which are considered by researchers to be of particular relevance for public perceptions of GMOs.

All groups were, as far as possible, composed of equal numbers of female and male participants (except for the two pilot groups in Germany, and Groups 5 and 8 in the UK); but occasional slight unbalances occurred, due to difficulties in recruitment (see National Reports for details).

Most of the groups were designed to be *homogenous* according to the set of key pre-determined variables listed in Table 3, but as diverse as possible in other respects. In contrast, two of the Phase II groups (n°9 and n°10) aimed to be *heterogeneous* with respect to the pre-set variable. Of course, people conforming to pre-set categories may differ considerably in other respects which are uncontrollable in advance by researchers. As Kitzinger and Barbour (1999, p.8) usefully remind us, one should not overemphasise the extent to which researchers can control for all characteristics which are likely to be relevant, and this is not necessarily a disadvantage.

It was also felt that regional diversity was important and focus groups were therefore conducted in different regions of France, Italy and the UK. This did not mean, of course, that the whole extent of diversity between regions could be accounted for, but the aim was to try to avoid the possibility that some uncontrolled variable linked to territorial location introduced an unrecognised bias in the results. For Spain and Germany, a different approach was used, due the strong attachments of the research institutions participating in the PABE project to their territorial location. In Spain, all of the groups

[7] For further details about the construction of these themes, see PABE working document "Phase II focus groups - key analytical questions" (September 1999).

were recruited and conducted in Catalonia; and in Germany, in the State of Baden Württemberg. The results from these focus groups should therefore only be considered relevant to those territories.

In all groups people employed (or with families employed) in sectors closely related to agriculture, agro-industries, or biotechnology were, as far as possible, excluded. This included farmers and persons with training in agricultural or biological sciences. People associated with marketing, publicity and media professions were also excluded. As far as possible, participants who knew each other were excluded, although this occasionally proved unavoidable for groups recruited in small towns and among churchgoers.

Specific pre-set recruitment criteria were as follows:

For the pilot phase, the key criterion used to differentiate the two groups was level of education, since formal knowledge is often hypothesised to be associated with risk perceptions, and this also serves to some extent as a proxy for other socio-demographic criteria.

For Phase I, a greater number of socio-demographic were utilised (education, age, small/large city or rural resident), to ensure that participants were drawn from a range of social backgrounds and situations. In addition, criteria such as the presence of young children in the home, religion or rural residency have been hypothesised to have a potential influence on perceptions of food and agriculture.

For Phase II, the participants for two of the groups were selected according to two criteria which emerged as significant in the analysis of the Phase I groups, and which we therefore wanted to investigate further: food consumption habits and feeling of agency.

- For "food consumption habits" half the group was composed of people who stated that they shopped mostly at local shops or markets, and/or bought organic products. The other half was composed of participants who stated that they did not pay much attention to what food they bought, shopped mostly in large supermarket in order to save time, and did not devote much time or importance to cooking and eating.
- For "feeling of agency", the group was composed half of politically active citizens, and half of politically passive citizens. Political activity was determined according to participation in one or more of the following: political party, parent/teacher association, NGOs, local community group or voluntary organisations (but excluding purely social or sports orientated activities)…

The third group for Phase II was composed of people with a high level of scientific education, in order to investigate the hypothesis, put forward by other researchers and commentators, that negative perceptions of GMOs (and other technological risks) are related to a low level of scientific education (sometimes referred to as "scientific culture" or "scientific literacy"). Participants with training or experience in disciplines closely associated with GM research were excluded.

4.5 Logistics

Recruitment was carried out either by a professional recruitment agency, or by the researchers themselves. Market agencies with experience in recruitment for academic research (as opposed to purely market research) were chosen when possible. There was an awareness that professional recruiters for market research agencies use their existing data base for selection, thus possibly leading to the recruitment of professional focus participants. This was addressed in Italy by recruitment conducted (for all groups) by the researchers themselves, using non-professional local sources. This was less of a problem for Phase II, because the recruitment criteria were more specific and were different to the socio-demographic criteria used traditionally by professional recruiters. Thus even when professional agencies were used, they could not easily rely on their existing database. Indeed this meant that for Phase II the procedure was adapted in France and in Catalonia, where large national market research organisation had been used for Phase I. In France an independent professional recruiter was used (as opposed to a large agency); and in Catalonia the researchers themselves carried out the recruitment using the same procedure as the Italian team.

Participants were paid for their participation (30-40 Euro for 2 hours in Phase I and 60-80 Euros for 4 hours in Phase II). Light refreshments were provided.

Most of the groups were held in the evening, from 19h00 to 21h00. Some groups (e.g. with unemployed or retired participants) were held in the daytime. Focus groups were held in relatively formal but diverse settings[8]: universities, research centres, local hotels, city halls, or market research company offices (see National Reports for details). This diversity will, of course, have had some influence on the results obtained.

Each discussion was audio- and/or video-recorded, with prior agreement of the participants. One or two PABE researchers facilitated the discussion. In some instances, another researcher acted an observer, sitting quietly (but visible) in the back, taking notes and sometimes contributing to the discussion at the end.

Table 2. Number of participants per focus group

Phase	Group n°	UK	France	Germany	Italy	Catalonia
Pilot Phase	**1**	8	7	8	8	10
	2	8	8	8	8	7
Phase I	**3**	8	8	9	8	8
	4	7	7	7	8	9
	5	7	7	7	8	8
	6	8	8	6	8	9
	7	8	6	7	8	9
	8	8	8	8	8	8
Phase II	**9**	8	8	11	8	8
	10	8	8	8	8	7
	11	8	7	6	8	8
Total per country		*86*	*82*	*85*	*88*	*91*

(Total for whole study: 432)

[8] In one case (in Italy) a private house (not belonging to one of the participants) was used.

Table 3. Recruitment criteria for focus groups

Pilot[a]	**1**	Low level of education	Sept/Oct. 1998
	2	High level of education	Sept/Oct. 1998
Phase I	**3**	Young, single urban professionals with high level of education	Jan./Feb. 1999
	4	Regular churchgoers[b]	Jan./Feb. 1999
	5	Socially excluded (unemployed with low income and low education)[c]	Jan./Feb. 1999
	6	Retired [d]	Jan./Feb. 1999
	7	Parents of young children[e]	Jan./Feb. 1999
	8	Rural dwellers	Jan./Feb. 1999
Phase II	**9**	Food habits (split between 'natural' and 'convenience' food user)	Sept./Oct 1999
	10	Feeling of agency (split between active and passive citizenship)[f, g]	Sept./Oct. 1999
	11	High level of scientific education	Sept./Oct. 1999

Notes on variations:

a) In Germany, gender was used instead of level of education to differentiate between the two pilot groups: Group 1 was composed of 8 men; Group 2 of 8 women.

b) For Group 4, the "regular churchgoers" were Protestants in Germany and mainstream Christians, including Protestants and one Catholic, in the UK. In France, Italy and Catalonia they were all Catholics.

c) Group 5 was composed of men only in the UK.

d) Group 6 was replaced in Italy by a group composed of unemployed or public employees.

e) Group 7 was composed of women only in the UK.

f) In the UK Group 10 differed in that all participants recruited had a high sense of agency.

g) In Italy, an additional sub-criteria was used: all participants (high and low agency) had a low level of education and social status.

All groups were, as far as possible, composed of equal numbers of female and male participants (except for the two pilot groups in Germany, and groups 5 and 8 in the UK), although occasional slight unbalances occurred, due to difficulties in recruitment (see National Reports for details).

In Italy, France and the UK, groups were recruited and conducted in different regions (see National Reports for details). In Spain, all the groups were conducted in Catalonia; and in Germany, all the groups were conducted in the State of Baden Württemberg.

4.6 Testing and validation of PABE focus group results

For this project, techniques for testing and validating the interpretation of data included:

(i) Iterative and interactive design of the analysis by the PABE team (intra-group testing)

a) Focus group transcripts were analysed independently by at least two separate researchers from each national PABE team. Different interpretations were then compared and discussed before being integrated into the final analysis.

b) Analysis of results collected in each country was first elaborated independently by each national team, and then discussed with researchers from the other PABE teams. Areas of apparent disagreement were especially focussed-on and either resolved by further examination or given provisional explanations in terms of comparative national differences (see section 7).

c) The 3-phase staged research design allowed questions which emerged in earlier phases to be re-explored in later phases.

(ii) Extended peer-review

a) In some cases, preliminary results were presented to the focus group participants for comments. This was mostly done in Phase II, when the groups were brought together for 2 discussion sessions. Preliminary results from the first session could therefore be presented to the participants at the beginning of the second session, and they were asked to react to them[9].

b) Dedicated workshops at national and EU levels were conducted in order to present and discuss preliminary results with key stakeholders and users of the research.

c) This research has been informed by a close and active involvement of the researchers in all five teams in policy debates, policy analytic processes and advice over many years. Researchers from each of the five teams are members of a number of advisory committees to governments, NGOs or industry. This policy involvement is a deliberate part of our research-learning model, and is not just seen as post-research dissemination. These activities serve to ground our research, to animate it, and also to ensure that our approach is appropriate to generate insights which would be of use for stakeholders. These continual interactive relationships with stakeholders in the relevant domains allow the testing of interpretations against other actors' understandings. The national and EU workshops conducted in the last phase of this project represent one way to encourage this kind of interactive relationship, but PABE researchers were also involved in numerous other meetings and other less formal relationships with the actors involved in the GMO debate.

d) Presentation of preliminary findings and interpretations at relevant conferences and seminars, involving both academic peers and policy stakeholders.

(iii) Inter-research group peer review

A third type of useful testing and validation is comparison and triangulation between results obtained using different methods. This was not part of the design of the PABE study, but the research presented here can be seen as complementing other research carried out using different approaches. PABE researchers are involved in developing comparison with results from other researchers, using the same or different methods, but this is not reported here. The results presented in this report will need to be compared and confronted with those obtained by other researchers, using similar or different methods and approaches. It is however important to realise that the issues raised by attempting to combine different approaches within or across disciplines are not trivial, because it involves identifying and analysing the underlying *framings* and *prior assumptions* of each research project. We have attempted to make this easier for the reader of this report by making our own prior assumptions explicit in section 2.

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[9] In Italy, participants were asked to agree, at the end of each discussion session (in all phases) on a summary prepared by the participants themselves, or by one of the researchers.

5. Evolution of the GM controversy in the five countries studied

5.1 Intensity of the GM controversies

The PABE study included stakeholder interviews, participant observation and analysis of documents (methods described in section 3). This component of the study had two objectives:

(i) To investigate representations of the public among stakeholders, in order to compare these with the results from our focus groups with ordinary citizens. These results are presented in section 8.

(ii) To carry out an analysis of the controversy in each of the countries where data on public perceptions was collected, in order to provide background information on factors that may be important in shaping public responses. This analysis is summarised here.

The temporal profile of the intensity of GMOs controversies in each of the five countries between 1985 and 2000 is sketched out in Figure 1. This illustration is based on an analysis of: the extent of media coverage, the number and vehemence of anti-GMO actions by NGOs, responses and initiatives by national public policy makers and by the private sector. The analytical framework for this temporal profile was derived from research carried out for a separate EC-funded project (ADAPTA) in which some PABE researchers were also involved (see box 4).

It is however important to emphasise that this way of portraying the trajectory of the GM controversy is necessarily too simplistic. By reducing the results to an uni-dimensional quantitative measure it does not, on its own, do justice to the multi-factorial and largely qualitative nature of the analysis used to construct such a chart. For a more representative and qualified analysis of the GM controversy in these five countries, the reader is referred to more detailed analyses published by PABE researchers elsewhere. A brief summary, with further references, is given below, in section 5.2.

Figure 1 does however serve to underline the diversity in the intensity of the GM controversy between these five countries in 1996, when the PABE project was elaborated. It also illustrates how the evolution of the controversy has varied between the five countries during the period of this research. Two points are worth emphasising:

(i) Between 1997 and 2000, and in contrast to earlier phases in the European GM debate, the level of intensity of the controversy was highest in France and the UK, and was relatively low in Germany. This had an impact on the anticipated results from the PABE study, since France had been chosen, among other reasons, as an interesting example of a country where, despite relatively high levels of activity in GM research and regulation, there was no public controversy. The study was therefore designed, in part, to explain this lack of controversy, but as it happened it became necessary to explain the sudden emergence of a controversy. Conversely, Germany had been chosen as the EU country with the most intense GM public debate, but this was not the case during the period of the study.

(ii) Spain and Italy had been chosen, in part, as examples of countries with no public controversy on GMOs but where, in contrast to France, GM-related research and regulatory activities were relatively insignificant. As described below, the debate evolved very differently in these two countries: in Spain, the intensity of the public debate has remained relatively low, whereas in Italy the controversy evolved remarkably, especially in 1999 and 2000.

Box 4: The arena framework for analysis of socio-technical controversies

The framework used to construct Figure 1 was elaborated in the context of another EC-funded project in which some PABE researchers participated (Assessing Debate and Participatory Technology Assessment, ADAPTA). The ADAPTA researchers observed that (as discussed in section 2) public controversies cannot be reduced to or defined solely by results of opinion polls or intensity of media coverage. They therefore attempted to answer questions such as "What defines the existence of a public debate?" and "How could one characterise the intensity of such debates?". A proposed framework arouse out of this research, founded on the hypothesis that public debates occur in specialised "arenas", for example: economic, scientific, regulatory, legal, political, and media. This framework is summarised below, and in Figure 2 (for further details see Joly and Assouline, 2001, and Joly et al., 2000 and 2001).

When an issue is not discussed in any such arena, there is clearly no public debate. 'Low level debates' remain confined within one or two such arenas, for instance, the scientific and the legal ones. In this situation (**situation B in Figure 2**), the issue is dealt with through the established norms and procedures of those specialised arenas, and within the frames of reference, or "symbolic referential" shared by the limited number of specialised actors who occupy those arenas and interact within tight stabilised networks. Moreover, negotiation of potential conflicts remains within the confines of individual arenas: there are few interactions between the arenas.

It is only when a debate develops in *more numerous* arenas, and when there is an increasing number of interactions *between* arenas that one can begin to speak of a "public controversy". An even more important factor is the intrusion of actors who begin to appear and to be influential in arenas in which they were not usually resident, because this can sometimes destabilise the established norms, procedures and frames of reference of specialised arenas, as well as the existing networks of actors. Moreover, as the debate further intensifies, new or unusual types of public expression may arise which do not fall neatly within the space and rules of any one arena, such as: direct action (e.g. destruction of GM fields, and the ensuing highly publicised court trials of activists), massive public demonstrations, lobbies of school canteens, monitoring of the food industry (e.g., publication of the "black list" by Greenpeace). **This is illustrated by situation D in Figure 2**.

This analytical framework therefore focuses on: the number of arenas concerned, the number and nature of interactions between specialised arenas, the intrusion of new actor within specialised arenas and the possible influence this has on the norms and procedures of those arenas; and the appearance of types of public responses which do not fit cleanly into any specialised arena, thus demonstrating the overflow of the public controversy into the broader public sphere.

This characterisation of public debates in terms of arenas can be used to illustrate the intensity of the controversy, and this is what is portrayed in Figure 1. We emphasise, however, that this should not be taken as a strictly quantitative assessment of the situation, and that the graphs in Figure 1 have to be read together with the qualitative narratives in section 5.2. In Figure 1, **"0" indicates** no debate on the issue at all, in any arena. **"1 to 2" (situation B in Figure 2) indicates** a debate which is mainly confined within a small number of specialised arenas: the debate involves only a few professionals who handle the problems raised according to the established rules of each specific arena. It hardly enters the media and remains unnoticed by the general public. **"3 to 4" indicates** a debate which involves a greater number of arenas, greater interaction between the different arenas, and a debate which *overflows* from specific arenas. This is reflected in greater media interest and changes in opinion polls, but the debate still involves mostly official stakeholder representatives: it is stimulated by NGOs and other forms of organised social movements. **"5" (situation D in Figure 2) indicates** that the fundamental characteristics of most of the arenas, including the type of actors present and the frames of reference used within each of them, have been significantly influenced by the dynamics of the public debate. Media coverage is high and the non-organised mass public becomes actively enrolled: everybody has heard about the issue and has something to say about it.

Figure 1. Evolution of national GM controversies

For the key to the scale used, see Box 4.

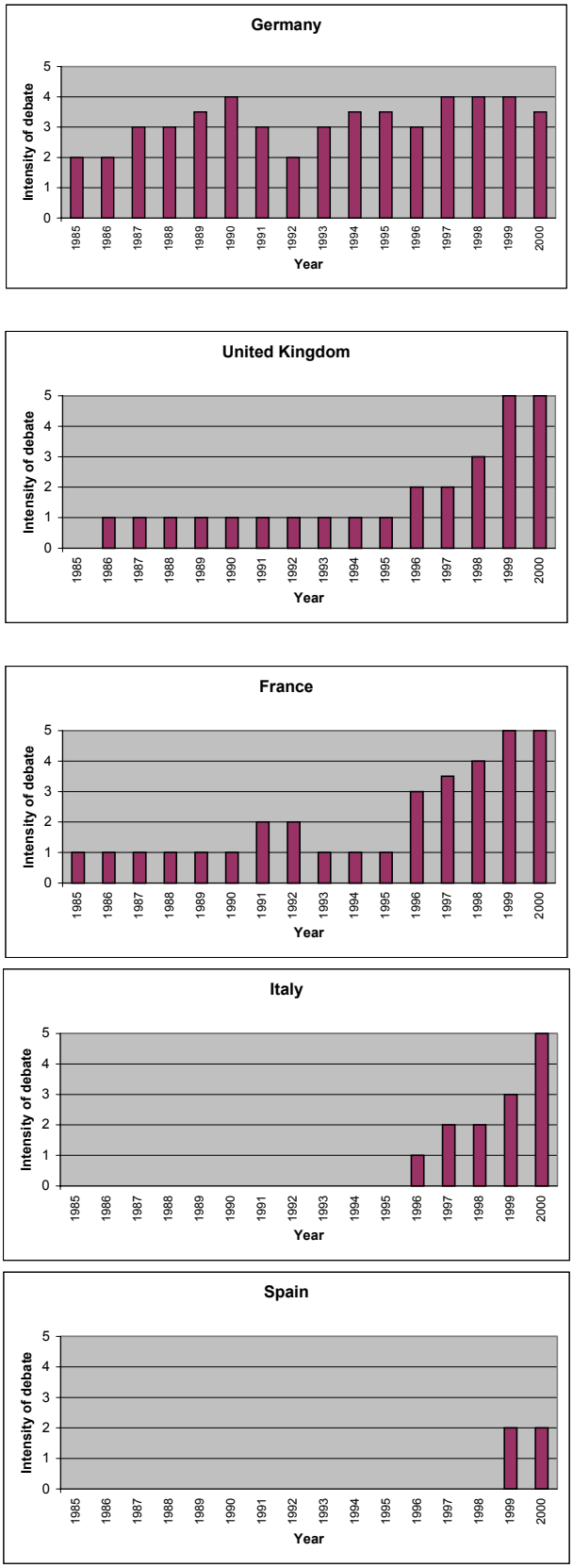
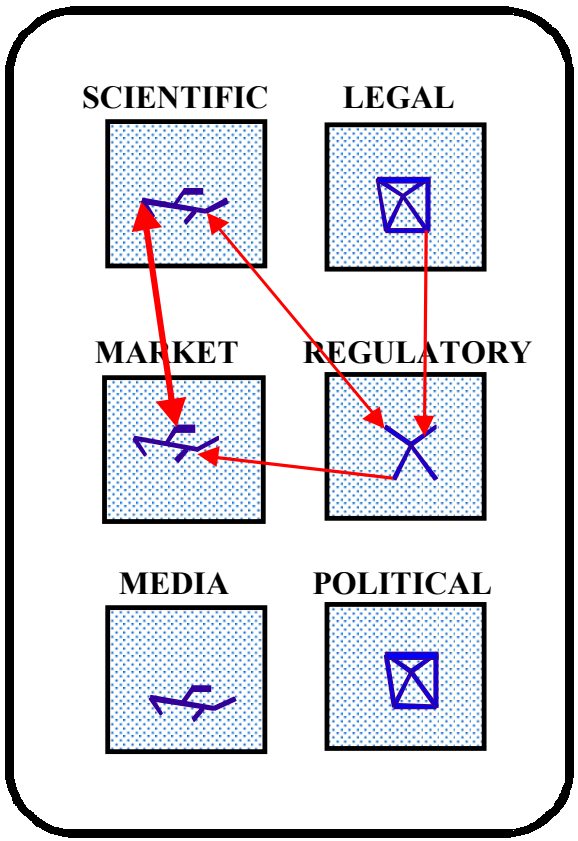
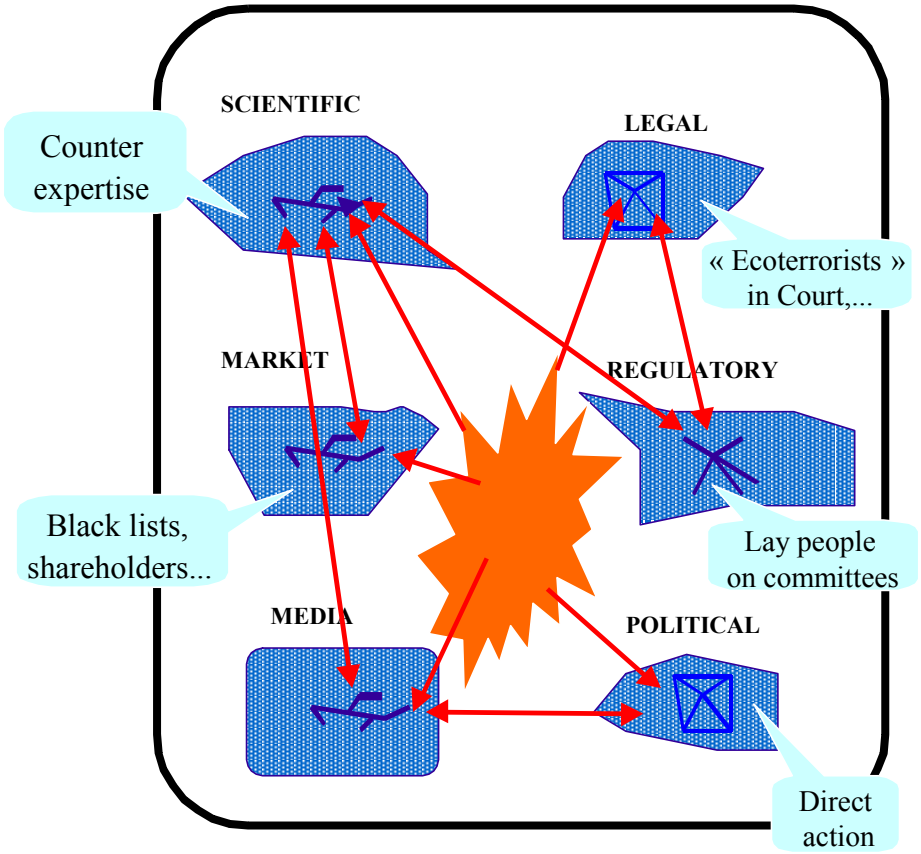


Figure 2. The arena framework for analysis of public controversies

Source: Joly and Assouline (2001, page 29)



« B »



« D »

Table 4. Key events at EU level

March 1996	(First) BSE crisis, following announcement by UK Minister of Health about the possible transfer of the disease from cows to humans.
3 April 1996	EC authorises the importation of a GM crop (Monsanto's GM Round-up Ready soya). This is was first effective authorisation for commercialisation of a GM product in the EU. (Decision 96/281/EC)
February 1997	Birth of Dolly the cloned sheep, accompanied by extensive media coverage.
November 1996	First imports of GM soya from the United Sates into the European Union, accompanied by the launch of a European-wide anti-GMO campaign by Greenpeace.
18 December 1996	European Commission announces decision to authorise the commercialisation of pest-resistant GM maize Bt176, despite the fact that at Council of Ministers' meeting of 26 June 1996, France had been the only Member State prepared to vote in favour of this authorisation (decision formalised on 23/01/97, Decision 97/98/EC)[10].
27 January 1997	Adoption of "Novel foods Regulation" 258/97 (enters into force in May 1997), which establishes labelling requirements for novel GM foods and ingredients, including GM. Modified by Regulation 50/2000 on 10 January 2000.
Feb.-March 1997	Governments of Austria, Luxembourg and Italy invoke the "safeguard clause" of Directive 90/220 (Article 16) to ban the commercialisation of Bt176 maize in their territories. French government decides not to authorise the cultivation of GM hybrids derived from Bt176 in France. The Italian government revokes the ban rapidly, but the bans in Austria and Luxembourg hold to this day.
18 June 1997	Adoption of Directive 97/35 which modifies Directive 90/220 and introduces obligatory labelling of some GM products.
19 September 1997	Adoption of Commission Regulation 97/1813, which provides for the labelling of products issued from GM soya and maize which had been authorised prior to adoption of the Novel Food Regulation (enters into force on 01/11/97). Repealed and replaced on 2 May 1998 by Regulation 1139/98, then modified by Regulation 49/2000 on 10 January 2000.
27 November 1997	(New) French government announces decision to authorise the cultivation of Bt176 maize hybrids in France (formalised on 05/02/97), and to organise a public debate on GMOs.
6 July 1998	Adoption of directive 98/44 on the legal protection of biotechnological inventions. Appeal against this Directive by the government of the Netherlands (supported by Italy and Norway), rejected by the European Court of Justice in October 2001 (aff. C-377/98).
25 September 1998	Following an appeal launched by Environmental NGOs (Ecoropa and Greenpeace) French Supreme Court (*Conseil d'Etat*) rules against the government and suspends the authorisation for cultivation of Bt176 maize. In December the case in referred to the European Court of Justice which rules, in March 2000 in favour of the French government.
25 June 1999	De facto European moratorium: at the European Council of Ministers, representatives from France Italy, Greece, Denmark and Luxembourg sign a declaration to suspend new authorisations for the commercialisation of GMOs. (In fact, no new authorisations had been issued since April 1998.) None have been issued since.
Nov-Dec. 1999	WTO conference at Seattle and associated demonstrations by anti-globalisation activists.
January 2000	Adoption of Cartagena Protocol on Biosafety to the Convention on Biological Diversity
28 February-1 March 2000	OECD Edinburg Conference on the Scientific and Health Aspects of Genetically Modified Foods.
12 March 2001	Adoption of revised Directive 90/220 on the deliberate release into the environment of GMOs, which became Directive 2001/18. Negotiations for the revision of this Directive had been ongoing since 1996, and intensified in 1999-2000.
2001	Ongoing discussion and negotiations regarding revisions to EU regulations on labelling and traceability of GM foods.

[10] For a discussion of the events surrounding Bt176 GM maize, see Marris (2000).

5.2 Outline of the GM controversy in each of the five countries studied

The evolution of the GM controversy in each of the 5 countries studied in summarised below. Table 4 outlines some key events which affected all EU Member States.

The UK context

When the PABE project was first conceived at the end of 1996 a public debate about GM food was hardly evident (situation B). A GM product, tomato paste, made from Zeneca's GM tomato, was on sale (clearly labelled) in two major British supermarkets and this was selling well. The public was unaware that GM soya was being imported from the US mixed with conventional soya, despite action taken by Greenpeace to block shipments. Any debate which was happening was confined to key interest groups such as food supermarkets, nature conservation agencies like English Nature and specialised NGOs (e.g. Greenpeace, FoE, Genetics Forum, GeneWatch UK, and GenetiX Snowball). In October 1998, when the pilot focus groups were being conducted, there was still little evidence of widespread public debate, although English Nature had been concerned about environmental factors and had been requesting a moratorium on field trials since July 1998.

In August of 1998 research scientist Arpad Pusztaï took part in a national television documentary stating that animal tests on a GM vegetable had shown potentially harmful health effects. (This is an example of an actor appearing out of his usual specialised arena). The media then began to take a keen interest, although in January 1999 the first full round of focus groups was held in an atmosphere of relative calm.

In February 1999 a carefully staged campaigning event, orchestrated by Greenpeace involving a joint statement by a group of international scientists deploring Pusztaï's treatment, revived media interest in the issue and lead to questions being asked in Parliament. (This is an example of the way in which a controversy overflows outside confined arenas, involves new alliances between actors usually confined to their own specialised arena, and leads to issues being dealt with in new arenas). Thereafter the media campaign intensified and the topic of GM food was never out of the UK media spotlight for several months. Also during that time a whole variety of new coalitions were formed, both for and against the introduction of GM products: for instance the Five Year Freeze campaign brought together an unlikely alliance of actors (from radical environmental NGOs to the very traditional Townswomen's Guild).

Thus when the second phase of focus groups were conducted (September-November 1999) the controversy could be characterised by situation D in Figure 2. Media coverage had been very high for several months and everybody had heard about the issue and had something to say about it. (This provided a non-intentional opportunity to explore the potential impact of media coverage and public controversy on public perceptions, by comparing results obtained from Phase II focus groups with those obtained in the previous groups.). Moreover, established norms and procedures for dealing with conflict were destabilised. For example, with respect to risk assessment, the House of Commons Select Committee on Environmental Audit responded (in May 1999) by recommending a more "strategic" approach to risk based assessment of this new technology. And in July 1999 the Government announced its intention to establish two new biotechnology commissions - one of which (Agriculture and Environment Biotechnology Commission, AEBC) would specifically oversee agricultural biotechnology and integrate existing committee structures in this area.

As the UK public debate intensified a further remarkable intervention came from a member of the Royal Family. On the 1st June 1999 the Prince of Wales wrote an article in a popular daily newspaper listing his fears about GM food as ten questions for debate. One of the questions was: "What sort of world do we want to live in?". At the time Prince Charles had already set up a discussion group on the question of GM food on his personal web site, and had received some 10,000 replies.

By the second week in July 1999 evidence of the extent to which consumer concerns were being taken up by supermarkets was apparent. In response to a massive number of calls to customer carelines three

major British supermarkets had first of all removed their 'own label' products, and then withdrawn all products containing GM ingredients from their shelves. Most major British food outlets followed suit.

During 1999, against this background of heated public debate and commercial reaction, Prime Minister Tony Blair's position was seen by many to be at odds with public opinion in so far as he continued to support field trials and accuse the media of whipping up hysteria. However, in February 2000 this chronology of public debate was punctuated by an event in Edinburgh, an international conference held by the OECD to debate GM food safety, and in reference to which Blair was finally forced to admit publicly that there were legitimate grounds for public concern.

For further details see: PABE National Reports; Weldon and Wynne (2001); Simmons and Weldon (2000).

The Italian Context

Up to 1996 and in the period between June 1998 and May 1999, when the pilot and Phase I focus groups were conducted, public debate about the issue of GM food was virtually non-existent in Italy (situation B). There was very little media coverage, except for reports of high profile NGO activities (such as Greenpeace actions against Monsanto). Nonetheless, pressure from commercial interests and scientists was beginning to build against government restrictions on licensing, but this was largely confined to specialised arenas. In February 1997 the Italian government invoked the "safeguard clause" (Article 16) of Directive 90/220 in order to ban the commercialisation of GM pest-resistant maize Bt176 in Italy, but revoked this ban rapidly.

By the latter part of 1999, when the Phase II focus groups were conducted, the public debate was beginning to become more polarised, and to overflow from the specialised arenas. New coalitions were being constructed, for example between producers (mainly farmers' unions) and NGOs (environmental and consumer) opposed to the introduction of GMOs into the environment. But the situation could not (yet) be characterised by situation D of Figure 2: this occurred during the year 2000, after the last focus groups had been conducted.

A key feature of the early part of 2000 was the independent actions by regional governments, some banning cultivation on their territory (e.g. regione Lazio) and others introducing controls on local production to declare the presence/absence of GM crops (e.g. regione Friuli-Venezia Guilia). (An example of the intrusion of actors not involved up until then in the regulation of GMOs). At the end of May a conference-exhibition on the topic of biotechnology, held in Genoa, was re-named "the Italian Seattle" when it was disrupted by anti-GM demonstrations led by NGOs and other members of the public (An example of public responses outside the confines of specialised arenas). This event was widely reported by the media. By the summer of 2000 the whole situation had changed and GMOs had become an everyday topic of conversation (situation D).

Government positions at this stage were strongly asserted, but differentiated: the Ministry of Agriculture being strongly opposed to 'green' applications, whereas the Ministry of Health less so in respect of the possible negative repercussions on medical research and applications. As the debate continued throughout the summer of 2000 many stakeholder positions were shifting, in particular those who represented food producers, retailers and consumer organisations. Concerned scientists were now more visible in media debates. Consumer perceptions, with regard to the importance of Italian food quality, was a key theme in defence of maintaining traditions and high standards. Food safety issues were less evident.

For further details, see: PABE National Reports; De Marchi and Pellizzoni (2001).

The French context[11]

Until 1996 French public policy on the use of genetically modified organisms (GMOs) in agriculture and food was broadly supportive, and there was essentially no public controversy in France on this topic. Any potential conflicts were dealt with using established norms and procedures, and were confined of specialised arenas (situation B). But in the winter of 1996-1997, seemingly out of nowhere, anti-GMO NGO activities intensified (and/or became more visible) and the media began to take interest. This was sparked off by the arrival of the first imports of transgenic soya and maize from the USA. These were brought onto the public agenda through Greenpeace actions, which utilised the message "Why are consumers not being given a choice about whether or not to consume these GM products?". Associations with BSE were established, especially in the media (the national daily *Libération* published a front-page article with the headline "Beware of mad soya!" on 1st November 1996). The debate was further inflamed by a series of contradictory governmental decisions with respect to the commercialisation of a specific transgenic maize (pest-resistant Bt176) developed Novartis.

In 1998, government policy began to change in order to introduce a more precautionary approach to the assessment and management of environmental and health risks, and more transparent and participative decision-making procedures. A consensus conference was held in June 1998 and this stimulated further media coverage. Thus, when the pilot focus groups were conducted in September-October 1998, the GM controversy was already well developed, but could not quite (yet) be characterised as situation D.

Despite these governmental initiatives, the controversy did not abate and by the end of 1998 public policy on GMOs was in disarray. In June 1999, demonstrating a complete reversal of its 1996 position, the French government called for (and in effect obtained) a moratorium at the level of the EU on any further authorisations for the commercialisation of GMOs. Thus, whereas France was, in June 1996, one of the EU Member States with the most supportive policy toward the introduction of GM crops and food onto the market, by June 1999 the situation was entirely reversed and France was one of the most obstructive EU Member States. Moreover, the norms and frames of reference of specialised regulatory and legal arenas had been radically transformed.

In the period 1999-2000, specialised arenas were further destabilised and the debate could be characterised by situation D. The "standard approach" for risk assessment was criticised by key actors within the regulatory system (Chevassus, 2000). Conflicts between natural scientist from different disciplines, which had been confined to expert scientific and regulatory arenas, were brought out in the open. Lay people and dissident scientists were encouraged to participate more actively in risk assessment committees. NGOs (and not solely or even mostly consumer NGOs) pressurised food distributors and manufacturers to offer "GM-free" alternatives to their consumers (Greenpeace "blacklist"). Legal authorities were implicated in challenging decisions about governmental regulatory decisions (appeal to the *Conseil d'Etat* with respect to the authorisation to commercialise Bt176). Farmers chose not to grow GM maize crops even when they were authorised. Activists (including farmers and environmentalists - the most (in)famous being José Bové) destroyed GM field tests, and were arrested and charged. This has led to a series of court trials and appeals (still ongoing) which have intentionally been used by the defendants to create a new space for public controversy. The participation of natural scientist witnesses on both sides has further fuelled and rendered visible controversies between researchers from different disciplines and with different points of view. Furthermore, the fact that most of the GM fields destroyed were conducted by public sector scientists, and were officially designed for risk assessment, has compromised claims of public sector research institutions to work for the public interest. This has in turn stimulated internal debates and public responses by these institutions, most notably the National Institute for Agronomic Research, INRA.

[11] The PABE analysis of the French GM controversy was enriched by a separate project funded by the French Ministry of Agriculture in which Claire Marris participated (Joly et al., 2000), and by close collaboration with members of the ADAPTA team.

The Phase I focus groups (January 1999), and even more so the Phase II focus groups (September-October 1999) were therefore conducted in a context of heightened public controversy, including intensive media coverage.

The French case provides a good example of the non-direct and non-obvious relationship between public opinion and public controversy. Our analysis suggests that the GM controversy in France was at first sparked off and fuelled, in large part, by a succession of measures taken by state authorities which were perceived to be incoherent and even contradictory by stakeholders (including biotechnology companies and farmers' unions) and ordinary citizens. These decisions cannot be directly attributed to evolutions in the intensity of NGO activity and even less to changes in the number or vehemence of negative responses in opinion polls. But they then facilitated the actions of anti-GMO social movements and forced key actors in the agri-food industries to pre-empt the government by establishing their own cautious line with regard to GM food products. Thus, public policies were, at least in the first instance (1996-1997), one of the main prompts for the public disquiet, rather than the other way around.

For further details see: PABE National Reports; Joly et al. (2000); Marris (2000).

The German context[12]

In Germany the public debate about biotechnology began early. Media coverage, which to a great extent ran parallel to the public and political debate, could be seen as following three stages. During the first phase, from about 1973 - 1984 biotechnologies were referred to in optimistic and hopeful terms as being a positive outcome of scientific progress.

The second phase (1985 - 1991) was marked by political controversy when the Green Party stepped up a public campaign to oppose some developments in biotechnology. The Green Party had been elected to the German Parliament for the first time in 1983. Subsequent political and public pressure led to the setting up of a Commission to investigate "Chances and Risks of Gene Technology" and finally led to the German Gene-Law in 1990. The intense political activity surrounding these events had the effect of increasing media coverage and raising the level of public debate about biotechnology to an extent unprecedented in Europe at that time (situation D).

A third phase in the debate, from 1991 to 1996 was characterised by an attenuation of public and media interest towards a more considered and complex discussion of risks and benefits of the various aspects of gene technology. Due to German re-unification, economic problems became more important in the early 1990s. As a consequence, an opportunity to make German regulation less restrictive was used. By 1996, when the first shipments of genetically modified soy beans reached Germany, an international debate led by Greenpeace had begun to heat up. But to some extent there was less hype in Germany than for instance in the UK and France, since the German media and the public had already been debating these issues for ten years.

After 1996 the ensuing debate was more international in character and led mainly by Greenpeace. Reports on the refusal of various supermarket chains in other European countries to sell GM food served as a trigger for German supermarket chains to change their policy and to reject GM produce officially. By 1998 consumer associations were also demanding GM free products from producers. This NGO pressure to prevent GM products entering the market stepped up over the next two years to the extent that, in the summer of 2000, Greenpeace was able to run a campaign against McDonalds for selling chickens which had been fed GM soya beans.

However, compared with the situation in other European countries during the period covered by the PABE research, the level of public debate was remarkably stable and could be described as relaxed (or perhaps resigned) scepticism among stakeholders.

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[12] The analysis of the German GM controversy was enriched by participation of the Center for Technology Assessment in Baden Württemberg in the European Community Concerted Action "Biotechnology and the European Public" and "Life Science in the European Society" (Durant et al., 1998; Gaskell and Bauer, 2001).

For further details see: PABE National Reports; Hampel et al., 1998, 2000 and 2001.

The Spanish context

Public debate on agricultural GMOs has not been as intense in Spain as in other European countries. Statements about GMOs from politicians and public decision-makers have been very scarce (almost non-existent) and the media has traditionally paid little attention to the issue. Media coverage of issues related to genetics or biotechnology have largely been restricted to specific science sections of newspapers, and the debate has focused mainly on human genetics, and above all on reproductive techniques. For example, the developments in EU legislation throughout 1996-1998 (see Table 4), had been almost completely ignored by the media, NGOs, and ordinary citizens. Thus one could say that, at least until 1999, the controversy in Spain had not even arrived at situation B in Figure 2 - and is thus best represented as '0' in Figure 1.

This situation changed in February 1999 when the magazine *The Ecologist* published in Spanish an issue devoted to the so-called "Monsanto Files". After that, there was an increase in media coverage of GM-related news, covering for example: British government statements on transgenic food products and British debates about the potential harmful impacts of UK farm-scale field trials; and the court trials of US farmers' against Monsanto, with fines imposed by this company on farmers convicted of re-using GM seeds. Curiously enough media coverage referred only to international affairs, while the activities of Monsanto or Novartis in Spain were not much commented; nor the authorised commercial cultivation of GM maize, which began on a relatively large scale in 1997. Thus, the controversy has been portrayed as something in the area of international affairs and not much related to day to day life in Spain.

1999, then, was a turning point in the GM controversy in Spain, especially when compared to the previous period, where discussions were limited to specialised actors. The debate could therefore be portrayed, between 1999 and 2000, as situation B, but has not, to date, ever reached the stage where it could be described as situation D.

The controversy did not, however, continue to intensify. On the contrary, media interest in GMOs seems to have weakened during the rest of 1999. For instance, the International Protocol on Biosafety, which was adopted in January 2001 in Cartagena (Colombia) was covered, although the Spanish government did not make any statement and only critical voices had some presence in the press. Neither was much attention paid to the UE Directive on Patents on biotechnological inventions, which was adopted in July 1998 and came into force in Spain in September 1999.

Despite the fact that media interest in GM-food seems to have dropped again, transgenic foods are often mentioned in the media when talking about the recent food scandals that have occurred in Europe: dioxins and chicken, BSE, clembuterol, etc. Thus, GM-food is often associated, by journalists, with illegal adulterations, under the general question "Is safe the food we eat?". In this way, GMOs tend to be portrayed as something dangerous for consumers' health.

This increasing concern regarding food safety has been accompanied by the appearance of scientists in the media, alongside the NGO actors whose views were traditionally covered. The most common statements by scientists found in the media affirm that GMO do not involve any risk for human health, but also support the labelling of GM-food in order to provide information to consumers. In this way, lack of reliable information on GMOs is identified as the key problem by both supporters and detractors of agricultural biotechnology. But there is no consensus about who should be producing and delivering this information in order for it to be seen as reliable by all concerned.

For further details, see: PABE National Reports; Cáceres et al. (2001); Lemkow and Cáceres (2000); Sentmartí et al. (2000).

6. Public perceptions of GMOs: focus group results

6.1 Overwhelming similarity of results between all the groups

The overall aims of the research, as stated in section 2.1, were to explore, describe and compare the influence of the underlying factors shaping public views of agricultural biotechnologies and related food-products within and across the five different European Member States, before going on to evaluate their implications for policy. As mentioned in section 4.3, focus groups results from each country were first analysed independently by PABE partners, before being discussed collectively by the whole PABE team and compared with results obtained in other countries. The project culminated with an assessment of the similarities and differences between the results obtained in each country.

Contrary to our expectations, the overwhelming finding to emerge from this comparison was one of considerable similarity, despite the differences in the intensity and nature of the public controversy in each of the participating countries described in section 5. There were national differences in the emphasis placed on particular views, and in the examples mobilised to support those views; **but underlying those differences, we found a broad similarity in the repertoire of arguments mobilised by focus group participants in all five countries**. In this section, we therefore present the key findings from the focus groups which were relevant to the groups conducted in all five countries. In section 7, we attempt to account for this surprising similarity of results, and outline the few differences that were observed.

We also found very little difference in the results obtained from each of the focus groups conducted *within* the same country, despite our efforts (described in section 4.4) to recruit groups that would be as diverse as possible. We found differences in the kind of language used by focus group participants from, for example, different socio-economic status; but the underlying factors shaping public views were surprisingly similar. Minor between-group differences observed are mentioned below, and further developed in National Reports. But overall, and unless otherwise mentioned, the results presented below apply equally to all of the groups conducted, in all five countries.

We emphasise that this similarity of findings, both within and between countries, was a result that was *unexpected*. We therefore considered whether the similarity in national results could be due to methodological problems. As mentioned in section 4.3, although the preliminary analysis of focus groups results was conducted independently by PABE partners, this analysis was performed according to an analytical framework designed in advance and collectively by the whole PABE team. Moreover, the PABE researchers all shared the research framings described in section 2. Thus, the similarity of the analyses conducted by each national partner could be an artefact of this shared protocol and framing. This possibility was given serious consideration by the project team before being rejected (see below), but can only be more fully resolved by subsequent inter-research group comparison of findings, and by extended peer-review (see section 2.10). As discussed in section 2, such methodological issues confront all research, whether the methods used are qualitative or quantitative in nature. The existence of such issues does not therefore undermine the value of a piece of research. The important point is that the issues are recognised and addressed.

PABE researchers felt that the nature of the focus group method mitigated, to some extent, the potential effects of the common protocol (see section 2.8). Despite the use of a common protocol and analytical framework, the relatively non-directive style of facilitation used in the focus groups gave participants considerable freedom to introduce unanticipated topics or arguments. (Indeed, the similarity of results was in itself a surprising result). The relatively open-ended and bottom up nature of the focus group method helps to ensure that any potential convergence effects produced by the use of a standardised protocol are to some extent off-set by the flexibility and openness of the focus group as a context for the expression of views.

Despite such qualified reassurances, PABE researchers decided to modify the design of the discussion protocol and the recruitment criteria for the Phase II focus groups in order to explore in greater depth

areas where potential differences had been expected, and/or were hinted at in the Pilot and Phase I results. In particular:

(i) The protocol aimed to allow more in-depth discussion of views of nature and the environment; and of public participation in decision-making.

(ii) Participants with very different attitudes towards food shopping and consumption were recruited for Group n°9.

Despite these modifications and further explorations of potential differences, the results obtained from the Phase II focus groups further confirmed the overwhelming similarity of results between the five countries, and between the participants in each of the groups.

PABE researchers spent much time discussing this surprising similarity and attempting to account for it. This finding seems to suggest a globalisation or, more specifically in the context of the research, a Europeanisation of public discourse, and presents us with the problem of accounting for this convergence[13]. We attempt to do this in section 7.

In this section, we describe the findings which were common to all focus groups, in all five countries. In the National Reports, the focus group results were presented according to the two sets of themes described in section 4.3. In this report, a combination of both sets of themes is used to structure the presentation of the focus group results in order to avoid unnecessary overlap and repetition. Some repetition is however unavoidable because of the interconnection between the different themes. A few new themes have also been included in order to portray some more general findings, in response to questions and remarks from stakeholders when we presented the preliminary findings in the PABE workshops (and other arenas). In addition, the way in which the results are presented here has been designed to facilitate comparison with the stakeholder views about the public described in section 8.

6.2 Ambivalence

Overall, focus group participants expressed a rather ambivalent attitude towards GMOs. A key finding was that participants expressed and elaborated arguments both for and against GMOs. It is important to emphasise that this did not mean that individual participants (or groups) could be divided into 'pro' and 'anti' GMO (contrary to stakeholder myth n°2, discussed in section 8.3). Rather, statements from an individual participant often included elements which both supported and criticised the development of GMOs. Moreover, the participants rarely expressed entrenched views on GMOs: they did not reject or accept GMOs out of hand, and discriminated between different GMOs; but, as we shall see below, this was not simply a distinction between medical and agricultural GMOs.

What we found was that participants expressed a number of questions which summarised their concerns (see Box 5). Throughout the discussion sessions, these remained as interrogations, rather than entrenched opinions: the participants did not necessarily converge upon definitive negative answers to these queries. However, it was precisely because they did not have satisfactory answers to these questions, that they tended to develop, as the discussion progressed, a more hostile general opinion towards agricultural biotechnologies.

Moreover, as can be seen in Box 5, these questions - and therefore these hostile opinions - did not focus so much on GMOs as a technological artefact, but rather on the institutional context in which GMOs have been developed, evaluated and promoted. As we shall see, focus group participants reacted to (and mostly against):

- The seemingly surreptitious way in which the first GM-food products were introduced on the market, in the form of ingredients derived from GM soya or maize present in a multitude of ordinary products used daily by most people, but unlabelled and/or difficult to identify (e.g. soya lecithin or protein).

[13] Our experience has indeed been, when we have presented PABE results to stakeholders, that our audience would find it easier to accept findings about *differences* between countries, than this finding of similarity.

- The introduction of GM-foods on the market without adequate labelling.
- Formal declarations about the safety of these products, which do not acknowledge potential unforeseen impacts.
- The gap between the promises of GM sponsors (e.g. feeding the Third World) and the first products put on the market (pest- and herbicide-resistant GM crops used essentially in rich countries).

It is important to emphasise that the fact that most of the concerns and questions expressed by the focus group participants related to *institutional processes* rather than GMOs as solely technological objects does *not* correspond to a distinction between 'science' and 'the use of science in society'. (As we shall see in section 8, this is a distinction often made by stakeholders). Thus, according to the focus group participants, important societal choices are also being made within the confines of scientific laboratories. As stated by one focus group participant:

"When they decided to create GMOs, what vision of the world did they have for later?"

Box 5: Key questions raised by the focus group participants

- Why do we need GMOs? What are the benefits?
- Who will benefit from their use?
- Who decided that they should be developed and how?
- Why were we not better informed about their use in our food, *before* their arrival on the market?
- Why are we not given an effective choice about whether or not to buy and consume these products?
- Do regulatory authorities have sufficient powers and resources to effectively counter-balance large companies who wish to develop these products?
- Can controls imposed by regulatory authorities be applied effectively?
- Have the risks been seriously assessed? By whom? How?
- Have potential long-term consequences been assessed? How?
- How have irreducible uncertainties and unavoidable domains of ignorance been taken into account in decision-making?
- What plans exist for remedial action if and when unforeseen harmful impacts occur?
- Who will be responsible in case of unforeseen harm? How will they be held to account?

6.3 Knowledge mobilised by focus group participants

Relative ignorance of recombinant DNA techniques

Understanding of the techniques used by scientists for the genetic modification of living organisms, although it varied between individuals and countries, was often rather limited[14]. In particular, participants tended to be unsure about the technical distinction between conventional breeding methods and recombinant DNA techniques. The level of knowledge about what is going on in terms of GM research, GM-regulations and existing applications already on the market was also rather low and confused. Indeed, some participants expressed the belief that GM food products have been present for many years in the shops (long before 1996) and that they had already been consuming them without being informed. A common example used in this context was 'tasteless tomatoes', which were assumed to already be genetically modified. (As we shall see below in section 6.13, 'tasteless tomatoes' are a very common reference used by focus group participants to describe or crystallise a whole range of evolutions in the agri-food sector).

All the above would, however, be best described as a *lack of knowledge*, rather than as firmly established false beliefs about genetics, because participants were *conscious* of their own technical ignorance, and readily admitted and reflected on it. Thus, in practically each discussion session, participants would at some stage say something along the following lines:

"By the way, I have a question which is maybe rather stupid, but what is the difference between GMOs and when someone makes a graft in their garden? And what is the difference with tomatoes which have been bred for years in order to be of the same size and colour? And what about when peaches where crossed with I forget which other fruit to produce nectarines?"

After discussing such questions, the group would generally admit, with humility, that they did not know the answers to such questions. In addition, participants often expressed the feeling that this ignorance was somehow imposed upon them by promoters of GMOs who did not take the trouble to explain the technology using means that would reach the lay public and in ways which they could understand.

But the most important point is perhaps that (contrary to stakeholder myth n°1 discussed in section 8.3) **the principal concerns expressed about GMOs (see Box 5) were not based on firmly entrenched erroneous beliefs about genetics**. These concerns were instead based on the participants' own empirical knowledge relating to the behaviour of insects, plants, and animals and human beings outside of the laboratory (see below).

Lay knowledge about human fallibility and the behaviour of institutions

In their attempts to answer the questions outlined in Box 5, focus group participants mobilised their knowledge about the past behaviour of institutions. This was empirical knowledge, derived from repeated occurrences in their own life experiences which they described at great length. Thus, focus group participants often linked GMOs to other affairs - most notably BSE. Other food-related scandals, such as the e-coli deaths in Scotland, Coca-Cola contamination, dioxins in animal feed and the use of pesticides, were often cited. Other examples related to agriculture were also used, such as the management of pesticides and fertilisers (e.g. in France: water pollution from pig farms in Brittany). But examples outside of the food sector were also mentioned, such as environmental pollution from motor vehicles, or nuclear technologies. Participants tended to refer to local experiences, therefore the specific examples mobilised varied from according to the country or region in which the focus group was conducted (see National Reports for details).

[14] Note that participants in group n°11, who all had post-school scientific training (but not in subjects related to GM technologies) did not display, overall, a more accurate technical knowledge of recombinant DNA techniques.

The key point for our analysis was that **the inferences drawn from these experiences were the same across all groups in all five countries**. Thus, one could say that the same lessons had been learned from the BSE affair and many other affairs, by all the focus group participants. These are outlined in Box 6.

It is important to point out that these affairs, including the BSE affair, were not portrayed by focus group participants as exceptional or surprising. Thus (contrary to stakeholder myth n°7 discussed in section 8.3), the way in which BSE has been handled was not considered to be aberrant. On the contrary, it was used in the group discussions as an *exemplary* case to describe the way in which institutions always behave with respect to risk issues. From their own personal experience of human fallibility and previous institutional failures, they felt that lack of rigour, corruption, fraud and lack of resources was nothing unusual within control authorities. Moreover, the focus group participants did not believe that decision-makers had learned from the BSE fiasco, in order to reform their ways. They therefore naturally considered that the same kinds of behaviour - and mistakes - could be expected with respect to GMOs.

Box 6: Lessons focus group participants had learnt from BSE and many other affairs

"It's just like BSE!"

- It is impossible to anticipate all harmful or beneficial impacts of a new product or technology, especially in the long term (irreducible uncertainty).
- This irreducible uncertainty is not admitted and is not taken into account by decision-makers: they just keep telling us that "it is safe".
- Preventative action is delayed even when risks become apparent: decision-makers only act when they no longer have any choice, usually when NGOs or the media expose a scandal.
- Even when regulations are established to reduce risks, they are not strictly adhered to due to: incompetence, fraud, lack of means, and the fact that they are often unrealistic with respect to the conditions of operators who have to implement them in real life.
- Decision-makers have to make difficult choices which have contrasting impacts on the different interest groups involved (different sectors of the economy, consumer health, protection of the environment…). This is normal, but the problem is that they do not explain to us how they make such decisions. We do not want to know only *what* decisions have been made, but also how and why these decisions have been taken? and what are the anticipated or possible consequences?
- Important decisions which influence our lives are made without us, above us, by unaccountable, alien institutions over which we have no control and which are not accountable to us (except via elections, which is inadequate).
- Given all the above points we suspect that economic interests tend to dominate over the protection of human health and the environment when risk decisions are made. We also suspect that the economic interests which predominate are those of the actors with the greatest financial resources (i.e. big firms rather than small firms, and economic sectors with the greatest impact on the national economy).
- New innovations in the food and agricultural sector all tend to encourage and be part of a more intensive and industrialised system.

Lay knowledge about non-human living organisms

The focus group participants also mobilised their lay knowledge about non-human living organisms to try to evaluate the potential consequences of widespread use of GMOs in food and agriculture. This knowledge was not derived from textbooks, or retrieved from school memories. It could perhaps be described as common sense, based on empirical experiences in their own life. For example:

(i) They displayed knowledge about the fact that living organisms are part of complex chains which make them inter-dependent. Thus, they expressed concern about what would occur if one particular organism (the GMO or its target in the case of pest-resistant crops) was removed from the chain, or if its function was modified. More specifically, with respect to the Bt-maize example which was provided by the facilitator, they asked questions such as: "*What will be the effect of Bt-maize on beneficial insects which also feed on maize? If the pest is killed, maybe other insects will also be killed?*"; "*What about other birds and such-like that feed on the pest which will be killed by the Bt-maize?*". It is important to stress that these arguments came up even in countries where these issues (e.g. the Monarch story) were not yet hotly debated in public arenas nor reported in the media. They were simply more fully constructed, with more specific examples when the public debate was more intense. For example in France, participants in the Pilot and Phase I groups used colloquial language and no specific examples (e.g. "*little beasts or insects that are part of the food chain*"), whereas in the Phase II groups some participants used more specific examples and sometimes referred to media coverage (e.g. Monarch butterflies). But the underlying frame of reasoning remained unchanged in all the focus groups.

(ii) They assumed that living organisms could not be confined to any particular geographic area, by pointing out, for example, plants produce pollen which is carried by the wind or by insects. This was not supported by textbook knowledge, but by expressions such as "*when I go on holiday to the countryside I see clouds of pollen rising from the fields*"; "*bees fly from one field to another*". Thus, they considered that GM-crops and their genes would not be retrievable once they were let out of the laboratory and into the fields.

(iii) They used many examples to support the idea that pests and pathogens have often in the past developed resistances to circumvent man-made technologies designed to eradicate them (antibiotics, pesticides, vaccines). With respect to Bt-maize, they therefore raised the question of "*How long will it be before the pest develops a resistance and the Bt-maize will be of no use?*". Again, we stress that this kind of question was raised even in countries, and at times, when this issue had not yet been put on the public agenda.

(iv) They raised questions related to human health that have also been considered important by scientists involved in safety evaluations, including some that are still subject to scientific controversy. With respect to the example (provided by the facilitator) of herbicide tolerant soya crops, they asked the question: "*Does that mean that when we eat the soya, we will be consuming the herbicide also? And will that be harmful for human health?*". With respect to Bt-maize, they asked: "*If the pest is killed, that means that the plant produces a toxic compound - will humans who consume the maize also be harmed?*".

(v) They were aware that crops with novel characteristics might lead to changes in production methods, which might in turn have either beneficial or harmful impacts. For example, with respect to herbicide-resistant soya, they asked "*Will that mean that more herbicide will be used?*". For Bt-maize, they tended to say: "*If it can reduce the amount of pesticide used, that would be great… but will it really? …And how long will it be before the pests become resistant?… and in that case maybe more pesticide will be needed?*".

(vi) They were aware that mutations and gene transfers had occurred without human intervention throughout evolution, but felt that these were on an entirely different time-scale, which allowed for opportunities for novel organisms to adapt to each other, and for natural mechanisms to operate to re-establish some kind of balance. (Some biologists similarly emphasise the important role of co-evolution between organisms).

(vii) More generally, they felt that no laboratory test could ever accurately predict real-life interactions between GMOs and real life ecosystems; and that animal experiments conducted over short periods could not accurately predict the human health effects of real life exposure. They also emphasised that different geographical locations have different characteristics (climate, soil-type, local farming methods…) and felt that this diversity could not be taken fully into account by laboratory testing, and yet might have important impacts (positive or negative) on the performance of GM crops.

The unease expressed by lay people about manipulations of the genome, and in particular with respect to the mixing of genes from organisms from different kingdoms (and thus further apart in evolutionary terms) tends to be seen, by many scientists and promoters of GMOs as proof of their ignorance of the relevant scientific facts (see section 8). The examples given above suggest, however, that these lay concerns could be seen as lay common sense, based on everyday knowledge of the complexity and interdependency of ecological systems, with the consequent belief that they cannot be disturbed with impunity. Indeed, some of the lay knowledge mobilised by the focus group participants raise questions - and definitions of harm - which were excluded from early assessments of the risks associated with the release of GMOs into the environment conducted by scientific experts, but which were later opened up for scrutiny in response to the GM controversy (e.g. non-target harm, impact of Glyphosate use on consumer health, "indirect effects" due to changes in production methods, tri-trophic effects…) (Levidow 1999 and 2000; Levidow et al., 1996 and 1997).

6.4 Perceptions of agricultural and medical applications

Focus group participants made important distinctions between different GMOs. Like other studies on public perceptions of GMOs (and consistent with stakeholder myth n°3, described in section 8.3), we found that perceptions were globally more positive for medical applications than for applications in the food and agriculture sectors. However, in contrast with previous analyses (and in contrast to stakeholder myth n°3), we found that this distinction was not solely, or even predominantly, based on perceptions of *personal* benefits. Thus, as described below, the issue of *need*, which was predominant in all of the focus groups, could not be reduced to a simple balance between perceived personal risks and benefits: many dimensions other than personal benefit were raised by the focus group participants when they compared medical and food GMOs. Moreover, as we shall see, the focus group participants also raised some concerns with respect to medical GM applications.

The comparison between agricultural and medical applications of GMOs was often raised spontaneously by participants in all the groups, but was also investigated in more depth by providing (relatively late on in the discussion sessions) some specific examples (see Annexes 3 and 4 for details). As far as possible, the examples were drawn from products already on the market, and from examples of GMO which already existed in laboratories and were described by stakeholders as "near-market" applications:

- Yeast used for bread making[15]
- Tomato used for the production of paste
- Herbicide-tolerant soya bean
- Pest-resistant maize
- Fish with faster growth rates
- Pigs with faster growth rates
- Tobacco plants which produce haemoglobin
- Sheep that produce a medicine in their milk
- Potatoes that absorb less oil during cooking
- Maize or soya with higher protein content
- Fruit and vegetables with more flavour
- Golden rice (higher vitamin A content)

[15] Only used in the pilot focus groups.

- Crops resistant to harsh climatic or soil conditions

The following themes emerged from the comparative discussions of these different applications of agricultural biotechnologies, and in particular with respect to the comparison of medical and food applications.

Societal need

The question of *need* for agricultural biotechnology was predominant in all of the groups. A specific and recurring point of comparison was between food and medical applications of biotechnology. The participants systematically made a contrast between the decision stakes involved when buying food as opposed to when taking a medicine or being subject to a medical therapy. Medicines were described as being used to cure a disease or even save a life, and often there was no alternative. In contrast, participants pointed to the quantity and variety of food products already available in their country, and to food surpluses in rich countries that could perhaps be used to alleviate hunger in poorer countries. They could therefore not see any pressing need for GM foods.

"It's true that if we were told that tomatoes were threatened with extinction, if there would be no more tomatoes if we did not modify them genetically, we would say 'well, OK, let's try it'. That's what I mean, as a caricature."

This question of need could not be reduced to a simple issue of perceived personal benefits. Thus (contrary to stakeholder myth n°3 and n°4, discussed in section 8.3), the focus group participants did not only wish to know how whether they would personally benefit. They were more concerned to ask whether or not some deserving party (e.g. a specific patient group, or poor people in developing countries - or even, as in the slightly sarcastic example above, the genetically modified crop itself) would benefit. Thus, the issue of need related to collective benefits to society in general, rather than their own individual benefit.

For pest-resistant crops, benefits to farmers and the environment were acknowledged as possible and desirable - but the participants remained sceptical about whether or not these had or would actually be realised. The extent to which this scepticism was expressed, and the detail of the arguments used, varied between the five countries and between the different phases of focus groups, according to the local intensity of the public GM controversy. When the controversy was more intense, participants were more forceful and used more fully constructed arguments, and examples drawn from the public debate. But it must be stressed that participants in *all* groups were sceptical about whether the promised reduction in pesticides would occur and be sustainable in real world conditions, even in countries and at times when the ongoing controversy surrounding this question had not yet been raised in public arenas. As mentioned above, the lay knowledge of focus group participants led them to assume that living organisms (pests and pathogens) could and usually would eventually develop resistances to any man-made strategy designed to get rid of them.

A similar scepticism was expressed about the potential contribution of GM-crop to alleviating third World poverty and hunger (see section 6.5).

Distribution and targeting of benefits and risks (equity issues)

When discussing the issue of benefits, focus group participants also systematically considered the *distribution* of risks and benefits. The benefits associated with the GM crops and food products already on the market were perceived to accrue essentially to the producers (mostly the biotech companies and food manufacturers), whereas it was felt that the risks would fall on the consumers and the environment.

Focus group participants made repeated references to the fact that the risks associated with medicines and therapies were, in general, "targeted", whereas the risks associated with food were much more

diffusely distributed. Thus, medicines were described as precisely targeted to the patient population which would benefit from their use. In contrast, the whole population was being exposed to GM-food ingredients, including vulnerable groups such as the very young, the old, and the sick or allergic, while the benefits accrued only to food manufacturers and biotech firms. In addition, medicines were portrayed as targeted in time and thus patients were only exposed to the risks for a relatively short period, during treatment for a particular disease. In contrast, participants repeatedly pointed out that: "*everybody has to eat, everyday of their life, several times a day*".

Information

Medicines and medical therapies were seen as typically being taken following the provision of extensive information, from doctors and safety notices or leaflets, in contrast to GM foods for which little or no information was provided to consumers. Furthermore, the information provided for medical applications was perceived to share a number of characteristics which were absent with respect to GM-foods:

- Direct provision of information from a trusted individual, via consultation with a doctor.
- Doctors and other information sources explain the pros and cons of the prescription.
- Information provided about the conditions for safe use of the product.
- The information is adapted to the particular individual, taking into account for example age, prior health condition, and other simultaneous medical treatments.
- The information explicitly admits the potential for harmful side effects, and the course of action to take in case these are realised (i.e. no blanket statements about the "lack of evidence of risk").
- The information acknowledges that despite all prior safety testing, domains of ignorance and uncertainty remain, since users are asked to report any unforeseen side effects to their doctor. (And this provides opportunity for monitoring and recall, see below)

Control and choice

Once patients have been provided with this information, participants felt that the patient could still make a choice about whether or not to subject themselves to the medicine or therapy. The participants were aware, of course, this choice is relative, depending on the decision stakes involved: in cases of life-or-death, the choice is seriously restricted. However, personal choice and control does still exist, and patients can refuse a treatment even if they know that the consequences will be very serious, including death. The patient also stays in control of his or her exposure to the risk, and can decide to stop the treatment at any point, especially if unexpected harmful effects occur.

Different perceived standards of testing and regulation

Perceptions of the role and operation of regulation in the medical and food sectors were very different. Safety testing and regulation was generally assumed to be more stringent and more effective in the medical than in the agricultural/food sector. Thus the food sector was associated with low standards of regulation, whereas the medical sector was associated with high standards of regulation. There was a persistent belief among focus group participants that biomedical products are subject to much more rigorous risk assessment and undergo several intermediate phases of clinical trials between laboratory tests and commercial licensing. In contrast, agri-food GM applications were perceived as having jumped in one step, and too rapidly, from the laboratory into widespread global use.

Post-market monitoring

Moreover, focus group participants emphasised that medicines were monitored even after being commercialised. There was a belief that doctors, pharmaceutical firms and regulators collect and analyse information at the national or international levels in order to identify potential problems. At a more personal level, medical treatment was closely monitored by a doctor. This was taken to indicate a welcome acknowledgement of the fact that, despite rigorous safety testing, remaining uncertainties remained. Thus potential harmful effects were acknowledged, and measures were taken to provide the means to act (e.g. by removing the product from the market) in case unexpected harmful effects were subsequently identified. Examples such as Thalidomide were given, to demonstrate that even after thorough safety testing, very serious unanticipated harmful effects could still occur. This was unfortunate, and all possible means to avoid it should be taken, but at least, with medical products these effects could be spotted relatively rapidly and action taken.

In contrast, focus group participants felt that potential harmful effects from GM-foods would be very difficult to identify, since the populations exposed where not identifiable by regulators. Neither would consumers be able to monitor potential health effects for themselves, since they did not know which foods contained GM-ingredients or not. This issue was therefore linked to the issue of access to information, labelling, and traceability.

The potential for unforeseen *beneficial* effects was also mentioned, with focus group participants giving examples of medicines which had been developed and tested for a particular condition, but were then found to be useful for the treatment of an entirely different disease. This was, however, also used to raise the fact that real life administration of medicines did not necessarily conform with rules and regulations, since medicines were routinely prescribed for the treatment of conditions which they had not been assessed and licensed for.

Different perceived motivations between the medical and food sectors

Linked to the issue of differential standards of control in the food and medical industries, was the operation of different incentives and constraints in the two market sectors. GM food was equated with low price/low quality and that of GM medical applications with high price/high quality, and this view exacerbated by the type of GM food products first introduced on the European market. This point was also linked to the perceived motivation of the two industries. The medical industry was often assumed to be responding to an existing human need, even if commercial profit and competition were also seen as very important; whereas the food sector was more often perceived to be creating demand for its products by manipulating consumers.

Specialised nature of expertise involved

Focus group participants were more willing to accept the perceived lack of transparency in the medical sector than in the agri-food. With respect to medical applications, this was more easily accepted due to the specialised nature of the expertise involved, the technical language that is used, the legitimate protection of proprietary rights, etc. In contrast, relevant and legitimate expertise for food and agriculture was considered to be more diffusely distributed and included many actors beyond scientific experts, such as farmers and consumers.

An ideal portrayal of medical applications[16]

Note that all the above represents an ideal portrayal of the dimensions of medical applications that would render them socially acceptable. This ideal type (summarised in Box 7) was mobilised by focus group participants in order to emphasise the contrast with their perception of GM-food applications. Thus, the focus group participants used this ideal description of medical products to empathise the fact that none of these desired conditions were applied to GM-foods.

This does not mean, however, that the focus group participants were unaware that these conditions are sometimes not realised for medical products either. The protocol used did not allow for the discussion to expand further upon the use of medical innovations, and this would need to be tested by further research, but it seems likely that members of the public are aware, for example, of the following:

a) Some medicines are taken by patients for long periods, and even in some cases for their whole life on a daily basis.

b) In some cases the information provide to patients by professionals was not adequate in that it did not acknowledge uncertainties or even beginnings of scientific proof of (as in the French case of HIV-contaminated blood).

c) Some medicines which turned out to have serious harmful effects were overly pushed by health professionals, given the relatively marginal expected benefit; for example the administration of human growth hormone derived from human cadavers to children of less-than-average height for their age which led to the death of hundreds of children from CJD.

d) Some patients (e.g. HIV-positive populations) have actively campaigned for the right to use medicines even before they had been rigorously tested for safety and efficacy.

Thus, although this was not tested in the PABE focus groups, our results suggest that medical applications which do not share the positive characteristics summarised in Box 7 would be perceived as posing problems similar to those described here for GM-foods. Thus, one can anticipate for example that medical applications (GM or not) that are not targeted to a specific population who derives the benefit, and/or for which exposure is not limited in time, would not necessarily be perceived as socially acceptable. Focus group sessions devoted solely to medical applications would need to be conducted in order to explore and confirm, or not, this suggestion. However, the public controversies (including court trials launched by patient groups) surrounding HIV-contaminated blood, human-growth treatment, and access to untested medicines by HIV-positive populations suggest that these are not, indeed, necessarily and consensually considered socially acceptable.

[16] This is a point (among many others) which was brought to our attention by stakeholders when we presented the preliminary results of the PABE study. We are grateful for this input, which demonstrates the value of extended-peer review.

Box 7: Positive characteristics of medicines according to focus group participants[17]

- Societal need
- Equitable distribution of risks and benefits (to the same population)
- Exposure to risks targeted in time, and to a specific restricted population
- Direct access to information, from a trusted person (doctor)
- Information adapted to circumstances of patient
- Safety information acknowledges potential harmful side effects
- Safety information acknowledged remaining uncertainty
- Personal control and choice about whether or not to take the medicine
- Rigorous, lengthy and progressive safety testing
- Post-market monitoring and possibility for recall (relative reversibility)
- Positive market constraints and incentives and industry motives
- High price, high quality market
- Specialised nature of the relevant expertise

Not-so-positive characteristics of (some) medical GM applications

Most previous analyses of public perceptions of GMOs (and stakeholder views about the public, see section 8) focus almost exclusively on the supposed distinction made by consumers with respect to the type of *application* of the final product. We found, however, that focus group participants also made important distinctions between GMOs *within* the same application sector. Thus, some proposed uses of GM technology for the production of medicines were not necessarily considered to be socially acceptable; and some agri-food applications were considered to be more socially acceptable than others. Additional characteristics used by focus group participants to discriminate between GMO products included:

- The type of characteristic introduced by genetic modification. For example, pest-resistance was considered to be a more socially valid objective than delayed fruit maturation or modifications in taste or vitamin content.
- The type of organism modified. There was little concern for micro-organisms, but more concern as one moves progressively to plants, animals, and humans.
- The source of the gene introduced. The participants were more concerned when the source organism and the receiving organism were from different kingdoms; and even more so when the source of the gene introduced into a plant or animal was human.
- The extent to which the final product already had a long history of use. For example, the use of GMOs for the production of insulin was considered to pose less problems than for the production of a novel medicines for cystic fibrosis (regardless of the type of organism genetically modified).

[17] As mentioned in the text, the characteristics listed in this box represent an 'ideal type' mobilised by the focus group participants in order to emphasise the contrast with GM-food products. Thus, all medical applications do not necessarily conform fully to all these characteristics - and thus all medical applications are not equally 'socially acceptable'.

- The extent to which the GMO would be used in confined environments, and could be isolated from the rest of the food chain. Note that focus group participants assumed, based on their previous experience, that a GM-crop or farm animal designed to produce a pharmaceutical would necessarily, one day, find its way into the human food chain, despite all regulations and official reassurances to the contrary. In contrast, the use of micro-organisms in confined environments (factories) was not seen to pose such problems.

On the basis of these concerns, the focus group participants tended to conclude that GM technologies should only be used in the medical sector in situations where the health condition to be cured was serious, and where there was no alternative. **They did not give an unqualified go-ahead to medical applications GMOs**.

The comparative discussion of different applications of GMOs, and the contrast made by focus group participants between medical and food applications therefore provided very valuable data for enriching our understanding of the underlying factors which shape public perceptions. The picture which emerges is more complex, and contingent, that that found in previous analyses which tend to suggest that, from the point of view of consumers "'red is good and green is bad" (e.g. Gaskell et al., 1997 and 1999). This has important policy implications, because current policy thinking is heavily influenced by this simplistic portrayal of public perceptions. We return to this in section 8.3 (discussion of stakeholder myth n°3).

Low awareness of the presence of GM medicines on the market

One final point is worth mentioning with respect to medical GMOs. The general belief, among stakeholders, that "medical GMOs are accepted by consumers" assumes that the general population is *aware* that a number of medicines derived from GM micro-organisms are already on the market and relatively widely used (insulin, human growth hormone, human and veterinary vaccines…). We found that this was not the case. Prior awareness of the existence of such products varied between participants from different groups and countries, but overall awareness of existing GM products was low, unless the participant had a personal reason to have such knowledge (e.g. being diabetic or having a close friend or parent who was diabetic). The only medical application of GM technologies which was often mentioned by focus group participants was gene therapy (which is not in routine use).

Cloning (in particular Dolly and human cloning) was also often mentioned, and was considered to be part of the same technological trajectory as GMOs. From the point of view of many scientists, cloning should be considered separately from GMOs since, strictly speaking, it does not necessarily involve genetic modification. The underlying factors identified by our research provide clues to why ordinary citizens might consider that GMOs and cloning present many similarities. As we shall see later we suggest that scientists (and other stakeholders) would do well to pay more attention to these the interconnections made by the public between different types of innovation, rather than systematically denying them by attributing to scientific ignorance.

6.5 Perceptions of GM crops for Third World agriculture

Many participants were aware of the argument that agricultural GMOs could perhaps improve living conditions in developing countries. The extent to which this argument was raised spontaneously varied from country to country. It was for example only raised once in the Italian focus groups. In any case, the argument was presented, with examples, by the facilitator (see Annexes 3 and 4 for details).

The reactions of focus group participants with respect to the potential use of GMOs for Third World agriculture in order to alleviate poverty and hunger were similar to that described above for pest-resistant crops. Thus, the objective was considered to be laudable, but scepticism was expressed about whether or not this objective would be realised, and (more so in some countries, notably the UK) whether this "technological fix" approach was the most appropriate.

Participants also tended to be very sceptical about to whether such research would ever be carried out, and the results applied in practice. Moreover, they frequently expressed the view that this was a

hypocritical message put forward by companies producing GMOs in order to try to manipulate their feelings. The participants often mentioned that if that was the main benefit associated with agricultural GMOs, why was Europe, with its over-production of food, being "flooded" with GMOs from the USA? They also believed that development of GM crops for Third World countries could be better achieved through public-funded research institutions; and yet believed that current on agricultural GMOs was dominated by private companies (see "perceptions of science" in section 6.7).

6.6 Perceptions of uncertainty about future consequences of GMOs

Uncertainty was a dominant theme which dominated the focus group discussions, and cut across most of the other themes. Indeed, rather than speaking of "public perceptions of risk", it may be more accurate to describe research of the kind presented here as an investigation into "public perceptions of uncertainty". Focus group participants assumed that short-term, acute impacts - i.e. known risks - could and would be taken care of by ordinary scientific assessments and regulatory processes. Most of the group discussions revolved around the assessment of longer-term and more chronic impacts - which were considered to be inherently uncertain.

Focus group participants took uncertainty for granted

The key finding here was that the focus group participants largely *took uncertainty about the long term consequences of GMOs for granted*. Thus, they expressed the following views:

- Nobody knows *and nobody can know* the full impacts of GMOs in the long term
- Unintended effects will necessarily occur (both harmful and beneficial)
- These will only become apparent later, when consequences "which had not been imagined" become apparent.
- The technology is "too young", "too recent": we do not have enough "backsight"[18]

It is important to stress that this situation was not seen as exceptional, and was *not* interpreted by focus group participants as a *failure* of scientific knowledge: it was described and accepted as a fact of life. These views were supported by numerous past experiences, such as BSE, asbestos, pesticides.

Public reaction to official denial of uncertainties - no demand for "zero risk"

One of the key connections between past experiences of institutional behaviour (e.g. in relation to BSE, asbestos, DDT…) was the belief that institutions responsible for the assessment and regulation of risks did not know, and could not know, the full impacts in advance. Thus, when discussing how the potential future consequences of GMOs might be assessed, the focus group participants raised many questions which demonstrated that they were aware of the inherent limitations of scientific knowledge for making valid forecasts about real life situations. As mentioned above (section 6.3), they considered that the interaction of GMOs with complex ecosystems - in many diverse geographical locations - could not be fully predicted from laboratory experiments. Participants criticised testing procedures for identifying adverse effects, even if carried out over a period of years, as being inadequately short-term compared to the much longer time scales of exposures, interactions, responses and effects which they felt to be relevant. The feeling which was frequently expressed was "how can they claim to know so much about the effects when they evidently know so little?". Focus group participants also used examples from past experience to demonstrate that regulators and innovators did not seem to incorporate into their decisions the means for monitoring the appearance of unforeseen impacts, or for rectifying the situation if and when such impacts occur.

[18] Translation of a common statement found in the French focus groups: "*nous n'avons pas assez de recul*".

The focus group participants therefore concluded from this past experience that uncertainties are not seriously taken into account in decision-making. From the point of view of these ordinary citizens, this *denial* of uncertainties was at the core of the problem - not the existence of uncertainty, which was taken for granted.

Thus (contrary to stakeholder myth n°8 described in section 8.3), the focus group participants did not demand or expect "zero risk". They were perfectly aware that their lives are full of risks that need to be counter-balanced against each other and against potential benefits, in the context of numerous other incommensurable competing constraints and motivations.

They therefore found expert statements asserting that there is "no evidence of risk" to be arrogant, lacking credibility, disconcerting and untrustworthy. This feeling was expressed throughout the discussion sessions, but became particularly apparent when the archetypal safety statement from a "government regulator" was provided as a prompt (see Annexes 3 and 4). The phrase "there is no scientific evidence [of harm]" was systematically picked out and criticised as inaccurate, or even dishonest and manipulative, because "no evidence of harm" is not the same as "evidence of no harm". The participants felt that official risk communication - and risk decisions - tend to use "no evidence of harm" as an unconditional validation for proceeding with the innovation, and did not find this convincing or trustworthy.

This public experience of expert institutions as *denying* uncertainty seemed to be a major cause of public scepticism towards regulatory bodies, not the inevitable expert inability – typically recognised by the focus group participants - to create zero risk or total certainty. Rather than zero risk, what people demanded was a more realistic and humble assessment of risks by regulatory authorities and GMO producers, which acknowledged uncertainty and real life conditions.

"Doubt is constructive because if one did not ask questions there would be no test, no safety, therefore it is a good thing that there should be doubts."

How to monitor and identify long-term chronic consequences?

Focus group participants therefore wondered how harmful effects would be identified in the absence of large-scale official post-market monitoring, and saw this as a contrast with medicines (see section 6.4). Moreover, identification of post-market impacts was considered to be even harder for GM-crop than for medicines, especially for environmental effects. Harmful effects from medicines were typically perceived as short-term, acute, and health-related. In contrast, the environmental impacts of GMOs were assumed to occur in the long term, slowly, and over large geographical areas, with potentially large distances (in time and space) between the source and the visible impact. The focus group participants therefore wondered whether observers on the ground would be able to identify harmful effects. For example, would a farmer be able to spot problems at the level of the farm?

In addition, they were aware that the validity of scientific predictions would depend on how human actors would behave in the real world. These human actors could, however, not be expected to conform with assumptions made by scientists and regulators when devising innovations and regulations, because these do not sufficiently take into account human fallibility, fraud, profit-driven competition and the sheer complexity and diversity of real life situations. Numerous office-based examples of unrealistic safety regulations were used to support this view.

These problem were felt to be exacerbated by the lack of labelling or other user-information for GMOs, which prevented effective monitoring of unforeseen impacts and thus added another level of uncertainty:

- Will farmers know that they are using GMOs? Will they know what precautions to take and what kind of effects to look out for?
- Will consumers know what precautions to take? Will they be able to identify the source of a health effect if it occurs?

Acknowledgement of uncertainty leads to the question of need

Since focus group participants assumed that, given the reality of inevitable uncertainty, there would, in the long term, be unanticipated consequences, they demanded that the reasons for proceeding with the innovation be good ones. This is our interpretation for why the focus group participants incessantly returned to the question "*What are they doing this for?*" "*What is the need?*", "*What is their purpose?*". They wanted to have the means to assess whether or not the intended purpose was important enough to justify exposing ourselves to these uncertainties. This was felt to be particularly important when the potential long-term consequences were irreversible and potentially serious - in both environmental and social ways. GMOs were described as falling within this category. The advent of GMOs was described as an important question which should be debated outside a closed circle of experts, because it would affect a lot of people, change the nature of living organisms, and change our way of life. The focus group participants might have been satisfied if they knew that some other trustworthy actor had seriously considered this question, but lessons from past experience made them feel that it was most likely that nobody had given it adequate attention. This was why they often concluded that "we don't need GMOs" - or at least "we don't need to rush so fast to introduce GMOs into the environment and onto the market".

Thus overall the balance discussed by the focus group participants, and thought to be crucial for evaluating the development of GMOs was not so much about *risks* versus *benefits* but about *uncertainty* versus *need* or purpose.

"What is the urgency for this life-scale experiment?"

"We don't need GMOs, that's what I say. The products are tested, I'm sure of that. But we don't know the impacts, in any case. We might know them in 20 years, or in 30 years. Or maybe we will never fully know them. That's all."

"Experts who evaluate GMOs should think about whether in the long term there are consequences, what are the secondary effects on health, will there be ecological effect, in the short term or in the long term. Is it good or not good ? To what extent is it good or not good? Is it going to feed populations who have nothing to eat ? It is always the same questions we ask of science, of progress: what are you inventing, does it have a beneficial or negative effect?"

Blurred boundary between "risk" and "ethical" concerns

These concerns, though they originated in how we might assess future *consequences and risks*, were therefore a judgement of the behaviour of institutions which evidently could not be trusted to be frank about their own predicament with respect to their lack of prediction and control of consequences. Thus although based on a *risk*-oriented concern, it was a deeply *moral* judgement and response, and this undermines the categorical divide between *risk* and *moral or ethical* which is often emphasised in social science research on public perceptions (and is taken up by stakeholders, see section 8, myth n°9). We suggest this categorical divide which is supposed to structure public perceptions is a artificial construction which is not supported by our focus group results (this point is further developed in Wynne, 2001).

6.7 Public perceptions of science

Public perceptions of science were complex and multi-layered. Different and to some extent conflicting views of science were expressed by participants, often in the same group, or even by the same participant. But the statements about science could to some extent be divided in relation to two different visions of sciences.

(i) Science as neutral and autonomous from society

On the one hand, science was portrayed as an enterprise separate from the rest of society, ruled and driven by its own specific cultural norms and recognised methods of investigation which ensure the production of neutral knowledge which can then be used - or abused - by non-scientific actors. In this context, scientists were portrayed as driven by curiosity, passion and the pure goal of knowledge acquisition, with references being made to famous scientists such as Einstein, Pasteur or Marie Curie. Both good and bad applications of their discoveries were described as having been developed, beyond their control, by non-scientists (e.g. nuclear bombs versus X-rays or radiation therapies).

Overall, this vision of science was globally positive and scientists were seen as neutral or benevolent actors. Responsibility for the "misuse" of scientific knowledge was attributed to non-scientists. The only problem identified was the possible existence of maverick scientists who would not follow established norms of behaviour and may seek to use their knowledge to develop "bad" applications. The common reference here was Frankenstein. At the same time, this vision of the "pure scientist" was associated with the problem that scientists were "in a world of their own" and detached from the real world outside their laboratory.

(ii) Science as part of society and influenced by contingent factors

On the other hand, scientific research was also portrayed as an activity performed by "normal" human beings, working in institutions that are subject to the same constraints as all other institutions. In this context, scientists were described as "people just like us", who could be honest or dishonest, influenced by a profit motive, taken over by the speed of change, and unable to control the social and institutional processes that determine their conditions of work. In addition, numerous institutional realities of science were described by the focus group participants, and these mirrored the wider societal trends that they identified with respect to the agri-food sector and society in general (see section 6.13):

- Scientist are no longer individual artisans, they are part of large complex systems which make them inter-dependent on other scientists, on "big" and expensive equipment, and on the institutions that employ them.
- Scientists need large sums of money to conduct their experiments and therefore even public sector scientists increasingly depend on from the private sector.
- This leads to research with more targeted aims, which must fulfil the short-term profit motives of their industrial sponsors.

This vision of science led to more ambivalent opinions about scientists.

Overall, the first vision of science (as neutral and autonomous from society) tended to be associated with discussions of science in general; whereas the second vision of science (as part of society and influenced by contingent factors) seemed to be mobilised for more specific discussions of GMOs. This distinction between "science in general" and "science in the particular" would, however, need to be confirmed by more in-depth analysis of the focus group data

Some of these views seemed to be more predominant in one or other country. For example, participants in Catalonia seemed to mobilise almost exclusively the autonomous vision of science. However, given the complexity of the views expressed, this finding would need to be confirmed by more in-depth comparative analysis of the focus group data. In addition, further fieldwork with more numerous respondents would be necessary to confirm (or not) that these correspond to cross-national differences rather than differences between the particular groups recruited for this study.

As already described above (in sections 6.3 and 6.6), the focus group participants also expressed an awareness of the contingent and conditional nature of scientific knowledge, and this appraisal was not specifically linked to one or other vision of scientists described above. It was nourished by numerous examples drawn from their personal experiences, which revolved around the inherent limitation of laboratory knowledge for predicting outcomes in real life conditions outside the laboratory, especially over long time spans.

6.8 Public perceptions of other key actors

Public perceptions of regulators

With respect to regulatory institutions there was often a lack of clarity or awareness about what institutional arrangements already existed for the assessment and regulation of GMOs and which actors were involved. There was often even a sense of a regulatory vacuum. As far as the effectiveness of the regulatory system was concerned, typical statements were *"the regulatory system works well as long as there is compliance*" or "*regulations will always be abused*", *"rules are there to be broken*". They was also the feeling that the regulatory system was being "overtaken" by the combined forces of scientific advance and economic interests. Regulators were often compared to lay citizens, with no specific scientific knowledge, dependent on exposed advice, and exposed to industry lobbying.

Public perceptions of consumer and environmental NGOs

A key point to emphasise was that the focus group participants did not identify unconditionally with these organisations any more than with any other group or institution. This suggests that results - or rather the interpretations frequently made of those results - from the Eurobarometer and other surveys about "trust in institutions" need to be qualified. Indeed, these organisations consistently obtain very high "trust scores" which are usually interpreted, especially by stakeholders, as meaning that lay people find this "source of information" particularly trustworthy, thus implying that laypeople prepared to believe anything that these organisations tell them. Our focus group results contradict this interpretation and suggest other possible explanations for such survey results.

In our focus groups, consumer and environmental NGOs were not a strong reference point in the participants' daily life, and were not mentioned as a key source of information. They were mentioned as relevant stakeholders with the potential to influence decision-making in the public and private sectors. A frequent comment was that "we are glad that they exist", as a counterbalancing force to other stakeholders, especially profit-driven commercial firms. NGOs, especially environmental ones, were therefore appreciated for their capacity and willingness to ask difficult questions and raise issues which would not be raised otherwise. But they were perceived as biased, just like other actors. The difference was that, compared to firms and governments, they were expected to take into account wider societal and environmental interests. But it was also recognised that NGOs have they own vested interests, such as raising funds and membership.

A more general point was that the focus group participants were clearly able to evaluate different sources of information and identify their specific biases, which they took into account when assessing the content of the information. Thus, when the typical statement from an NGO was provided for discussion by the facilitator (see Annexes 3 and 4), focus group participants identified it as an extreme statement, and qualified it with statements such as: "*well of course they put forward the disaster scenario, that's what they're there for - they always exaggerate but at least they ask the questions*".

In some countries (notably Germany and France) direct actions conducted by environmental NGOs (or farming activists), such as the destruction of GM fields, were portrayed as unnecessarily violent and extreme. But at the same time some participants expressed the view that violence was often the only way, these days, for a group with critical views to be heard.

Public perceptions of commercial firms

Commercial interests were perceived as a main driving force, and big multinational companies were perceived as the ones establishing the rules for the whole sector. These firms were portrayed as solely driven by profit-motives, but this pursuit of financial profit was perceived as legitimate, provided that it was regulated by other actors (such as governments) in order to ensure that this profit motive did not override health and environmental and broader societal considerations. The participants felt that firms

could or should not be expected to prioritise social welfare and the protection of the environment. Indeed, the focus group participants reacted very strongly against communication messages from these firms which denied that profit was their key objective and attempted to portray their companies as driven by humanitarian goals such as feeding the poor in the Third World.

Public perceptions of the media

Focus group participants stated that the mass media - and especially the television (and even more specifically the daily television news) - was their main, even only, source of information, including for issues surrounding GMOs. However, they expressed great dissatisfaction with the way in which the media treated these issues. The media were criticised for their "sensationalist" approach, which focused on scandals and controversies, rather than providing more balanced background information. The typical media format was described as getting people with opposite views to argue with each other, but this was felt to be an inadequate means of information. On the one hand, they said that they wanted the media to provide them with neutral and objective information, while on the other they said that they wanted to hear a wide variety of arguments. A key point was that they wanted to be given more information about *who* was speaking, in order to be able to take into account their specific subjective biases and take these into account when assessing the information. They also wanted to be told how a particular person had reached a particular position, rather than simply being presented with conclusions and entrenched views. Moreover, focus group participants clearly expressed the desire for information about the societal implications of GMOs, and not only about the technicalities of genetic manipulation.

Surprisingly, focus group participants frequently expressed the feeling that GMOs had not been covered in the media - even in countries and at times when the written press was substantial[19]. This finding, which was surprising in the first instance, could be understood with reference to the paragraph above. Thus, the participants meant that the media had not covered the *issue in ways which they found satisfactory or useful* for them to form a considered opinion; and that it had not been covered by the television, except, as they sarcastically noted "in late night programmes when nobody is watching anymore".

6.9 Perceived lack of information

Lack of information was a crosscutting theme which is relevant to most of the other themes identified and discussed above - but each time with different implications. The overwhelming feeling expressed by the focus group participants was: "we are not informed". And indeed, as already mentioned, participants displayed rather low levels of awareness of existing developments in the biotechnology field (in term of research, regulation or commercial applications), as well as about the technicalities of genetic manipulation.

This perceived lack of information was, somewhat surprisingly, just as strong in countries such as Germany, the UK and France, where media coverage of GMOs was high (at least for Phase II), where high profile initiatives for public consultation had taken place, and where Monsanto had launched, during 1998, a fairly extensive advertising campaign.

At first sight, this may seem surprising, and these statements by participants could be rejected as blatantly incorrect, with respect to independent objective measurements of the quantity of information which was (in theory) accessible to all citizens via the media and other channels. However, the focus group method enables us to provide a more sensitive interpretation. Thus, if we examine all of the other statements made, indirectly, by participants about information, we can begin see what the participants meant by the statement "we are not informed". It seems that they were not so much

[19] For example in France in the Phase II focus groups conducted in September-October 1999, when the written press (and to a lesser extent the television news) had been covering the 'José Bové story' intensively for several weeks in a row; or in the UK, groups conducted in February and September 1999, following extensive media coverage of the 'Pusztaï affair'.

expressing dissatisfaction with the quantity of information, but rather with the quality of that information; and the group discussions give us many clues about the *nature* of the information that is *desired* by the participants. Thus, the statement "we are not informed" perhaps needs to be translated into "we are not *adequately* informed". The following dimensions are clearly considered important with respect to information:

(i) Comprehensive labelling of products containing GMOs or ingredients derived from GMOs was systematically demanded, but this had not been provided by EU or national legislation (labelling of "GM-free" food products was not considered to be an adequate solution).

(ii) Lack of labelling was seen as an infringement of personal choice and control, but this was not solely demanded in order to protect oneself from potential harmful consequences. Labelling was also felt to be important to allow consumers to boycott the products in order 'send a message' to manufacturers about a whole range of concerns other than health risks associated with GMOs; and to enable post-market monitoring of unintended harmful effects, and removal from the market if such harm was identified. A frequent question raised was "How can long term chronic impacts be evaluated if the products were not even labelled?". It was also felt that labelling would demonstrate that "they [the promoters] have nothing to hide".

(iii) Lack of labelling, and of other sources of information, was closely connected with the felt lack of control over ones own life world, and the felt lack of influence over institutions. Participants therefore desired information which would provide them with the means to have more control and agency.

(iv) Concerns about lack of labelling were exacerbated by the fact that the first GM-food products on the market were "hidden" ingredients (soya and maize derivatives) present in many "ordinary" food products. This surreptitious introduction of GMO into the food supply gave the impression that the firms using GMOs have something to hide.

(v) The comparison with ideal type medical applications (section 6.4 and Box 7) gives important clues about the kind of information that is desired: provided directly by a human being that one trusts from past experience; adapted to the user, acknowledges (rather than denies) potential harmful effects and uncertainties…

(vi) The description of perceptions of the media (section 6.8) also gives clues: if possible, neutral objective sources of information; failing that, a variety of sources, with sufficient detail about each one to enable listeners or readers to identify specific vested interests; information about the pros and cons, about how the person or institution has reached a particular conclusion or opinion; not just technical information.

(vii) There was also a feeling that the lack of provision of information was intentional, and thus that their ignorance was in some way imposed on them by the promoters of GMOs. This was exacerbated by the general belief, derived from experience of BSE and other affairs, that institutions conceal information to protect their vested interests.

Thus, one of the many connections between the different affairs used as a reference by focus group participants (see box 6), was the impression that institutions responsible for managing them knew about harmful effects long before choosing to admit to them, intending to hide information from the public:

"They kept assuring us that there was no risk… until the harmful effects were so obvious or scandalous that they could no longer be ignored - or hidden."

They therefore did not expect regulatory or commercial bodies to be honest and open about the potential harmful impacts of GMOs. BSE was a key reference point to support this reasoning, but it must be stressed again that this was not seen as exceptional: it was seen as the normal behaviour of institutions.

6.10 Perceptions of Nature

GMOs were frequently characterised as "unnatural" by focus group participants, although this varied between countries (this was for example practically absent in the Italian focus groups). But even when the term "unnatural" was not utilised, focus group participants in all five countries expressed the feeling that directly modifying the genome was qualitatively different from any previously used technique. A common viewpoint was that until now we had only been crossing already-existing organisms, within "natural" species boundaries, using "natural" fertilisation processes. But with GM technology we were now also creating novel life forms that would not have existed otherwise, hence the label, "unnatural". According to many focus group participants, we had only "helped nature along" before, whereas now we were modifying Nature. Genetic engineering techniques were also often

described as "pushing Nature beyond its limits", and were thought to "upset the equilibrium of Nature".

This was related to the idea that scientists do not know or understand the full extent of their work, and cannot anticipate the long-term consequences of their actions on ecosystems, human health and social relations outside laboratory conditions. It was in this sense that participants in the UK and Germany spoke of "playing God", while those in France described those involved in the creation and management of GMOs as "sorcerers' apprentices'.

Furthermore (and contrary to stakeholder myth n°6 described in section 8.3) many of the concerns expressed about GMOs, including those about "unnaturalness", were *also* expressed in relation to other agricultural innovations, such as the use of pesticides, animal-derived animal feed, and antibiotics in animal feed. Thus, the focus group participants did not express the view that non-GM agricultural technologies were necessarily natural or did not pose similar problems to GMOs.

Participants felt that most innovations in agricultural production were driven by the need or desire for increased productivity, economies of scale, and profit, and that this tended to lead to uniform and tasteless food (see section 6.13). This was another way in which the concept of unnaturalness was mobilised and a very common example was the advent of tomatoes which were available all year round, looked good, had a long shelf life - but which were considered to be totally tasteless. (References to such "tasteless tomatoes" are found in virtually all focus groups related to food conducted in developed countries). Thus, although they were felt to represent a qualitative change, GM technologies were seen by many participants as the next logical step in a long-established trend of manipulating Nature.

GMOs were in this way perceived as the ultimate incarnation of an ongoing longer-term trajectory in agricultural production which they felt ambivalent about.

In some countries (UK and France, but not Italy), the concept of organic agriculture was perceived as reversing or opposing this industrialising trajectory. But in all countries, some participants at least maintained that there is an alternative to hyper technology and hyper-industrialisation of food production systems, that would consist in a kind of paradigm shift involving:

- focusing on prevention rather than cure
- changes in lifestyles (slow down, pay more attention to social relations)
- closer connection with the "natural environment", meaning other living organisms, the climate, seasonal cycles, soil types…
- more equitable distribution of profits
- a redefinition of progress

All of these dimensions were incorporated in the definition of what counts as "natural" or not for focus group participants. This therefore challenges stakeholder myth n°6 described in section 8.3, which assumes that lay perceptions of the "unnatural" characteristics of GMOs are exclusively based on a misunderstanding of the technical similarities between conventional breeding and rDNA techniques.

6.11 Perceived relationships between health and environmental impacts

As a generalisation, the majority of people who expressed concerns about risks associated with agricultural biotechnology tended to focus on the potential impacts upon human health. Environmental issues emerged with less clarity and often in relation to human needs for a healthy environment.

It is possible that this focus on health was in part an artefact of the protocol design, which approached the issue in terms of food and food production, labelling and used comparisons with agro-pharmaceutical applications. Taken together all of this may have directed participants towards considering mostly health implications. This possibility was taken into account when designing the protocol for the Phase II groups, to ensure that the salience of environmental issues and other wider concerns were adequately explored. Even so the tendency remained. Another plausible explanation for

this tendency was that official discourses continually stressed or even exclusively dealt with food health risks to individual food consumers as if this were the only risk issue.

However as mentioned in some of the other themes above, concerns about the impacts on nature or the environment also figured in many of the focus groups. It is noteworthy that only rarely was the introduction of agricultural biotechnology seen as likely to benefit the environment, even though this has been an expressed hope of the industry (see discussion of perceptions of benefits associated with pest-resistant crop plants in section 6.4).

Moreover, health and environmental impacts were not necessarily seen as distinct categories. Focus group participants often expressed the view that any impact on the environment would also, in the end, lead to human health impacts.

There was, in the focus group discussions, a strong culturally rooted relationship between perceptions of the technology as a food technology and health issues. As has been noted by other researchers, people experience food in ambivalent ways. One the one hand it represents a source of sustenance and bodily pleasure, of sociality and conviviality, while on the other it also represents a potential source of danger and harm that is literally taken into the body in the most intimate ways[20].

6.12 Perceived speed of social and technological change

One issue that was widespread was a concern about the speed of change. This related to:

- Increasing rate of scientific discoveries and technological innovations.
- The short time span between the creation of GMOs in scientific laboratories and their widespread introduction into the environment and onto global markets.
- Rapid speed of change in the food sector more generally.
- Rapid speed of change of ways of life.

Associated with this, focus group participants expressed a sense of cultural disorientation or disruption produced by the impact of these changes on their life-world. In addition there was the concern that too little time was being taken to evaluate the social desirability of these developments and their possible social, environmental and human consequences. The theme of undue speed in GM crops and food innovation recurred in most of the focus groups and touches on a key aspect of the experience of modernisation processes that becomes particularly acute in relation to developments associated with high levels of uncertainty or risk.

6.13 Perceptions of evolutions in the agri-food system and society

In the first part of the Pilot and Phase I focus groups, participants were invited to discuss evolution in food and agriculture in general, and were asked to describe positive and negative evolutions. In response, participants in different groups - and in all 5 countries - produced very similar accounts of cultural practices related to food production, processing, retailing and consumption. These were systematically linked, by focus group participants, to broader changes in lifestyles and society. These changes were seen as representing an undesirable societal trajectory to do with unnaturalness, extreme techno-dependency and vulnerability, with corresponding loss of flexibility and resilience, and loss of life-skills like food growing and cooking. This frequently led to discussion that was framed either in terms of trying to retrieve something that was felt to have been lost or in terms of trying to stop, or re-humanise, what was felt to be an inexorable trajectory towards anonymity and lack of identity.

It must however be emphasised that focus group participants also described *positive* evolutions in the agri-food sector, such as increased hygiene, increased choice of products (e.g. foreign or out of season foods), or the convenience, in terms of time saved, of supermarkets and processed foods. Indeed, the very same developments were often described, by the same individuals, as being *both positive and*

[20] See for example Fischler (1990).

negative; and the balance between advantages and drawbacks was considered to be difficult, since they were largely incommensurable dimensions: quality, taste and sociality of food on the one hand, and quantity, variety and easy availability on the other. But, even when underlying the positive aspects of these evolutions, most (but not all) participants emphasised that these changes had gone far enough and that it was time to slow down or even reverse this trend.

These cultural concerns related to food were often associated with a distinction between traditional and modern lifestyle orientations, with modernity being simultaneously a source of satisfaction and anxiety. In the focus groups, references were made to changes in a number of areas of life that seemed to indicate more generalised anxieties about loss of quality of life. Frequent examples fell into the following six categories:

(i) Lack of time, for example: "we no longer have enough time to shop/cook/eat proper meals"; "we only do so on special occasions and at week-ends".

(ii) Eating as a social activity, with participants arguing, for example, that "people/families don't eat together anymore" or that "people eat in front of the television").

(iii) Cooking as a social activity: people don't cook *for* other people anymore, for friends, for family. This was seen as resulting in both a decline of the social rituals of cooking and a loss of culinary and dietetic skills.

(iv) Shopping in small shops, in markets, or directly from small producers; as opposed to shopping in large supermarkets. Small shops or traders tended to be associated with geographical and social proximity, with good quality or "genuine" "real" food, with being able to chat and to ask for information, with trust in the knowledge held by the small shopkeeper.

(v) The perception that there is an increased variety and choice but that food is increasingly homogenised (for example, lots of different kinds of apples but all increasingly tasteless or lots of processed food products that actually taste the same). One aspect of this was the belief that food is marketed in a way that tries to "trick" consumers, by attracting them with the appearance. This was combined with a reflexive understanding that this tends to work and that consumers are actually attracted to better looking food products.

(vi) Lack of good-tasting fruits and vegetables, and the concomitant increase in availability of tasteless fruit and vegetables available out-of-season (tomatoes being the most common archetype). Many people were ambivalent about this extension of the period of availability because it was culturally disorientating, disrupting associations between specific foods and seasons.

These six categories seemed to come up systematically in all five countries. What differed between the countries was the specific examples used (e.g. the focus on supermarkets in the UK) and to some extent the time frame for the changes (that is, feelings about whether something had already been lost, was currently being lost, or was about to be lost). Moreover, no difference was found among participants who had been specifically recruited (in Group 5) for the more 'traditional' or 'natural' food-orientation, in terms of self-described shopping habits[21], nor between groups with very different age-groups or lifestyles.

Thus, the same discourse about "lost times" was expressed by participants from 25 to 65 year old; and conversely among the rare participants who expressed a total lack of interest food production systems, and in the quality of the food they ate there were both young and old participants. On the other hand, older participants often talked about young people having very different attitudes to food, stating that "young people these days" take less care about what they eat, and spend less time shopping or cooking. But statements of this kind were quickly challenged by young participants in the group (when these were present), who insisted that they, personally, did not conform with that image. Differences could not be attributed to parenthood or yuppie lifestyles either. When we analysed the results from the Phase I groups, we found this lack of differences between groups surprising, and therefore decided to recruit, in Phase II, one group composed of participants with different food habits (Group 9, see Table 3). However, even in these groups, we did not identify clearly distinguishable perceptions of evolutions in the food production system (or of GMOs) between the two types of participants. Thus, the overwhelming majority of participants, regardless of whether they had been recruited as "natural" or "convenience" eaters, and regardless of their age, expressed *ambivalence and*

[21] The 'traditional' or 'natural' participants for Group 5 were recruited via a pre-recruitment questionnaire and/or via networks connected to organic and health food shops (see section 4.4).

anxiety about ongoing developments. What was different between participants was their personal choice - or capacity in terms of income and time - about how to deal with these changes in their own life.

This ambivalence was not limited to evolutions in the agri-food sector. The participants also expressed concerns about more general evolutions in society which they felt went in the same direction (uniformity, profit-driven competition, lack of social relations…). GMOs were portrayed in the focus groups as the crystallisation of this particular view of the world and way of life that they were not entirely happy about. Their concerns were exacerbated by the feeling that they had next to no means to influence this trajectory, and that the pace of evolution was constantly and exponentially increasing (see section 6.14).

A key problem identified by the participants was that the main driving force for these changes was commercial profit, and this was felt to override health and environmental concerns. The focus group participants did however also acknowledge their own role, as consumers, in bringing about these changes (e.g. "if we didn't buy tomatoes in winter the shops would stop providing them"). But the power of the market (including advertising) and the speed of change were perceived as overwhelming and difficult to resist - especially given the other rapidly evolving constraints on ones social and work life associated with societal evolutions outside the food sector.

6.14 Sense of alienation, lack of agency, lack of control of the life-world

Focus group participants felt that decisions which had important consequences on their way of life were taken without them, "above them", by institutions "far way" which they could not easily influence and which were not accountable to them. Governments could be overthrown at election time, but this was not felt to be adequate to deal with the issued raised in the group discussions.

In these ways, focus group participants expressed a widely felt lack of influence and control over institutional processes or changes to their life-world. This lack of agency was associated with the lack of adequate information on GM food ingredients and potential effects (discussed in section 6.9). This felt lack of agency was not specific to GMOs, but was also felt more generally with respect to the process of innovation in the food sector, which was widely perceived as inaccessible and obscure, and driven by corporate interests and the pursuit of profit.

Such public concerns are often interpreted as a (novel) lack of trust in government, regulatory bodies, and science. But the analysis of the focus group results described in the various themes above suggest that this could perhaps be better interpreted as a realistic attitude towards the behaviour of institutions, and as scepticism rather than lack of trust. Moreover, as we have already emphasised, this phenomenon is not a *consequence* of the BSE crisis, which was considered as an exemplary case rather than an exception.

It was notable that, despite some differences in emphasis between countries, people tended to relate to the food distribution system primarily as consumers. Although in some ways this was not surprising, what was more unexpected was that it also tended to hold when they raised issues that were more political in nature. It seemed that for many individuals, the only social identity through which they felt able to conceive of exercising some limited form of agency in relation to concerns about food production in general and agricultural biotechnology in particular was that of consumer, not as citizen exercising democratic rights and responsibilities. Thus, boycotting GM food products (if they were adequately labelled) was often considered to be the only effective way to "send a message" to the developers of GMOs. This not only reflects widespread alienation from and disaffection with the mechanisms available within the political system, but also the extent to which the market ideologies promoted so vigorously during the 1980s and 90s have permeated all spheres of social existence. That is not to say that people necessarily see the market as a *satisfactory* mechanism for expressing wider social concerns, since many recognise the inherent limitations and even contradictions of responding in their capacity as consumers to concerns which reach much farther. On the contrary, it is simply that many do not perceive there to be any credible or effective alternative.

Thus the identity of "citizen" was rarely invoked as an effective expression of agency. When it was invoked, it was conceived as a collective endeavour to be enacted not so much through the traditional means of representative parliamentary democracy, but rather through participation in (or representation by) groups such as consumer organisations. The individual citizen was portrayed as isolated and with no means of action to be heard. Note that this felt lack of agency was also extended to other actors, in particular farmers, small shopkeepers, or individual scientists, who were perceived as dependent on large institutions just as they were.

6.15 Ambivalence, anxiety and socio-technical change

Viewed from a broader analytical perspective, two rather more generalised themes were identifiable from the focus group data as underpinning many of the critical views expressed. The first of these was a sense of *ambivalence* towards the process of societal modernisation, which can be detected in relation to several of the specific themes described above[22]. The second, related theme, is what has been termed *ontological insecurity*, that is, a sense of the precariousness of established social identities in the face of rapid and pervasive processes of social change, which gives rise to a diffuse sense of anxiety[23]. Both of these themes are more generalised in the sense that they do not relate solely to perceptions of specific institutions or technologies but to aspects of the human condition in modern European societies[24]. Nevertheless, these two underlying themes have profound implications for our understanding of public responses to the new agricultural biotechnology. If we accept that these two themes are dimensions of contemporary human experience, it suggests that some of the conditions underlying public responses to new technologies are even more diffuse and deep seated than might be concluded from studies which focus exclusively on public perceptions of, and public trust in, specific techno-institutional configurations. From this perspective, it is not simply the characteristics of the technology in question or of those institutions within which it is embedded that influence public perceptions and responses, but characteristics of the wider socio-cultural milieu.

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[22] Bauman (1991) develops an extended treatment, highly relevant to the analysis offered here, of the place of ambivalence in human experience of contemporary consumer society.

[23] This concept deriving from psychoanalytical theory has become associated with discussions of risk and technological change through the work of sociologist Anthony Giddens (1991).

[24] Our dependence on alien institutions over which we have no control, in ever increasing domains of our daily life activities which had previously been moderated by social relations, has been analysed by Michalis Lianos (2001) as a fundamental transformation of contemporary societies which leads to novel forms of perceived danger and feelings of vulnerability

7. National comparisons of focus group results

7.1 Expected differences?

A number of factors are commonly used to account for national differences in results obtained in public opinion surveys and with questionnaire surveys on public perceptions of risk, such as the Eurobarometer. Their role in the shaping of opinion pubic perceptions has rarely, however, been systematically and rigorously tested by social science researchers. Indeed, the way in which they are mobilised as explanations is often preposterous. However, since these are commonly referred to by stakeholders and research sponsors, some care was taken to make sure that the partners chosen for this project came from countries which provided diversity according to these dimensions, which include:

Intensity of public debate on GMOs	Including media coverage and anti-GMO NGO activity
Cultural factors	North/South (Mediterranean) culture
	Protestant/catholic culture
	Relationship to food
	Relationship to the environment/nature
	Relationship to animal welfare issues
Political factors	Activity and influence environmental and consumer NGOs
	Presence of Green parties in Government
GMO innovation policy	Level of R&D activity in public and private sectors
	Level of regulatory activity

Culture of public participation in risk decision making

The salience of recent national crises in the management of risk both in relation to the food chain (e.g. BSE, contaminated cooking oil in Spain, e-coli and salmonella in UK) and in other areas (e.g. HIV-contaminated blood in France).

Level of intensification and industrialisation of agri-food system

Thus, the five selected countries could be characterised as follows when the project was designed, in December 1996:

France: No public debate, even among NGOs; established regulatory system for GMOs; high level of R&D in biotechnology sector (in European terms); numerous field tests; technocratic political culture which excludes public participation; strong attachment to indigenous food culture; no public interest in animal welfare; intensive agriculture and small scale farming.

Germany: Intense early public debate on GMOs in the late 80s and early 90s, with strong governmental responses (e.g. Gene Act, 1990); established regulatory system for GMOs; political culture of public participation in risk decision-making; political influence of Green Party and environmental movement; influence of protestant culture; high public concern about human applications of genetics.

Italy: No public debate; less intensive agriculture; strong attachment to indigenous food culture; influence of catholic culture; regulatory system for GMOs less well established; low level biotech R&D; very few field tests.

Spain: No public debate; less intensive agriculture; regulatory system for GMOs less well established; strong attachment to indigenous culture; low level domestic biotech industry and R&D; very few field tests.

UK: Low level public debate, mostly confined to NGOs since the late 80s; well established regulatory system for GMOs; high level (in European terms) of R&D in biotechnology sector; numerous field tests; high level of intensification in agriculture and food production; high public interest in animal welfare.

It should be emphasised that this rough classification of the five partner-countries was elaborated in 1996, which is considered by most commentators as a watershed year for the GMO debate in Europe. As described in section 5, the GM controversy evolved in most of these countries during the period of the project (especially in France, UK and Italy).

7.2 Accounting for the similarity of results between the countries

As mentioned in section 6.1, the results from focus groups conducted in each of the 5 countries were surprisingly similar. The possibility that this might be due to the shared protocol, analytical framework and research framing among PABE researchers was discussed in section 6.1. Reasons were given there for rejecting this as the determining explanation for the similarity in the results.

A second methodological issue relates to the object (or level) of analysis. To begin with, given the differences in national contexts, we might have expected a greater diversity in the results of the preliminary analysis. On reflection, however, it was recognised that, because the focus of the PABE analysis was on *underlying factors*, such convergence in the results was perhaps not so surprising. Thus, although the intensity and nature of the public debate was very different in the 5 countries, the underlying socio-cultural factors identified in section 6 as influencing public views are to a greater or lesser extent common to many, if not all, EU Member States. In contrast, most of the inter-country differences which were observed (and which are outlined below) related to more superficial descriptive aspects.

If we return to the set of common themes or factors that emerged from the focus group data (described in section 6), we can see that they relate to aspects of the wider social-institutional context. In this perspective, media are *secondary* actors. The *primary* actors shaping the forms and discourses of management and promotion of GMOs are industries and governments, along with their surrounding phalanxes of communications consultants. These actors define the agenda to which public responses (and media coverage) tend always, in the nature of things, to be *reactions*, not initiators.

The orientations and operations of the industries involved, and of national governments and EU regulations are increasingly harmonised and largely framed in terms of international trade and economic competition of global markets. Thus, if public responses are shaped by the behaviour and discourse of these actors, it is perhaps not surprising that we found overwhelming similarities between the five EU Member States studied. The arguments and sentiments expressed by the focus group participants and summarised in section 6 refer to social, political and economic processes. These increasingly globally-standardised processes shape the world within which we live. Through the analysis of the focus group data, we can begin to understand not only the ways in which individuals experience their relationships to these processes but also, most importantly, how that experience in turn mediates and shapes their responses to agricultural biotechnology. The implication of this is that the analytical task of the research involves situating and explaining people's views of the technology in terms of the salient socio-cultural conditions of contemporary European societies.

Thus we suggest that the finding of commonly shared responses across the different national contexts does reflect real conditions in the salient dimensions of experience of ordinary people. Indeed this gives some important clues as to what *are* the salient dimensions of public experience when it comes to influences on perceptions.

Whether, or to what extent, the unexpectedly shared character of public responses across these different EU partner countries, represents the emergence of a common European public culture with respect to new scientific and technology trajectories remains an intriguing question for future consideration. Certainly the consolidation of a common EU position vis-à-vis global trade conflicts with the USA, and over conflicting EU-US interpretations of the precautionary principle, can be seen as a potentially important recent factor in the possible creation of a more shared European public identity in such matters. This hypothesis should however be qualified and further tested in the same way as the presumed linear relationship between public perceptions and public controversy discussed in section 2.5. Political identities are constructed out of a multifarious repertoire of interests, projections and claimed representations, and may bear only at best a tenuous relationship with public

perceptions. On the other hand the more significant, stabilised and articulated such political positions become, the more one might expect public responses to define themselves, favourably or critically, with reference to such recognised positions.

7.3 Differences between the focus group results in the five countries

Although the general pattern of public responses was one of similarity, there were also differences between the national results. We summarise these below. It must however be emphasised that, due to the focus group method used, these can only be provisional findings that would need to be confirmed by further research with larger and more statistically representative samples. The differences observed in this study might be due to differences between the specific groups recruited rather than more generalised and consistent cross-national differences. Moreover, because focus groups provide qualitative data which is particularly rich and multi-layered, differences can be due to differing interpretations of similar data by PABE researchers analysing the results from different countries. As far as possible, this possibility was addressed by discussion and comparison conducted collectively by the whole PABE team, and further exploration of some specific themes in the Phase II groups (e.g. perceptions of the environment, which had been expected to be different between for example Germany and Spain; and perceptions of public participation procedures). In some cases however, for example with respect to views of science (see section 6.7), the data collected within individual countries or groups provided such multifaceted perceptions, even within the same group, that it was difficult to attribute any particular view to particular populations.

Awareness of GM foods

Awareness of agricultural biotechnology (in terms of knowledge developments about in research, regulation or commercialisation of GM-products) varied considerably both within and between the focus groups, so no clear cross-national comparison could be made. It was notable, however, that in Catalonia there appeared to be the lowest level of awareness. However, the level of awareness and detailed knowledge was in general very low in all five countries, even in countries such as Germany where media coverage had been relatively high since the late 1980s. Morevoer, as emphasised in section 6, the *underlying forms of reasoning* deployed by focus group participants in each of the countries, and within the same country in the different phases of focus groups (which covered periods of low and high media coverage), were remarkably similar.

Animal welfare issues

Animal welfare and animal rights were raised only in some of the German focus groups. It was rather surprising, in the light of recent public controversies in the UK (e.g. about the transport and export of live veal) and the general portrayal of the British as animal lovers, that similar concern was *not* expressed in the British groups. It may be that this was an effect of the exclusion from the focus groups of environmental group members, and given a larger sample of participants, such concerns might have appeared. However, in all five countries there was a definite antipathy towards the transgression of species boundaries.

Perceptions of national and EU policies on food

In all countries, participants mentioned the fact that national policies, including risk-related regulations, were to a large extent now subordinated to EU. In France and Catalonia, participants tended to feel that regulatory policies concerning the protection of the environment were less well developed in their country than in other EU member States, such as Germany, that were perceived to be more environmentally sensitive. This seemed to contrast with the UK and Italy, where participants tended to perceive other EU Member States as having weaker safety regulations. There were also marked differences in perceptions of EU regulation in the agro-food sector, with focus group

participants in France and Catalonia expressing somewhat more confidence in European regulations than either Germany or, more emphatically, the UK. In general, however, where opinions were expressed, EU institutions tended to be seen as distant and EU regulations as overly bureaucratic.

Perceptions of food distribution

The most notable difference in relation to the food distribution system was that the UK focus group participants placed far more emphasis upon the role and influence of major supermarket chains than those in any of the other countries. This presumably reflects public awareness of the dominant position of these companies in the structure of the UK food sector.

Perceptions of agricultural farming and production systems

In relation to farming practices there were discernible national differences in the way that people perceived changes relating to loss of traditional practices and moves towards industrial farming and, in some cases, organic farming. For instance, in Italy organic farming was seen as simply another form of industrialisation of agriculture whereas in the UK and France this was perceived as a return to traditional practices - or at least, traditional values. Attitudes towards the development of the organic sector differed between France and the UK, however, to the extent that in France it was considered to be an extreme development and therefore not necessarily desirable, whereas in the UK it was seen as a response to consumer demand for natural produce. In general, however, changes in farming practices were generally thought of as being heavily influenced by outside agencies (whether EU regulations or supermarket control) and therefore to be often beyond the control of farmers or consumers.

Public agency and public participation in decision-making about technological choices

Despite a generally felt sense of a lack of agency in relation to agriculture and food, there were clear differences in views about the role of the public in decision making about these issues. A sense of individual agency and action was mostly framed - in all 5 countries - in terms of "consumer choice", rather than "citizen action". However, where references to citizen influence or action did arise in the discussions, it was clear that there were differences in how this was viewed. Perhaps the strongest view came from German participants, who tended to display the greatest confidence that as consumers they could make a difference to the trajectory of commercialisation of the technology. They also seemed to have clearer ideas about what public participation in decision making might entail. In Catalonia and France, however, there was no clear idea of the forms citizen involvement might take[25]. Decision-making was seen by the Spanish and to a great extent by many of the Italian participants to be the domain of experts. Although there was a general rejection of citizen protests involving direct action against genetically modified crops and foods, German condemnation appeared to be more strongly felt. On the other hand, some focus group participants in France and UK reflected that high profile direct action events might be the only way for citizens to make critical views heard.

[25] Despite the fact that a government-led consensus conference on agricultural GMOs had been held in France in 1998. Indeed this conference was hardly ever spontaneously mentioned in the French groups (see Joly et al. 2000 and Marris and Joly, 1999 for further details of this conference and of public perceptions about it).

8. Views of the public held by stakeholders

8.1 A dominant view of the public emerges

A particular and very dominant view of the public emerged clearly from our stakeholder analysis (interviews, participant observation and document analysis - see section 3), in the five countries studied[26]. The main characteristics of this view of the public are summarised in Box 8. These views appeared very frequently in the discourse of many stakeholders, especially those within governmental, regulatory, scientific (research and expertise) institutions, and commercial organisations (mostly biotechnology firms, less so food producers and food distributors)[27]. These are essentially the key policy actors, i.e. those who have an important direct influence in the definition of public and private decision making with respect to GMOs. They can also be characterised to some extent as the promoters of GMOs and of public and private policy decisions related to GMOs. However, it is important to point out that a very similar view of the public exists also among representatives of organisations involved in anti-GMO lobbying activities (environmental and consumer NGOs, farmers unions).

Of course, this dominant view of the public is not necessarily shared, or held in an unqualified form, by all of the employees of these institutions. But the ideas outlined in Box 8 are expressed by many of their employees or spokespersons in interviews and in public arenas, and their presence or influence is clear in many official documents. These views are therefore dominant not only in the sense that they are commonly found, *but also because they clearly influence the strategies and policies of these actors*.

We choose to call them "myths" (or "received ideas") in order to convey the fact that, among certain circles of actors, they are assumed to be obvious and do not need to be supported by empirical evidence. Thus they circulate, largely unchallenged, accompanied by a series of repeated anecdotes which are accepted as confirmation of these views. As such, they are the basis of a shared culture among these actors: they represent routinised habits of thought which tacitly define what is real without the need for explicit deliberation or hypothesis-testing. Even when some members of these institutions do not share these assumptions, they tend to remain silent rather than contradict them publicly, or else their opinions are not taken into account for policy[28].

We also choose to call them "myths" in order to emphasise the fact that, as we shall see, our interpretation of the PABE focus groups results suggests that these myths are *not* supported by our empirical study of public perceptions. More precisely, we shall see that in some cases the stakeholder views about the public can be supported at a primary level, but that the *explanations* given by the actors for these observations are challenged by our focus group results. Thus, stakeholders make untested assumptions about the *forms of reasoning* employed by the public, but these are not confirmed - indeed they are contradicted in many ways - by the PABE focus group results (and other research in the field). This has important policy implications, because decision-makers tend to base their decisions on these unsupported underlying *explanations*.

This is why we purposefully focus here on those aspects of stakeholder views which are challenged by our focus group results. We recognise that this leads to a polarised vision of public thinking and that what is presented here is an over-simplification of a more complex state of affairs. We do believe, however, that this bifurcation between "stakeholder myths" about the public and research results on public perceptions (not just this PABE study) represents something real and significant which needs to be addressed by researchers and policy makers. We do not take any special pleasure in pointing out

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[26] Note that although the Spanish and German teams conducted their focus groups in Catalonia and the State of Baden Württemberg, the stakeholder analysis was conducted at the national level.

[27] In a separate study, we also identified similar views among stakeholders in the USA (Joly et al., 2001, pp. 85-143).

[28] There are of course notable exceptions. For example in the context of the GMO controversy in France: Bernard Chevassus (biologist, member of expert committees, President of the Food Safety Agency…) or Pierre-Henri Gouyon (biologist, member of expert committees). See Chevassus (2000); Noiville and Gouyon (1999).

errors in stakeholder thinking, but have chosen to portray our results in this particular way in order to try to contribute constructively to policy making and institutional learning. More qualified analyses of stakeholder views, including discussion of the diversity of views of different actors within and between organisations, can be found in the National Reports (some of the "myths" outlined below were more or less predominant in the 5 countries).

Throughout this section we give some references to publicly accessible documents written by stakeholders which exemplify these myths, and the ways in which they are mobilised in the GM controversy. It must however be emphasised that these are simply given as illustrations, and that the description which follows is derived from extensive empirical - and mostly oral - data collected through interviews, participant observation and sustained involvement over many years in interactions with policy stakeholders. Further details and specific examples can be found in National Reports and in the publications listed in Annex 1.

Box 8: Dominant stakeholder myths about public responses to GMOs

Myth 1: The primordial cause of the problem is that lay people are ignorant about scientific facts

Myth 2: People are either 'for' or 'against' GMOs

Myth 3: Consumers accept medical GMOs but refuse GMOs used in food and agriculture

Myth 4: European consumers are behaving selfishly towards the poor in the Third World

Myth 5: Consumers want labelling in order to exercise their freedom of choice

Myth 6: The public thinks - wrongly - that GMOs are unnatural

Myth 7: It's the fault of the BSE crisis: since then, citizens no longer trust regulatory institutions

Myth 8: The public demands "zero risk" - and this is not reasonable

Myth 9: Public opposition to GMOs is due to "other" - ethical or political - factors

Myth 10: The public is a malleable victim of distorting sensationalist media

8.2 Objective versus subjective risk

The dominant view of the public and the myths outlined in Box 8 are founded on one fundamental reference: the supposed distinction between (a) objective risks, which are considered to be evaluated - rationally - by scientific experts; and (b) subjective risks, which are considered to be perceived - subjectively and irrationally - by lay people.

In order to demonstrate the supposed irrational thinking and behaviour of lay people, a number of anecdotes circulate among stakeholders. For example, these actors insist on the idea that each time a new technology has been introduced into society, lay people resisted in the first instance, but then adapted and got used to it (common examples used are the train, the car, the plane or vaccines[29]). The way in which these anecdotes are mobilised in stakeholder circles is always the same: the aim is to show that the initial reactions of the lay public were shown to be unfounded, and thus their (irrational) over-reaction eventually and naturally disappeared. The systematic implication is that we can and should expect the same thing to occur with respect to GMOs (or whichever new technology is being discussed). However, these constructions of historical events fail to acknowledge that the technologies in question were modified, through regulatory and technological evolutions, before becoming accepted

[29] The specific examples vary from country to country, according to historical experience. For example in France, Pasteurisation and the role of Parmentier in the introduction of potatoes are common examples.

(e.g. extensive regulations concerning the driving and manufacture of motor vehicles). Moreover, they fail to acknowledge that many of the original risk concerns raised by the lay public have indeed been realised (e.g. pedestrian deaths from car driving, plane accidents, Chernobyl accident, negative health impacts linked to vaccination…), and that less well anticipated negative impacts have also occurred (e.g. harmful environmental impacts of motor vehicles). Another way in which lay public concerns mentioned in these anecdotes have ended up being realised is in the sense that the ordinary people anticipated - even if this was left largely unarticulated - that these technologies, for example the motor car, would fundamentally transform society. Thus, the advent of motor cars was not a trivial event, and could not be understood and assessed solely on the basis of mortality estimates. It has shaped our cities and our daily routines, accelerated the pace of life, and rendered possible activities and ways of life which were not conceivable before.

The anecdotes told by stakeholder systematically follow the same story-line, and these kinds of public concerns are totally marginalised through this shared storytelling. This another reason why we call these beliefs about the public "myths": they resemble fairy tales told to children in order to construct a particular shared view of the world - and in order to prepare children (in this case, fellow stakeholders) for confronting the outside world by scaring them and/or providing them with coping strategies (in this case, for how to deal with supposedly irrational public responses).

A second type of anecdotes used by stakeholders refer to the fact that people routinely accept very high risks (defined in terms of mortality) in certain domains, whereas they object vehemently to much smaller risks in other cases, for example: "people who smoke or mountain climb accept enormous risks, but these same people will not accept much smaller risks associated with GMOs!" (or nuclear technologies, or BSE, or dioxins…). These actors therefore refer a lot to *risk comparisons* (e.g. "it is much more dangerous to drive your car to work everyday than to eat GM-food!"). The implication behind such examples is virtually always the same: the behaviour of lay people is incoherent, and this represents an almost insurmountable barrier for a rational and serene management of risks, based on reliable scientific foundations. These actors often conclude by advocating the use of "objective risk scales" for improving risk communication towards the public. Such interpretations are founded on the belief, by stakeholders, that lay people do not realise that the risk, as defined by experts, is higher for smoking, car driving, or mountain climbing than for GMOs, nuclear power plants, BSE dioxins etc. However, numerous studies, starting with the seminal work of Slovic (Slovic et al., 1979; Slovic, 2000) have demonstrated that when asked *specifically* about mortality rates, lay peoples' estimates are not so different from those of experts - especially in terms of relative *ranking* of different technologies or activities. Thus, these studies have repeatedly shown that lay people who drive cars or smoke are perfectly aware of the risk of dying from such activities[30]. In some cases this is indeed acknowledged in stakeholder discourses, but usually only in order to emphasise that laypeople are prepared to accept higher risks with respect to activities which they choose to partake in voluntarily, and from which they receive a direct benefit. Yet again, this tends to be used in order to portray the behaviour of laypeople as irrational.

The construction, by stakeholders, of this supposed opposition between objective and perceived risk, and the associated belief that perceived risk is subjective, incoherent, irrational, labile, and unpredictable, has already been observed, described and challenged by numerous social scientists (e.g. Callon et al., 2001; Slovic, 2000; Wynne, 1995). Our stakeholder analysis demonstrated, however, the extent to which this way of thinking about public perceptions of risk is still, despite these existing critiques, very firmly rooted in certain circles. Moreover, the PABE study enabled us to observe how this more general myth is translated into more specific myths within the context of public responses to GMOs, and this is what is outlined in Box 8 and described further below. For the most part, these are simply developments of arguments already deployed previously in other domains (most notably

[30] Consistent minor biases are observed with low level and high level risks, as well as the so-called 'optimistic bias' for persons (e.g. smokers) who partake in a dangerous activity. These findings do not, however, challenge the fact that the overall ranking of risks by lay people - in terms of annual moralities - is virtually the same as that of experts. Moreover, it has been shown that experts asked to make risk estimates outside of their own field are subject to the same biases as lay people (Slovic, 2000).

nuclear technologies). But a few dimensions are new, or at least more vigorously deployed in the ongoing GM controversy than in previous socio-technical controversies: (i) the attribution of an individualistic (or even egotistic) attitude and behaviour to ordinary citizens; and (ii) the insistence on the false dichotomy supposedly employed by lay people to distinguish between what is considered to be natural and or unnatural. We therefore emphasise these two aspects more extensively in this report, both in this section and section 6.

8.3 Stakeholder myths on public perceptions of GMOs

Myth 1: The primordial cause of the problem is that lay people are ignorant about scientific facts

According to this myth, there are facts on one side of the debate and ignorance and emotions on the other. Rational facts are founded solely on scientific evidence and demonstrate, to the best of our knowledge, that GMOs are safe. Thus, people who oppose GMOs are irrational; if only they understood the science better, they would be reassured and would accept GMOs. Moreover, opposition to GMOs is considered to be founded not only on ignorance, but on strongly held erroneous beliefs, derived from science-fiction, sensationalist media, or unfortunate historical events concerning eugenics, notably in WWII Germany. The key point here is not so much whether or not lay people have good knowledge about genetics, but rather that stakeholders believe that scientific ignorance is the primordial and largely insurmountable barrier for a serene and rational dialogue about GMOs with the public.

A very common reference to support this view is the Eurobarometer survey, and in particular one specific question from this survey. The Eurobarometer is a large-scale survey of the European population commissioned by the EC, conducted in 1991, 93, 96 and 99 (INRA, 2000). The Eurobarometer contains a "knowledge quiz" which includes the following "true or false" question: "Ordinary tomatoes do not contain genes, while genetically modified tomatoes do". Very frequently, we heard stakeholders use the results to this "tomato question" (see Table 5) to demonstrate that the public founds its perception of GMOs on false beliefs (written illustration: Marchant, 2001). On the basis of these results, stakeholders exclaim: "70% of the population thinks that ordinary tomatoes do not contain genes, whereas genetically engineered tomatoes do!". The implicit or explicit implication of this observation is always the same: the kind of knowledge tested by this "science quiz" is essential for the formation of a reasoned opinion about GMOs, and this type of ignorances explain public opposition to GMOs and the impossibility of a serene dialogue (written illustration: Le Déaut, 1998, p. 69).

Table 5. The "Eurobarometer tomatoes"

Question: " Ordinary tomatoes do not contain genes, while genetically modified tomatoes do. True or false?"

	"correct" answer	"wrong" answer	Don't know
Europe	35%	35%	30%

Source: Eurobarometer 52.1 "The Europeans and Biotechnology" conducted in 1999 (INRA, 2000)

How myth 1 was challenged by the PABE focus group results:

Our focus group results confirmed (see section 6.3) the impression of stakeholders that ordinary citizens have rather little or vague knowledge about genetics, and the distinction between genetic modification obtained through recombinant DNA techniques and other methods (this is the primary level observation). The PABE focus group results did, however, challenge the idea that this type of ignorance represents the main barrier for dialogue, and the main reason for public opposition to GMOs (second level stakeholder assumptions):

(i) Focus group participants did not have firmly entrenched erroneous beliefs about genetics. On the contrary, they acknowledged and were humble about their lack of knowledge (section 6.3).[31]

(ii) The principal concerns expressed by focus group participants about GMOs (see Box 5) were not based on erroneous beliefs about genetics, but on their own empirical knowledge relating to the behaviour of insects, plants, and animals and human beings outside of the laboratory (see section 6.3).

Thus, even if one could, by magic, create tomorrow a world where all citizens knew that all tomatoes contain genes, the basic questions which were expressed in the PABE focus groups would remain unanswered, and the controversy would be unlikely to abate. Indeed, there is evidence that more knowledge about GMOs makes people more sceptical or polarised, not less (Martin and Tait, 1992; Gaskell et al., 1998). Contrary to the view commonly expressed by stakeholders, there is in fact very little direct link between the type of knowledge tested by such "science quizzes" and public perceptions of risk or opinions about GMOs. This is, indeed, what is revealed by more sophisticated analyses of Eurobarometer results, which find no linear correlation between level of knowledge and attitude to GMOs (Gaskell at al., 1999)[32].

Myth 2: People are either 'for' or 'against' GMOs

According to stakeholder discourses, people are either 'for' or 'against' GMOs: either they "accept" them, or they "reject" them. Moreover, during the period 1998-2000, a majority of European citizens, or at least those from particular Member States, were considered to be or to have become 'against'. This uni-dimensional categorisation emerges clearly from the discourses of those qualified above as the key policy actors, but the figure of the consumer (or citizen) "who refuses GMOs" is also widely mobilised by consumer and environmental NGOs, notably through the use of opinion surveys. Moreover, citizens who have not yet formed such a one-sided opinion are often considered as being "undecided", or unable to understand and take sides in a "complex debate", and/or who have not bothered to make the effort to take an interest in the subject. Thus, while some stakeholders (mostly the promoters) complain that people are 'against GMOs' in an unqualified fashion, at the same time all kinds of stakeholders seem to consider that the only normal condition is to be 'for' or 'against' GMOs: those who are undecided have not yet entered into the debate, and are considered to be stuck in a preliminary and immature phase.

How myth 2 was challenged by the PABE focus group results:

Focus group participants did not, overall, express entrenched opinions 'for' or 'against' GMOs. The same participants expressed, often with the same statement, arguments for and against their development (section 6.2).

Focus group participants discriminated, in very sophisticated ways, between different types of GMOs, which went beyond a simple distinction between agricultural and medical GMOs (section 6.4).

Myth 3: Consumers accept medical GMOs but refuse GMOs used in food and agriculture

According to this myth, very widely expressed by stakeholders, and also reproduced in some social science research in this field, people are concerned about the use of GMOs in agriculture ("green"

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[31] Note that this is also apparent from the results of the Eurobarometer survey on transgenic tomatoes shown in Table 5: 30% of the EU population state that they *do not know* whether or not 'ordinary tomatoes' contain genes, and this is a remarkably high figure for any quantitative survey. This revealing result is however rarely discussed by stakeholders and social science researchers using or analysing Eurobarometer results.

[32] These authors, who are co-ordinators for the Eurobarometer survey, also point out - rather ambiguously - that the science quiz, and in particular the question about transgenic tomatoes did not aim to measure "objective knowledge" but rather "negative images" associated with GMOs.

GMOs), but not about their use for the production of pharmaceuticals and medical therapies ("red" GMOs). This is often portrayed as being incoherent since, from the point of view of a scientist, the same recombinant DNA techniques are involved in both cases.

The explanation given, by stakeholders (and some social scientists), for the apparent acceptability of medical GMOs, is founded on the notion that people only accept new products or technologies when they are perceived *to provide direct personal benefits*. Thus, so the argument goes, people can see direct benefits of medical GMOs, whereas for agricultural GMOs - at least for those produced so far - consumers do not detect any personal advantage (in terms of price or health). **In this way, the whole issue is reduced to a simple risk-benefit equation, *at the level of the individual consumer* (or his or her family). This is the key point which is challenged by our focus group results.**

Following this logic, stakeholders believe that medical GMOs (including the use of GM crops to produce pharmaceuticals) are and will continue to be accepted[33], and that if the next generation of GM-foods provides direct benefits for consumers (e.g. improved nutrition) these will be accepted by consumers, and that this might help to enhance the public acceptance of GMOs in general. The first generation of GMOs is described as having brought benefits mostly to farmers, and not to consumers, and this is considered to explain their reticence. But promoters of GMOs announce the arrival of new generations of GMOs which will provide direct benefits to consumers, and which will therefore, in their eyes, help to resolve the controversy[34].

A paradox arises within this view of the public. On the one hand, as described above, lay persons are portrayed as irrational and their responses are assumed to be based on un-scientific subjective perceptions. On the other hand, with respect to this issue of benefits, they are at the same time portrayed as hyper-rational actors who calculate all of the (personal) risks and benefits of all possible options before making the choice which corresponds to the best optimisation of their resources.

In addition, on the one hand, stakeholders (especially promoters of GMOs) accuses the public of rejecting without discrimination *all* GMOs, without making distinctions on a case-by-case basis. But on the other hand, when members of the public do make a distinction between different types of GMOs (e.g. medical and food), they are again accused of irrationality because the same scientific techniques are involved.

It is important to stress once again that this figure of the individualistic consumer does not only circulate among policy actors or promoters of GMOs: it is also prevalent among consumer and environmental NGOs and influences their lobbying and communications strategies. Some therefore devote particular attention to exposing potential evidence of health risks to consumers of GM-foods, and are concerned about the possible arrival on the market of more acceptable pharmaceutical GMOs which they believe might weaken their anti-GMO campaigns. This explains, for example, the investment made by Greenpeace in a pan-European campaign against GM foods, thus venturing into a domain (consumer protection) and following strategies (black list) which had until then been mostly reserved to consumer organisations. It also explains, to some extent, the vehemence of the current controversy surrounding Golden Rice. On the one hand, many promoters of GMOs have utilised this example as a tool to try to increase the social acceptability of GMOs in general, and on the other hand, anti-GMO NGOs have reacted against this communication strategy, because they fear that it might

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[33] However, during the period 1998-2000 we also observed the appearance of the fear, among promoters of medical GMOs, that the controversy over the use of GMOs in agriculture and food might 'contaminate' their field and give rise to controversies also about developments in the medical field. Moreover, when trying to defend themselves against this perceived threat, these actors often repeat and emphasise the critiques made by anti-GM lobbyists against 'green' GMOs (in particular with regard to putative risks associated with dissemination into the environment).

[34] Several different and sometimes conflicting definitions and mobilisations of the concept of 'generations' of GM products circulate among stakeholders. Some are more based upon technical dimensions (for example, future generations will utilise tissue specific or inducible promoters), but the definition based upon potential direct benefits to consumers has become increasingly dominant, as reflected by the definition of "2nd generation crop" used by the European Commission in their recent consultation document (EC, 2001b): "New GM varieties of plants that may have traits (such as enhanced nutritional properties) that appeal directly to consumers, in contrast to 1st generation crops that tend to benefit the producers."

work. Our focus group results suggest that both these types of actors, through these strategies, fail to recognise the sophistication of public responses.

How myth 3 was challenged by the PABE focus group results:

This is a typical case where the primary level observation (i.e. a broadly more positive public opinion of medical GMOs compared to agricultural GMOs) was largely confirmed by the PABE focus group results, but where the *explanation* given for this observation was challenged by the focus group results.

However, even the primary level observation deserves qualifying, since it is based on the assumed linear relationship between 'public perceptions' and 'public controversies' that we challenge in section 2.5. Thus, the more correct observation would be that there is little or no public *controversy* about medical GMOs. This does not necessarily mean, however, that the public has no *concerns* about medical GMOs. Moreover, the definition of "red" and "green" GMOs is open to different interpretations. When stakeholders speak of medical GMOs, the examples they give tend to be medicines produced by genetically modified *micro*-organisms, in *confined* environments (insulin, human growth hormone). But the characteristics which distinguishes these products from GM-crops are *not* solely based on their sector application, but also on the type of living organism modified, on whether they are released into the environment or not, and on the fact that the medicinal product is one which already has a long history of use. As described in section 6.4, these characteristics were considered important by the participants in the PABE focus groups, and this meant that they did not find all potential medical applications of GMOs unconditionally acceptable.

The way in which Eurobarometer results are presented feeds and exacerbates this misconception. Thus, a questionnaire item which is phrased as follows: "introducing human genes into bacteria to produce medicines or vaccines, for example to produce insulin for diabetics", is systematically reduced by the researchers co-ordinating the analysis to "medicines" when they summarise the results (see graphs in Gaskell et al., 1997, 1998 and 1999). Yet more sophisticated analyses of the results from the Eurobarometer and other questionnaire surveys provides interpretations which are much more similar to our analysis of the PABE focus group results (see Hampel et al., 2000, p. 73-74). The problem is that simplistic representations of Eurobarometer results contribute to the stakeholder belief that it is the *medical* characteristic of the product which is of primary importance, and obscures other dimensions. This has important policy implications, since it is on this basis of this interpretation of Eurobarometer findings that stakeholders end up believing that, for example, GM-crop plants that produce pharmaceutical products would necessarily be socially acceptable, and continue to develop them without public consultation.

Yet as described extensively in section 6.4, the PABE focus groups demonstrated that this is not the case. Participants did make a distinction between food and medical applications of GMOs, and were, on the whole, more willing to accept the latter. The perceived benefits associated with medical applications provided a clear argument in their favour, *but this was not the only or even the dominant argument*. The distinction made by the participants between medical and food GMOs encompassed a great diversity of dimensions - all of which were perceived to be in favour of medical applications. Moreover, the sector of application was not the only dimension considered: participants also made important distinction between different medical GMOs, and different food GMOs. Based on these additional dimensions, it became clear that some proposed medical GMOs (notably GM-crop which produce novel pharmaceuticals) might not be considered to be socially acceptable.

In addition, statements about the public acceptability of medical GMOs are founded on the assumption that the general population is aware that medicines derived from GMOs are already on the market, but as demonstrated by our focus group results (section 6.4) this is not necessarily the case.

Myth 4: European consumers are behaving selfishly towards the poor in the Third World

The figure of individualistic consumers who are only concerned about the (positive and negative) consequences of GMOs to themselves and their families is also been widely deployed to argue that citizens of rich northern countries - or at least organisations who pretend to represent them - are behaving *egotistically*, because their refusal to accept GMOs is preventing the development and transfer of agricultural biotechnologies to developing countries which are, according to promoters of GMOs, necessary to combat widespread hunger and poverty in those countries (written illustration: Herrera-Estrella and Alvarez-Morales, 2001). One assumption here is that lay people do not realise that GMOs could improve food production in developing countries.

How myth 4 was challenged by the PABE focus group results:

Most participants did not reject out of hand the idea of using GMOs for alleviating hunger and poverty in developing countries, and felt that this objective was laudable. They were, however, very sceptical about the extent to which such research would be carried out, and the results applied in practice. Negative reactions to this idea where mostly generated by the fact that it was perceived as a manipulative marketing ploy by biotechnology firms who had no intention of developing this type of GMO themselves (section 6.5).

Myth 5: Consumers want labelling in order to exercise their freedom of choice

The figure of the "individualistic consumer" is also associated with discourses and policy about labelling. According to policy actors, consumers want labelling in order to exercise their right to choose whether or not they wish to consume GM foods. This is in general considered, by decision-makers, to be legitimate[35], in order to take into account the fact that some consumers will remain concerned about potential impacts on their own health and will therefore wish to protect themselves; and that some consumers may wish to avoid GM foods for ethical reasons (especially vegetarians or those following diets imposed by their religion).

How myth 5 was challenged by the PABE focus group results:

Again, the first level observation was confirmed: focus group participants did want labelling of GM food. However, yet again, the assumed motivation for this wish was challenged - or rather complexified - by the focus group results. Thus, the use of labelling to protect oneself from potential harmful effects was only one among many arguments expressed by the participants in favour of labelling (section 6.9).

Myth 6: The public thinks - wrongly - that GMOs are unnatural

An important notion in stakeholder discussions about public responses to GMOs revolves around the concept of what is considered "natural" or not. According to many promoters of GMOs and scientists, lay people are obsessed with the idea that GMOs are unnatural. In this context, it is assumed that the lay public perceives all GMOs as "unnatural" - and all other agricultural technologies as "natural". Promoters of GMOs utilise this as yet another proof of the public's ignorance of scientific facts. They speak of this public perception with despair, and consider that it represents yet another important barrier for rational dialogue. On the other side, anti-GMO lobbyists often insist on the supposed unnatural character of GMOs, hoping that this will mobilise their constituencies. The ongoing debate among stakeholders about whether or not GMOs represent a continuum or a revolution compared to

[35] In the EU, but not in the USA (Joly et al., 2001). And even in the EU, this argument was not consensual during the 1990s, when the Novel Food regulations were being negotiated, but became increasingly consensual among policy actors (public sector regulators and industry) in the period 1997-2000.

techniques previously used for genetic modifications (especially "conventional" breeding) is closely associated with this debate about their "naturalness".

Promoters of GMOs and many scientists (especially molecular biologists, less so biologists from other disciplines) therefore consider that the lay public does not realise that human beings have been modifying Nature and the genetic make-up of living organisms for thousands of year, using conventional breeding techniques. They insist on the idea that there is nothing fundamentally novel about recombinant DNA techniques and that they are indeed (according to these actors) more precise and predictable than previous techniques, and thus if anything inherently safer[36].

This is most apparent in public relations material produced by biotechnology firms. Note that this is an example of our analysis of *implicit* visions about the public: these documents do not explicitly sate that "the public thinks that GMOs are unnatural and represent a discontinuity with respect to previous techniques". However, the first and main message of these documents systematically refers to the continuum between "old biotechnologies" and "new biotechnologies" and we interpret that fact as demonstrating that they believe this is a key point that needs to be communicated to the lay public.

As a written illustration (one among very many), here is an extract from the preface of the book which accompanied an exhibition designed by the Nestlé foundation which aimed, according to its sponsors, to "de-dramatise the debate". The key question identified by the sponsors was: "what is common between Neolithic agriculture and genetic engineering?".

> Biotechnology, which has contributed for millenniums to ensure human food, is subject to a decisive boom thanks to possibilities offered by genetic engineering. Man observes and selects food plants, cultivates them, modifies them; he domesticates animals and crossbreeds them. For millenniums, he has intervened in Nature and has adapted it to his needs, with the constant objective to improve the basis of food and to obtain more resistant and productive plants and a livestock of higher quality. Technical progress of the 19th and 20th centuries has opened up fascinating perspectives in domains which had remained invisible and unexplored until then. We have known about DNA for just 50 years, thanks to which our understanding of biological processes which occur in cells has considerably deepened. The molecular tools borrowed from Nature enable a much more precise intervention in the cell.
> (Schärer-Züblin, 1998, p. 4, translated from French)

How myth 6 was challenged by the PABE focus group results:

GMOs were often described as "unnatural" by focus group participants. But many pre-existing non-GM agricultural technologies were *also* considered to be "not natural", including the products of conventional breeding and others such as pesticides, fertilisers, meat and bone meal. Therefore, the distinction between what counts as "natural" and "unnatural" did not rest upon the use of GM technologies, and the focus groups gave some clues as to what was incorporated into lay definitions of "naturalness" (section 6.10). For many (not all) participants, GMOs were simply seen as the latest stage in a long-established trend of modifying Nature. When GMOs were singled out for special attention, it was because they were felt to crystallise a particular view of the world and way of life that they were not entirely happy about (section 6.13).

Indeed it is the stakeholders, and some social science research, who have constructed GMOs as *the* issue and the use of rDNA techniques as the key distinction for public responses (for example by commissioning the Eurobarometer which focuses solely on these technologies).

A consequence of this analysis is that it is inaccurate to portray people who are concerned about GMOs as being necessarily 'for' pesticides - as was often the case in stakeholder interviews.

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[36] This vision of recombinant DNA techniques was promoted early on in documents that informed the regulatory framework for GMOs, most notably at the OECD (1986). It was, however, implemented differently in the EU and the USA, and according to our analysis (Joly et al., 2001) this is one of the key reasons for the difference in the GM debate between these two regions today (rather than any difference in public perceptions).

Myth 7: It's the fault of the BSE crisis: since then, citizens no longer trust regulatory institutions

According to this myth, virulent reactions against GMOs are due to an unfortunate series of previous and ongoing food scandals in Europe. BSE is considered to be the most important precursor[37]. Thus, according to dominant stakeholder discourses, the whole situation has changed since the BSE scandal and citizens no longer trust regulatory institutions. Note that this myth is largely founded on the assumption that *before* the BSE crisis, citizens and consumers *did* trust regulatory institutions. Opinions about whether this removal of trust is legitimate or not vary, but overall it has become common to state that regulatory authorities in Europe did indeed commit errors in the management of BSE risks, and therefore it is reasonable for Europeans to express such distrust. The key objective identified is therefore to "restore trust", either by making changes in institutional procedures (e.g. changes in the organisation and membership of EU level expert committees, and the creation of the European Food Authority), and/or by improving risk communication.

Moreover, according to the dominant stakeholder view of the public, consumers have been over-sensitised and now react in a disproportionate and irrational way to any new story about food risks, however small. And the media is accused of overemphasising food risks and thus amplifying such public responses.

An extreme version of this myth argues that people erroneously amalgamate BSE with GMOs: they do not understand the science well enough to understand that there is no scientific link between the two, since the accepted BSE pathogen, the prion, contains no DNA.

How myth 7 was challenged by the PABE focus group results:

BSE was indeed frequently referred to by the focus group participants, and they used the experience of the BSE affair to construct their view of GMOs. However, many other affairs were also cited, and in each case the behaviour of institutions was described as ordinary - not exceptional or aberrant. Thus, it seems incorrect to assume that before BSE, the public trusted regulatory institutions, but that this trust was lost because of the way BSE was handled. The participants expressed scepticism toward regulatory (and other) institutions, but this was based on their realistic assessment of past behaviour, based on empirical knowledge of past behaviour. Moreover, they did not believe that these institutions had learnt any lessons (or rather the right lessons) from the BSE affair. They therefore expected them - until proved to the contrary - to continue behaving in similar ways (described in box 6), including with regard to GMOs (section 6.3 and others).

Myth 8: The public demands "zero risk" - and this is not reasonable

According to policy makers and promoters of GMOs, people demand "zero risk", and this is not realistic because we all face risks in our daily activities. They usually add that if we had applied such a "zero risk policy" in the past, we would not have developed technologies such as the steam engine, electricity, the motorcar, etc… On the other side, anti-GMO lobbyists often make such demands for "zero risk", and interpret the precautionary principle as meaning: "in case of any remaining doubt or uncertainty about risks one should not authorise a new product" (see for example Greenpeace campaigning material).

How myth 8 was challenged by the PABE focus group results:

This myth was radically challenged by the focus group results, in ways which have very important policy implications. The focus group participants did not demand "zero risk", and were perfectly aware that the daily activities of their ordinary lives are associated with a great number of risks, and

[37] The BSE scandal first exploded in March 1996, and the European GM controversy developed essentially from the end of 1996 (see section 5).

benefits, which have to be balanced against one another in ways which are often incommensurable. Rather, they demanded that inherent and unavoidable uncertainties - which they took for granted - be acknowledge by expert institutions, and be taken into account in decision making. It was the *denial* of uncertainty by these institutions which they found untrustworthy (section 6.6).

Myth 9: Public opposition to GMOs is due to "other" - ethical or political - factors

As already mentioned, overall, policy makers - and sponsors of social science on public perceptions - tend to assume that the object of public perceptions is risk, and moreover, risk as defined by scientific experts and risk regulations (section 2.7). However, when this approach does not seem to resolve their problem, policy makers and scientists often shift into another mode, where they argue that public opposition is *not* about risks, but is instead related to "other factors", usually described as "political, ethical or socio-economic". This idea that public opposition to GMOs is about "other", non-scientific or non-risk factors, is also apparent in EU-level policy discourses (Levidow and Marris, 2001).

When asked to develop on this point in interviews, policy makers focused on ethical factors (rather than political or socio-economic ones), and the predominant example used was that of the crossing of barriers between species or kingdoms. In this way, a whole range of issues (such as those raised in the focus groups) is systematically reduced to this single consideration (one which was not predominant in the focus groups), and is moreover then usually further reduced to a religious dimension.

Anti-GMO activists also often emphasise the importance of ethical, political or socio-economic impacts. The difference is that scientists and officials tended to refer to these "other factors" as being outside of their remit, whereas anti-GMO activists see these as key issues to be addressed.

Some actors (mostly promoters of GMOs) also complain that anti-GMO activists "use" the GM debate to surreptitiously advance broad political objectives (anti-capitalism, anti-multinationals, anti-globalisation). This was more evident in countries, such as France, where anti-GMO campaigns have indeed been closely associated with anti-globalisation social movements (via NGOs such as the *Confédération Paysanne* and ATTAC). They consider that such questions are either outside of their remit, or need to be (or have been) addressed through existing democratic procedures such as voting. In this context, biotechnology firms and other promoters of GMOs often feel that firms and GMOs have been unjustly singled out and that they cannot effectively respond to such criticisms, since they do not seem to be specific to GMOs.

These views were apparent in interviews, but were also demonstrated by participant observation at GM events. At meetings organised by scientists, public policy makers or industry, members of the audience who raise broader questions which are considered to be of a political nature were almost systematically cut off by the organisers and told that "this is not the right place" for such discussions.

With respect to the research presented in this report, two key points need to be emphasised:

(i) Policy makers and scientists usually consider these "other factors" to be *private*, based on *individual value judgements*, and totally void of any intellectual content. As a result, the assumption is that there can exist as many positions as there are individuals, and the issues raised are considered to be intractable, and not amenable to societal deliberation. At best, the only legitimate references considered are religious leaders or philosophers.

(ii) Stakeholders of all types tend to consider that these "other factors" are totally unrelated to risk or scientific dimensions.

How myth 9 was challenged by the PABE focus group results:

The focus group participants did raise a wide range of concerns and issues which were not related to risk, as defined by scientific experts and regulations. But overall, these broader issues were not "extra-scientific" or intellectually vacuous and private. These broader concerns, which are traditionally thought of as "ethical" or "political", could not be simplistically separated from considerations about risk assessment, or about R&D policies.

Concerns about crossing species boundaries were raised, but were not predominant (even in groups of practising Catholics). And when this issue was raised, it was directly related to questions about how to predict the behaviour and impacts of the new living organisms "which had not existed before".

Moreover, moral-ethical objections were expressed about the ways in which official policy attention, shaped by expert knowledge and advice, has excluded the very dimensions of the issues which most concern people. This was particularly true in the case of negative judgements made about the undue narrowness of the scientific framing of risk and risk assessment. When support for the development of GMOs is based on assertions about risk assessment ("no of evidence of risk"), concerns are expressed about the implications of *not* raising these wider questions. This judgement was founded on an intellectual judgement of scientific risk assessment and the exaggerated claims made for it when it denies the predicament of ignorance and unpredictability. (All of the themes covered in section 6 are relevant, but see in particular 6.3, 6.6 and 6.7).

Myth 10: The public is a malleable victim of distorting sensationalist media

A very dominant myth among policy actors and promoters of GMOs is that the public is manipulated by a sensationalist media which distorts the facts. In this context, members of the public are assumed to be powerless, as if they were just passive receptors who absorb information from the media without any capacity for critically assessing both the content and the source of information.

Thus, the GM controversy (and other socio-technical controversies) are often described as being almost single-handedly generated by journalists. In this context, journalists are often portrayed as irresponsible, because they unnecessarily scare consumers and generate important economic losses. Moreover, a key complaint by stakeholders (especially scientists involved in GM research) is that journalists misrepresent scientific facts and pay more attention to anti-GMO activists than to more serious scientific sources. Thus scientists often propose initiatives to set up "media observatories" which would aim to systematically identify and denounce scientific errors in the media. This position is founded on the belief that the role of journalists is to transmit (popularise) scientific information from scientists to the public[38].

A detailed analysis (and documented refutation) of accusations levelled at the media by stakeholders in the context of the UK GM debate has been developed by Hargreaves and Ferguson (2000), who start with the same observation as us (p.1):

> The media stand accused of fanning baseless public concern, even hysteria, and so depriving citizens of scientific knowledge and understanding. Propelled by competition, newspapers and broadcasters are widely seen to be 'dumbing down' at a time when the pace and salience of scientific change demands a smarter, calmer, more scientifically literate public.
> Reporting of the GM affair has reinforced the longstanding contention of many scientists that there is 'something wrong' with the way the media go about their business; that journalist should be firmly rapped on the knuckles and invited to mend their ways.

[38] The PABE study did not include any direct or detailed analysis the role of the media in the GM controversy, because it was felt that this was beyond the means available for this project, and that research about the media by other researchers could be utilised to complement our study. Moreover, although the mass media certainly play an important part in any public debate, we consider, as discussed in section 2.5, that there exists ample evidence to demonstrate that there is no direct link between media coverage, public perceptions, and controversies. (Journalists were not included in the list of stakeholders to be interviewed, although they are of course key actors).

How myth 10 was challenged by the PABE focus group results:

The fixation, by many stakeholders, on the role of the media as the key determinant of public views implies a passive and intellectually vacuous public; a public that is simply the *tabula rasa* upon which media discourses are inscribed. The PABE focus groups were not designed to explore the reception of media messages by lay people, but our results confirm previous research (e.g. Hargreaves and Fergusson, 2000; Philo, 1999) in this field which demonstrates that the public is in fact actively engaged in the interpretation and judgement of multiple forms of mediation and information, some of it involving the mass media, some not. Thus members of the public cannot be characterised as victims who simply absorb media information. (See "perceptions of the media" and "perceptions of NGOs" in section 6.8 and section 6.9).

Hargreaves and Ferguson, quoted above (2000), attempt to answer the question "why have we, in the last two years, once again, slipped into such bitter recrimination abut the relationship between science and the media? And what can be done about it?" (p.2). Like us, these authors (p. 3-4) argue that:

> to suggest, as politicians and scientists often have during the GM foods controversy, that 'the public' is a malleable victim of distorting media is at best an oversimplification and at worst an outright deception. Rather, we must try to understand a set of circumstances in which all trust is contingent, shifting and, necessarily, subject to multiple forms of mediation, some of it involving the mass media, some not.

8.4 Misconceptions about Trust

One additional key concept mobilised by policy makers when discussing public responses to GMOs is trust, or rather lack of trust, which has increasingly been identified as a key problem and issue to be addressed by institutions involved in risk management.

The focus group results presented here suggest that trust is indeed an important dimension in public responses to proposed technologies and policies, and that the issue of trust cut across all the other socio-cultural factors identified in the focus groups discussions. Mistrust was for example related to:

- lack of *adequate* information
- failure to acknowledge past errors and to learn from past mistakes
- lack of sanctions for those responsible past mismanagement or fraud
- denial of inherent uncertainties, especially about long term or chronic impacts
- apparent failure to take into account common sense knowledge about the behaviour of plants, animals and institutions in real life
- reliance on limited types of expertise
- lack of transparency about how different interests, risks and benefits are balanced against one another
- failure to take into account equity issues (distribution of risks and benefits), and societal need
- lack of any means to influence inter-linked societal and technological trajectories

In all of these ways, official institutions moreover demonstrate *their own mistrust of the public*: they do not seem to consider that ordinary citizens might be capable of maturely sharing with them difficult multi-faceted decisions and the uncertainties associated with them.

Restoring public trust in regulatory institutions tends to be seen as an issue to be resolved by improved communication strategies and is largely treated independently from other policy decisions. But our results demonstrate that trust is not just about how an institution *communicates*, but is much more about how it *behaves*. Restoring trust would therefore, we suggest, require profound changes in institutional culture and practice, not just better public relations strategies. In order to engender public trust and legitimacy, the research presented here suggests that institutions would need to demonstrate

their capacity for adequate management of risks through consistent behaviour over a long period, and across different fields (not just GMOs), by, for example:

- Admitting past errors.
- Admitting that they don't always necessarily know best.
- Admitting uncertainty, and explaining how this has been taken into account in decision-making.
- Utilising input from all relevant sources (not just scientific experts).
- Being transparent about *how* decisions are made, including explaining how different interests, risks and benefits have been balanced against one another.
- Imposing heavy sanctions in cases where mismanagement or fraud is identified.
- Overall, demonstrating that views of the public are understood, valued, respected, and taken into account by decision-makers - even if they cannot all be satisfied.

8.5 How can one explain the persistence of such mistaken views about the public?

The PABE focus groups results did not support the dominant stakeholder view of the public characterised by the 10 "myths" listed in Box 8. Moreover, previous research on public perceptions had already challenged such visions of the public (e.g. Callon et al., 2001; Slovic, 2000; Wynne, 1995). How then can one explain the persistence of these views about the public among stakeholders, when numerous and independent studies of public perceptions have demonstrated that they so inaccurately represent views expressed by ordinary citizens? This question is even more important and perplexing given that we argue that these entrenched views about the public are self-defeating, in that they lead to policy strategies (e.g. in terms of R%D, commercialisation, regulations and communication) which do not respond to public demands in a satisfactory way. Thus, following our argument, the current impasse in the European GM debate is largely due to these misconceptions about the public. How can this be so?

For stakeholders who play an active role in decision-making (civil servants, scientists, regulators and representatives of biotechnology firms), this persistence can be explained to some extent by examining their sources of information, and the references that they mobilise (in interviews or in public) when describing public responses to GMOs. Three key sources were identified i our interviews: opinion surveys, media coverage, and anti-GMO activists engaged in the debate.

The first reference is **opinion surveys**, and in particular the Eurobarometer. But such surveys utilise closed questions with unidimensional scales which only allow respondents to express a degree of support or rejection to the proposed item. This explains in part representations of the public as either 'for' or 'against' GMOs. More qualified, discriminating and conditional attitudes cannot easily be captured surveys of this type. These more nuanced public responses can appear as "don't knows" (as is apparent in the results to the Eurobarometer question on transgenic tomatoes - see Table 5), but these responses tend to be overlooked in the analyses of the survey results. In addition, superficial utilisation of survey results are often used to portray the public as irrational, when responses to different questions seem incoherent or inconsistent from the point of view of the researcher or the actor using the research results.

This problem is exacerbated by the fact that, when stakeholders utilise results from quantitative surveys, they tend to stop at the level of primary raw data which seems to them to summarise the situation accurately (e.g. the "Eurobarometer tomatoes"). They do not to refer to more sophisticated secondary analyses that some researchers develop (e.g. Gaskell et al., 1998; Hampel and Renn, 1999). Moreover, the way in which Eurobarometer researchers themselves present the synthesis of the survey results obscures more complex dimensions. For example, as discussed earlier (section 6.4 and myth n°3 in section 8.3):

(i) The translation of the item on recombinant insulin to "medical GMOs" feeds the "red is good green is bad" myth; and

(ii) The absence of discussion of the - often very high - levels of "don't know" responses fails to convey the fact that many Europeans do not have entrenched views on GMOs (or do not accept the framing of the question posed in the survey).

We found that stakeholders tended to refer to the Eurobarometer articles in *Science* or *Nature* (Gaskell et al., 1997 and 1999), and not to the books written by the same authors (Durant et al., 1998; Gaskell and Bauer, 2001). Stakeholders also referred to the raw data, which is published in reports by the Commission long before the books containing the detailed and more nuanced analysis of this data. They also took their cues from the press releases accompanying the publication of these reports, which represent one particular interpretation of the key findings from each survey. Like all interpretations, that published in these press releases is necessarily subjective.

As discussed in section 2.8, qualitative methods including focus groups, because they are more open-ended, can facilitate the expression of more ambiguous or complex public responses. They can therefore help to explain seemingly inconsistent quantitative results, and can be used to try to avoid the imposition, by researchers, of particular framings of the problem on respondents. Ideally, public perception research and policy insights from this research should be developed on the basis of mixed-methods.

A second frequent reference used by stakeholders when describing public responses is **media coverage**. Journalists (like most other stakeholders) claim to represent the public and the public interest, and many of the myths described above are promulgated in the media. However, as discussed in section 2.5 media representations cannot be taken as accurate and direct reflections of public views. The media is just one of many arenas in which controversies are played out, and the mobilisation of different representations of the public by different stakeholders is part of the social dynamics of public debates (see section 5.1).

Thirdly, the interactions these actors have with the public are limited (within their professional life) to meetings with **actors engaged in the debate**: representatives from trade unions, or environmental and consumer NGOs. Moreover, existing institutional procedures (in EU democracies) tend to mean that, at least in the short term, it is these organisations that hold these policy makers to account for their actions. Decision makers, especially in the public sector, therefore pay particular attention to identifying, understanding and responding to the views expressed by these stakeholders from civil society, and can loose sight of the fact that these organisations do not necessarily accurately represent the views of ordinary citizens. Moreover, in the context of negotiations, activists, in order to promote their cause and influence public policy will tend to adopt rather extreme positions[39].

These three sources of reference (opinion surveys, media coverage and activists) are inter-connected and mutually reinforce each other. For example, journalists report surveys which reveal negative opinions, and activist actions and arguments. This can reinforce the distorted view that decision-makers have of public views. Alternatively, some decision-makers will on the contrary insist on a marked contrast between ordinary citizens and journalists or activists who purport to speak for them, and will claim that the media manipulate the opinion of misguided citizens, as if these were unable to form their own opinions. These two apparently contradictory were indeed found to be expressed by the same individuals.

A more profound source of stakeholder views of the public (and of the role of lay people in the evaluation of risk and in the appraisal of science and technology policy) can be traced to underlying views of scientific knowledge (Callon, 1998; Joly, 2001; Wynne, 1995). The dominant view of the public, which we identified among stakeholders in the GM debate, corresponds to a particular conception of science as autonomous from society, ruled by its own particular norms and procedures, which assure the production of neutral, objective and universal knowledge (model 1 in Callon, 1998 and in Joly, 2001). The continued prevalence of this particular view of the public can therefore be seen

[39] These views will not necessarily reflect the 'real' or only view of the activist either, since activists (like other actors) will adopt different attitudes and discourses according to the arena in which the confrontation is taking place (Dodier and Barbot, 2000; Epstein, 1996; Joly et al., 2001).

as part of the work conducted by decision-makers to construct or preserve the boundary between what counts as science and what does not, in order to preserve the legitimacy of science as the basis for decision-making (Gieryn, 1983; Jasanoff, 1987)[40].

[40] This point is further developed in Marris, 2001.

9. Key policy implications

We outline below the principal policy implications that arise from the findings of our research. We readily acknowledge that the kinds of challenge which this research has identified are demanding and complex – perhaps more so than in conventional representations of the public acceptance problem.

9.1 Need for broad based cultural change among institutions

The possible solutions to the crisis surrounding GM agriculture and foods in Europe lie substantially in changed policy commitments as practice, rather than only (as is often conventionally implied) in "modes of risk communication" and "forms of representation".

If the public lack of confidence crisis that the EU and other bodies have recognised is to be addressed, one of the over-riding and crucial practical implications of this study is that scientific and policy institutions should be encouraged to examine in a critical way their own actions, reactions and habitual modes of thought. They need to change their cultural habits of thought and practice, both with respect to scientific knowledge and with respect to public views and responses.

The problem with presenting this cultural change as a practical policy implication of our research is that, rather than being an immediate practical challenge, changing the prevailing institutional culture is more about changes to conventional ideas and habits of thought which define routine practical responses to events and situations. Thus it cannot be reduced to the usual tool-box of imaginable instruments and policies, but instead has to be described in terms of abstract ideas, since these are what constitute the problem and the objects of much needed change. Thus, inevitably, what follows appears not as a set of practical actions to achieve a recommended policy or political situation, but as a series of connected ideas, more or less orientation guidelines rather than practical recommendations. What is proposed here should be seen as a long-term process, not as a singular policy act, tool, or decision.

In the discussion below we provide several substantive elements of what this cultural change would involve. Recent EU policy documents, most notably the White Paper on Governance (EC, 2001a) suggest that momentum for this cultural change is gathering, although understandably there is still some way to go (Levidow and Marris, 2001). The current debates stimulated by the EC President over "science and governance" are a good example of a constructive approach to this wider policy-cultural challenge of governance beyond the boundaries of GM policies alone.

9.2 Science does not have all the answers – nor all the salient questions

One of the key aspects of this desirable cultural change would be to cultivate a climate of thought in which science is not routinely assumed to be able to predict all consequences of new technologies. Nor can it be expected to be able to imagine all the salient questions. Furthermore, ordinary publics are quite capable of living with this reality of lack of control. The evidence clearly shows that they already know this anyway, so it is not a good idea to continue to allow scientific and policy institutions in effect to deny this predicament, and thus undermine their own public trust and support. These observations are offered in the spirit of profound support for the healthiest science and the best possible scientific information of policy and public debate, a commitment which we are convinced even some of the harshest critics of GM science and its present modes of development deeply share.

9.3 Need to be open about uncertainty and ignorance

There is a need to be open about uncertainty and ignorance, in the light of our key findings about the typical public readiness to accept, as a necessity, uncertainty in the form of lack of predictive control over consequences, especially in the long term.

It is widely assumed that the public expects scientists and policy makers to deliver zero-risk with certainty before technological innovation can be accepted. But we have found, consistent with other research, that ordinary people recognise ignorance and lack of predictive power as a common predicament in innovation and regulation.

Thus the assumption that the public is unrealistically expecting scientists to prove zero-risk before innovation will be allowed, was not supported by our focus group results. Our fieldwork shows, again consistent with other work, that people assume that there will be unanticipated consequences and that this is not necessarily science's fault. They are more concerned to ensure (a) that scientists and scientific institutions openly recognise this reality, and (b), that given this inevitable ignorance, the reasons for proceeding with innovation are good ones. This is our interpretation of why in our focus groups people incessantly asked, "what are they doing this for?" about GM food innovation. "What are their purposes? Are they private ones, for people already with little need? or are they for some important public purpose, like feeding starving people, or medical therapies which cannot be obtained in any other way?" These examples of the wider questions which the public feels to be salient, which cannot be answered by science and which are neglected in policy institutional processes.

9.4 Need for societal deliberation about the *purpose* and *need* for innovations

A debate about the purposes and social visions driving and shaping research and innovation needs to be developed and made part of the accountable decision-making process. Moreover, this debate should not be confined to the latter stages (near-market) of R&D trajectories, and limited to so-called ethical or social issues.

The connections between the expressed public concern about the purposes driving technology, and public recognition of ignorance, need to be understood. From the point of view of the public, it is precisely *because* science cannot reasonably be expected to fully and accurately predict future impacts that the question of need has to be addressed.

Moreover this does not stop at the boundaries of publicly funded GM research. The same needs to be done for private corporate R&D programmes, and this of course runs into problems of confidentiality. Even if the solutions are difficult and presently invisible, the problems need to be addressed as such, and not falsely simplified and distorted in ways which further undermine public acceptance and trust. It ought to be possible to develop debates and practical responses in ways which allow scientists, and others who influence R&D, to become more sensitive and responsive to public concerns and priorities without this meaning direct involvement of unqualified people in technical decisions, and without legitimate commercial interests being compromised**.**

9.5 Recognise the relationship between ethical concerns and risk-knowledge issues

Ethical concerns need to be recognised by scientists, stakeholders and policy makers as being intricately interconnected with scientific issues. They are not "extra scientific" or intellectually vacuous and private - they are concerns about the undue narrowness, denial even, of wider issues within the policy process, including within scientific appraisal of risk. These intersections between and across conventional categories of analysis and policy debate (science/risk and "other" factors) need to be recognised, otherwise the role of existing institutional behaviour as a central part of the problems will continue to be obscured.

We have found public discourses to be richly-filled with questions and statements which express moral-ethical frustrations and objections. These objections were about the ways in which official policy attention, shaped by expert knowledge and advice, has excluded the very dimensions of the issues which most concern people. This was particularly true in the case of negative judgements made about the undue narrowness of the scientific framing of risk and risk assessment. When support for the development of a technology is based on assertions about risk assessment ("no evidence of risk"), concerns are expressed about the implications of *not* raising these wider questions. This widespread ethical judgement needs to be recognised as founded on an intellectual judgement of scientific risk assessment and the exaggerated claims made for it when it denies the predicament of ignorance and

unpredictability. These objections about the institutional framing and selection of issues need to be recognised as ethical concerns, but they need not be considered as private and not amenable to rational debate (Wynne, 2001).

9.6 Objectives of public participation

From our perspective, public participation in what have been treated as exclusively expert deliberations and decision processes is about making prior framing assumptions, including technical ones, open to questions and accountable answers. Public participation is not simply about adding on "extra-scientific" dimensions to decision making, as if all scientific issues were settled. This is very different from a conventional understanding about public participation.

The most common response to the policy crisis over public opposition to GMOs and related science has been to increase modes of public participation in expert deliberations, as if this would somehow automatically engender better, more legitimate and more trusted decisions. We support this general move, but with some key qualifications outlined below. Public perceptions research allows some insight into what kinds of factors lay members of the public might bring to such mixed deliberations, and what role they might be expected to play vis-à-vis expert knowledge and the issues to be resolved.

One clear point from our fieldwork is that participatory initiatives should not be founded on the assumption that lay publics know better than experts about the processes which may be relevant. Nor do lay people imagine that they are; they are quite ready, even anxious, to defer to expert knowledge where that has been legitimated by some combination of:

- existing institutional relations and channels;
- practical experience of trustworthy past performance;
- experience of acceptable institutional "body-language", e.g. consistency between stated and apparent motives;
- evidence that the experts are listening to people's own definitions of what the issues are, and are taking these into account.

We believe that the objective of public participation should be to open up expert knowledge to reflexive questions about its own framing – how and why did it came to be focussed upon a particular definition of the problem? What were the alternatives and how were these deliberated? And what other possible questions have thus been neglected and why? All of these questions also involve the question: what kinds of knowledge are relevant to this issue? Very often the only effective way to achieve this form of reflexivity is by involvement of participants from outside the established expert sub-cultures. This extended peer review may involve both lay publics and critical experts.

In addition, public participation can bring with it specific kinds of lay knowledge which had been ignored but which is strategically important to the issues, for example practical knowledge of workplace short-cuts and the like. These are not superior bodies of knowledge, just necessary complementary ones which need to be taken into account in decision-making.

9.7 Science and Gouvernance, and the precautionary principle

Our findings have important implications for current EU debates on "Science and Governance" and the application of the Precautionary Principle.

Our observations correspond with the recommendations of Stirling and colleagues (Stirling, 1999) that, in order to be consistent with the precautionary principle, policy deliberation processes for the appraisal of GMOs and other technologies should include deliberate consideration of:

- the aims and purposes behind the innovations in question (for example: sustainable domestic agriculture? globally-just food production and distribution? globally-competitive food prices? or maximum value-added production from land-use?);
- systematic accountable appraisal of a range of alternatives;
- as diverse-as-possible a portfolio of alternative options;
- the broadest possible inclusive deliberation about the issues, possible consequences and the conditions under which any chosen technology would be implemented.

Recent EU policy debates and policy statements have undertaken to make the policy-making process more inclusive and accountable by involving citizens, and the White Paper on Governance (EC, 2001a) catalysed a more fundamental analysis of legitimacy problems for science and technology. Our recommendations are in line with those made in the associated report on "Democratising Expertise", which emphasised the inherent, normal conflicts around scientific knowledge in policymaking:

> The experts themselves are thus key actors of 'governance'... While being increasingly relied upon, however, expertise is also increasingly contested.... Scientific expertise must therefore interact and at times conflict with other types of expertise, while at the same time being subject to the normal cut-and-thrust of academic debate within the scientific disciplines themselves. In general, the lack of transparency in the way expertise is selected, used and diffused by governments is considered by many (e.g. parliaments, media, civil society organisations) to undermine the legitimacy of the policy process (Liberatore, 2001: 2).

This account attributes the legitimacy problem to unacknowledged choices in constituting official expertise and evaluating scientific knowledge. To remedy that problem, it proposes various measures such as the following:

> 'Democratising expertise' should not be understood as sacrificing quality, but as extending the traditional procedures for assessing quality. This refers not only to scientific excellence but also to the ability to respond to policy and social concerns (ibid.: 7).
> As a general rule, the evidence used to shape policy decisions, and how it was used, should be published... Rather than providing simplistic 'black and white' message that could prove inaccurate or wrong, the strategy should ensure that uncertainties and controversies, where they exist, should be made explicit (ibid.: 20).
> Knowledge used for policy-making and public debate should not only be excellent from a scientific point of view; it also needs to be 'socially robust', responding to policy, social, economic needs or concerns. This involves expertise beyond traditional and professional 'peer' community to include those with practical or other knowledge about the issue at hand (ibid.: 22).

According to this report, then, decision-making procedures should acknowledge the choices and uncertainties which are normally hidden by scientific advice. This overlaps with our findings and suggests that the broad cultural change we call for here has already begun. However, the recommendations in "Democratising Expertise" stand in tension with the prevalent EU policy language and current institutional structure of expertise (Levidow and Marris, 2001).

9.8 The contribution of qualitative social research

Qualitative and interactive methods like focus groups, competently used, are a useful resource which can enlighten institutions in important ways to improve their policy effectiveness.

If carefully used, they can achieve deeper and subtler levels of understandings of the nature of public perceptions than survey methods (which have other uses). Moreover these extra forms of insight are important for practical policy, perhaps offering understandings which could if taken seriously allow the emergence of more resilient, discriminating and mature policies, policy actors and policy processes than have yet been seen in this overall field.

The use of focus groups for public perceptions research can more effectively capture qualities of real social situations in which debate, reflection, and the interactive formation of authentic public attitudes occurs. While their limitations should not be ignored, focus group discussions simulate to some extent the real-life situations in which sooner or later ordinary people shape their own attitudes, in relation to others around them. These real-life processes of course also intersect with and are influenced by other more - or less - authoritative sources of information and views at large in society.

9.9 The public should not be seen as the sole source of the problem

Policy makers should be prepared to consider that the source of the problem is not only to be found in the behaviour of the public but also in the behaviour of institutions responsible for creating and managing innovations and risk. This seems to us the most urgent imperative for the development of a more constructive and satisfactory debate on agricultural biotechnologies in Europe.

We do not believe that the object of public perception research should be "to improve public trust in science, institutions, or their policies". Expressed in such an instrumental way this is almost automatically self-defeating. Better all-round understanding and better policies (e.g. for risk reduction or the development of socially useful innovations) are surely the correct objectives, from which complex conditions like trust (which is not the same as agreement or acceptance) should follow.

We are convinced that public (lack of) acceptance, or (lack of) trust, should not be defined as the central problem, since this implies that the problems all lie with the public (and agencies which influence it like the media and NGOs). Recognition of the problems, rather than continuing to project the problem onto others, would we suggest in itself contribute to a positive change in the climate of public confidence.

If the institutions involved could demonstrate an authentic commitment, and capacity, to engage in the kind of self-reflexive understanding and practice which has been described in this report, conventional solutions (which imply full control and resolution of the problem) would not be needed in order for public policy to make major advances in terms of gaining public legitimacy. The resulting debates might not be any tidier, but if members of the public were to feel that the real issues were being addressed, with the right motivations, this would not matter. Such a policy re-orientation would probably itself change the basic mood of the GM public debate for the better.

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Annex 2. Protocol for Phase I focus groups

Part 1 – INTRODUCTION
(10 minutes – N.B. timings are approximate and only included as a rough guide)

1.1 Introduction by moderator
- Introduce moderator as social researcher from [Name University] (and colleague, if appropriate). Explain that moderator will facilitate the discussion, and colleague will listen, take notes and look after the tape recorder.
- Explain what use will be made of audio recordings: the recordings will only used by the researchers, and the identity of the participants will not be revealed.
- Explain that this research has European Commission funding.
- Repeat that the group will be discussing food and new developments in food production.
- Explain that participants should be free to express their opinions, that their opinions matter, that there are no right or wrong answers.

1.2 Warm-up question to participants
"Will you each introduce yourself and say a little about who is responsible for buying and preparing food in your household." *(Go around the room)*

Part 2 – FOOD (15-20 minutes)

"Thinking about the changes that have taken place in the way that food is produced, would you each think of one way in which food has changed for the better and one aspect that you are not happy about or which has caused you concern." *(Go around the room)*
Probes: What changes do participants view as significant in relation to:
- Farming practices
- The food processing and distribution chain – processing, distribution, retailing, packaging
- Related health standards and issues
- Related environmental standards and issues
- Regulation of the food industry (is it strong/transparent/effective enough?)
- Food quality (e.g. consistency, flavour, safety, convenience, variety, etc.)

"What do you feel has been gained and what has been lost as a result of these changes?"
Probes: do participants make any distinction between past and recent developments?
- Perceived differences in pace of change;
- Perceptions of qualitative differences in change; and
- Judgements about good as opposed to bad changes.

Compare more historical changes with changes in the past ten years or so.

- Who or what are the main drivers of change in the food supply chain?

E.g. consumers, retailers, food manufacturers, farmers, agro-companies, regulators (including local/regional, national and European government)

- How responsive to public demands are these different actors?

Probe: Look out for and follow up any international comparisons.
If none are made spontaneously, prompt participants for their views on how things are/might be done differently in other countries.

"Where do you see these changes heading? Where do you think the food industry will be in ten years time?" *(Don't go round the table)*

Part 3 –GM CROPS AND FOODS (15 mins)

"What images or associations does the term 'genetically modified food' raise for you?"
Make a list and probe to find out what associations and meanings images have.

"If you looked up a definition of genetically modified foods in an encyclopaedia, it might say something like this [*show board*]. Genetically modified organisms are now beginning to be used in agriculture and food production."
Board:

Genetically modified organisms (GMOs) are bacteria, plants or animals which have had some of their characteristics changed by manipulating their genetic make-up.

Probe questions:

- Have you heard about such developments?
- What have you heard?
- Where did you hear/see that?
- Who said what?
- Have they encountered different or conflicting points of view?
- Who do you/would you believe?
- How do you feel about these developments?

Part 4 –EXAMPLES OF GM FOODS (35-40 minutes)

"We have talked generally about genetically modified foods. What I would like to do now is to give you a few specific examples and hear your views about them."
Probe questions for all examples:

- Is such a development generally a good or bad thing? In what way?
- What companies would be the first to make them – why?
- Which shops would be the first to sell them – why?
- Who would buy/use a product made in this way?
- In what ways do you think these people are like/unlike you?

Genetically modified crop plants

"Here are two examples of genetically modified plant crops"

Show statements on display board or OHP

A gene has been inserted into soya bean to make them resistant a specific weed-killer. This means that when the weed-killer is sprayed on the field, it kills all the weeds in the field without killing the soya bean crop. Corn (or maize) that has a gene from a bacterium inserted to make it resistant to an insect-pest. This means that when the insect eats the maize, it is killed.

Suggested probe questions:

- Are these developments generally a good or bad thing? In what way?
- Who would make and sell them?
- What kind of farmers might grow them?

"Let's look at some of the food products that might use these genetically modified crops."

Show examples on display board or OHP (this text is too long so cut verbal examples by using a collage of photographs of typical products – with a little text - to give an impression of the range of products affected to cut down on use of text)

Soya: "Not many people eat soya beans themselves, but soya derivatives are used in many common foods. For example, soya protein is added to many pre-cooked meals (such as cannelloni, shepherds pie, lasagne) and soy sauce is used for cooking. Soya oil is used as a cooking oil and also as an ingredient in other foods, including some margarine. Soya flour is used in bakery products. Lecithin is extracted from soya bean oil and is used as an additive (emulsifier) in many processed foods, such as margarine, sliced bread, fruit tarts, chocolate, chocolate and biscuits. Soya flour is also used in cattle feed." Maize (or corn): "Corn can be consumed directly by humans as sweet corn or corn-on-the-cob. Corn flour is used to make corn flakes and corn chips for human consumption. Corn flour, modified starch and gluten derived from maize are found is small quantities in many common foods, such as packet soups, chocolate desserts, pre-cooked frozen meals, tomato sauce, biscuits, baby food, crackers and custard powder. Corn is also used a lot for animal feed (to feed pigs and poultry). Corn derivatives (starch and sugars) are also used for non-food purposes, such as the production of paper, glues, pharmaceuticals, plastics."

Tomatoes: "Another example is tomato paste, made from tomatoes that have been genetically modified so that they soften more slowly. This makes processing into tomato paste easier."

Probe questions:
- What do you think about the use of genetically modified ingredients in these foods?
- What benefits do you think they may have?
- For whom?
- Are they needed?

Probe: If labelling not raised spontaneously move onto labelling by asking:
- Do you think such products should be labelled?
- Why?

Probe to see why they want product labelling: e.g. health and safety, ethical or environmental reasons for labelling and food-choice.
- Do you read food labels?
- What kind of people read labels?
- Do you think the food producers will want to label such foods?

Move on to GM animals and pharmaceutical applications
"We have talked about genetically modified plants. There are also experiments with animals. Let's look at some types of genetically modified animals that might soon be used in agriculture."

Show statements on display board or OHP

A trout gene has been inserted into carp to make the fish grow quicker.
An animal gene has been inserted into salmon to make the fish grow quicker.
A human gene has been introduced into pigs to make them grow quicker.

- What do you feel about these developments?
- What benefits do you see them bringing?
- Who will benefit? (e.g. consumer or producer)
- Are they (all) desirable…or is it needed?

"This same technology can also be used to produce pharmaceutical products, although none have been commercialised as yet. Here are two examples of experimental developments."

Show statements on display board or OHP

A human gene has been inserted into tobacco plants to produce haemoglobin, that it is hoped could be used to treat human patients.
A human gene has been inserted into sheep so that a medicine, which it is hoped could be used to treat a serious human disease, can then be extracted from the milk of the genetically modified sheep.

Discuss as before

Part 5 – TRUST (20 minutes)

"Now we are going to talk about genetically modified maize again: the type that has been modified to be resistant to an insect pest. This is how some people might talk about the new product."

Show each statement in succession (use boards or OHP):

The safety of the corn has been assessed by a group of experts. There is no scientific evidence that the insect toxin in the corn can cause harm to humans. The toxin is found in very low levels in edible parts of the corn and disappears during processing. Therefore consumers need have no concerns about eating the genetically modified corn.
Government regulator
Crops with their own in-built insecticides mean less chemicals will need to be used. We have done feeding trials with animals and looked for any changes in the corn that could be dangerous. Based on this we conclude that genetically modified corn is just like any other corn and just as safe. This new technology is essential to increase the world food supply without having to plough up the entire planet.
Company that produces genetically modified plants

With genetic engineering the species barrier has been broken –new organisms have been fashioned that are not found in nature or in traditionally bred crops. Some scientists argue that the long-term effects of this corn are unpredictable. It may accelerate the development of resistance in pests and unbalance natural controls. *Environmental group*

- What do you think when you read such statements?
- Which of the above are you likely to believe – and why?
- What would each of these groups have to do to improve your confidence in the use of genetic modification in the agricultural and food industries?
- What role or responsibility do you think each of these organisations should have in relation to these developments?
- Are these organisations likely to behave in such ways?

Part 6 – PUBLIC PARTICIPATION AND AGENCY (10 minutes)

"Do you feel that, at present, members of the public have any role or influence in making decisions about these new developments?"

- What role do the mass media play in informing and orienting public opinion and your own views?
- Should the public have a role?
- If so, what form do you think that it should take (at national/European level)?
- Probe further on question of information (rights), etc.

"You may have heard that some of the people who oppose these developments have taken direct action, which has included up-rooting crops at test sites. What do you think about such actions?"

Part 7 – FEEDBACK AND CLOSE (5 minutes)

Explain that the project aims to inform public policy on these issues, emphasise the value of their contribution, and thank them again for attending. Offer to answer any other questions about the research.

Annex 3. Protocol for Phase II focus groups

Outline of main sections/ themes and s*uggested* timings

First meeting

1. General introduction	(10 minutes)
2. Lifestyle orientations (including food-related cultures)	(30 minutes)
3. Speed of change associated with food technologies	(20 minutes)
4. Views on social need (and private interest)	(30 minutes)
5. Food, health and nature/environment	(30 minutes)
Second meeting	
6. Summary of main points raised in the first session	(10 minutes)
7. Perceived long-term uncertainties	(30 minutes)
8. Views of key institutions	(40 minutes)
9. Views on public agency	(30 minutes)
10. Concluding statements and debriefing	(10 minutes)

Notes to moderators

A few very important points should be made about the use of this protocol. The analytical themes that have been used to organise the prompts are not 'sustainable' as discrete topics of discussion. People will certainly move across these false boundaries in the course of the group. For example, in the final hour of session 1 the discussions of social need/private interest and of environmental and health risks are likely to intermingle as these issues are so closely linked. The protocol should be used more as a map of the analytical issues to be covered, rather than followed slavishly in a linear way. The prompts in **bold** should follow in an order that makes some sense (although that does not preclude deviating from that order if the discussion dictates) but the suggested probe questions in *italics* are not listed in any particular sequence.

You may find that, particularly in the later part of session 2, that you do not wish to use all of the suggested statements/stimulus materials (perhaps because people have already picked up on the issues and to do so would interrupt the flow of discussion). As long as the relevant issues are covered, that will not be a problem. Again, the 'quotes' are only intended as an aid to discussion - if you feel that not all of them are needed, don't feel that you have to use them. The suggested timings for each section are also very approximate and should be taken as no more than a rough guide and, particularly as some topics will blur together, they should be adjusted accordingly.

Finally, the main purpose of these groups is to explore the analytical themes and issues identified in our discussions in Venice. To facilitate that, a separate note is also being circulated that compiles from the reports of those discussions the main points to be investigated. This note should be treated as just as important as the protocol for keeping the relevant issues in mind when conducting the groups.

DISCUSSION SESSION 1

1. INTRODUCTION

Introduce the researchers.

Explain that the research is being carried out by university researchers and is funded by the European Commission - reiterate (if necessary) that it is not market research.

Explain that we are talking to several groups of people in different parts of the country/Europe.

We have already spoken to a few groups of people and want to take this opportunity to follow up on some of the issues that were raised.

Remind them that we want to hear their views on some aspects of developments in food production and agriculture.

Give a brief explanation of how the two meetings will run.

Promise a full debriefing at the end, when any questions that they may have about the research will be answered.

Ask the participants to introduce themselves (go around in turn)

2. LIFESTYLE ORIENTATIONS AND FOOD CULTURES (30-35 minutes)

"Thinking about the way that food is grown and produced, would you tell me one way in which you feel that it has changed for the better and one way in which you feel that it has changed for the worse" (go around in turn).

Use probe questions to explore these responses as appropriate

"Other people that we have spoken to about this have raised some of the same issues. We can come back to the food production issue in a few minutes but first I would like to take a brief look at some of the things that have been mentioned specifically about food consumption and hear what you think about them".

Show quotes

There isn't enough time to prepare proper meals. Nowadays we only do that on special occasions or at weekends. People don't sit down and eat together anymore as a family. Most of the time they tend to eat in front of the television. Cooking a good meal for others is an important part of making food but people don't seem to cook for friends or family anymore. These days, a lot of people don't even know how to cook properly. The food you buy from small shops and local markets is usually good quality. You can always ask the people there if you want to know anything and you can rely on them to know what they're talking about - not like the supermarkets. There is a lot more variety and choice these days but a lot of the food just seems to taste the same - if it tastes of anything at all. They just make it look good. Now you can buy a lot of fruit and vegetables all the year round, where they used to be seasonal. I miss looking forward to things coming into season, at the right time of the year. It doesn't feel right eating fresh peaches in January.

"So what do you think about these statements?"
Probe:

- For links between these issues
- For ways in which participants feel that these issues have affected them.
-

"If we look at the quotations (and at the things that some of you have said), there seems to be a sense that in all of these changes that have taken place in food production, we have <u>lost</u> something. What do you feel about that?"
Probes:
"What is it that you feel we have lost?
What could we do to regain it" (i.e. whatever is identified as being lost***)?***
"How do you see these things developing in the future?"

Then link to:
"There is one particular change in food production that I would like to ask you about, which is the development of <u>genetically modified crops and foods</u>." (If GMOs mentioned already in discussion, simply refer back to the topic instead - or, if appropriate, refer to fact that there has been recent media coverage of the issue*).*
"What associations does that have for you? "
Quote or show the brief definition used in phase 1:

Genetically modified organisms are bacteria, plants or animals that have had some of their characteristics changed by manipulating their genetic make-up. Genetically modified organisms are now beginning to be used in agriculture and food production.

If participants do not make the link themselves, ask:
"How does genetically modified food fit in or relate to the other changes that we have been talking about?"

3. SPEED OF CHANGE (15-20 minutes)

"In our previous discussions (or ***"Earlier…"*** if topic already mentioned*) some people seemed concerned at how fast all these changes have been taking place. Others were not so bothered by it. What do you feel?"***
Probe:

- Do they feel that the pace of change has been getting faster?
- If so, what implications does that have?

"Some people have said: 'You can't stop progress!' On the other hand, some people have told us that progress needs to be controlled. What do you think?"
Probes:

- What do people mean/understand by 'progress'?
- Do they see it as a good/bad thing - or are they more ambivalent?

- Is 'progress' seen as being inevitable?
-

If they have not already included GMOs in this discussion:
"How do genetically modified crops and foods fit in here?"
Probe for links between GMOs and notions of progress; also for concerns about speed of introduction of the technology and its products, e.g.
"Some people do not feel that the potential benefits of genetically modified foods are being delivered quickly enough. Others feel that we should take more time. What do you feel?"
Watch out for and probe any links made between GMOs and other technologies.

4. PERCEIVED TENSION BETWEEN SOCIAL NEED AND PRIVATE INTERESTS (30 minutes)

"I would like to hear what you think about some of the proposed uses of genetic modification of plant crops. For example, there are some, which are already in use, that affect crop production:"

Crops that have a gene added that makes them tolerant of a specific type of weedkiller, so that when the fields are sprayed they are not affected. The manufacturers say that less weedkiller will be used. Critics are concerned about the gene spreading to wild plants and creating 'superweeds' that are also resistant.
Crops that have a gene added that makes them resistant to certain types of insect pest that normally damage the crops. The manufacturers say that it will not be necessary to use chemical pesticides. Critics are concerned that harmless, environmentally important insects could also be killed by the gene, upsetting the ecological balance.

"Others have been developed to improve characteristics of the food for the consumer"

Potatoes that absorb less oil during cooking.
Maize (corn) or soya with higher protein content.
Fruit and vegetables that are genetically modified to have more flavour?

"Some are being modified with the needs of developing countries in mind":

Rice that has a gene added to produce a higher Vitamin A content. The scientists who have developed it say that it could help to deal with the problem in some developing countries of diseases caused by Vitamin A deficiency.

Crop plants that might be more resistant to very hot or cold climates, to drought or to poor soils.
Critics are concerned that the use of such products will make farmers in developing countries economically dependent on big multinational companies, and that the consequent loss of traditional seeds and farming methods will make these countries more vulnerable if anything goes wrong with the new seeds.

"This same technology can also be used to produce pharmaceutical products from plants and animals, although none have been commercialised yet. Examples of experimental developments that it is hoped can be used to treat human patients include: "

A human gene has been inserted into a plant to produce haemoglobin (which is an essential component of blood).
A human gene has been inserted into a sheep so that a medicine can then be extracted from the milk of the genetically modified sheep and used to treat a serious human disease.

"What do you feel about these potential uses?"
Probes:

- *Which (in any) of these potential applications of biotechnology do you think should be pursued? Why? What makes some of them more or less worthwhile?*
- *Which ones do you think will, in reality, be pursued? Why?*
- *Do feelings about the different uses (food, pharmaceutical) differ in any way?*
- *Is there any perceived difference between the pharmaceutical industry and the food industry that makes people view these products differently? What difference?*
- *What is the difference between deciding to eat a new type of food and deciding to take a new drug?*
- *Equity issues: who will benefit from these developments and who will bear the risks?*
- *Who <u>should</u> decide on whether there is a social need for a particular GM product? Is that the same for food products as for medical uses?*
- *How far do they think that this issue of social need is <u>currently</u> taken into account when decisions are made about GM foods? Is that the same for red and green applications?*
- *If there is a perceived difference between red and green - WHY do they believe there to be a difference?*

- *To what extent should the issue of social need be considered in other types of technological innovation?*
-

5. FOOD, HEALTH AND NATURE (30 minutes)

There should have already been some reference to health and environment/issues in the previous section, so there is likely to be some linkage/overlap with this section.

"Do you think that GM foods are likely to have some effect - whether good or bad - on human health? Or perhaps no effects at all? What makes you say that? What sort of effects do you think they might have?
Probe:
For sources of knowledge about health/effects - 'expert'/public or 'lay'/experiential knowledge?
For ambivalence about food - food as necessity, pleasure and danger.
For links to other food attitudes/issues.

"Do you feel that GM crops and foods are likely to have some effect - whether good or bad - on the environment? Or perhaps no effects at all? What makes you say that? What sort of effects do you think they might have?"
Probe:
For sources of knowledge about environment/effects - 'expert' or 'lay' knowledge?
For underlying constructions of 'the environment'.

"Thinking about this whole issue of agriculture and food production, should we see environmental and health issues as being connected or should we see them as being completely separate?"
Probe: Why? In what ways? Can you give any examples? Do people prioritise on over the other? What is their reasoning?

"Some people have argued that the use of genetic manipulation to insert the genes of one species into another is 'unnatural' or 'against nature' - others see it simply as an extension of the selective breeding techniques that have been used with plants and animals for thousands of years. What do you feel about this?"
Probes:
In what ways is it 'unnatural'.
Try and pin down what underlies this category of 'unnaturalness'.
Do they seem to include human beings in 'nature'?
Is 'naturalness' a moral or religious criterion?
Is it a reaction to the hubris of science - with an expectation of a tragic end that is based on past failures?
Look for links to other issues and experiences to clarify this.
How does this relate to 'respect for nature' - and what does that signify?
Does this category of 'natural-unnatural' operate as a kind of risk heuristic?

Close session with a brief affirmation of the value of the discussion and a reminder of details of the next session.

DISCUSSION SESSION 2

6. SUMMARY OF THE MAIN POINTS RAISED IN SESSION 1 (10 minutes)

The moderator should present the participants with a brief summary of the main points raised in the first session (this could be summarised in bullet points on a board or overhead slide). Ask if any important points have been missed off. Link from summary to first topic for this meeting.

7. PERCEIVED LONG-TERM UNCERTAINTIES (30 minutes)

"Another issue that has been raised concerns the long-term effects of growing or eating these genetically modified foods. Many people were happy that the experts have carefully investigated this problem but others were not persuaded. These two statements capture something of the two points of view. (Show statements*) What do you feel about this?"***

The safety of the genetically modified foods now being grown has been assessed by experts. There is no scientific evidence that they can cause any harm to humans or the environment. *Some scientists think that we have not spent enough time and resources to investigate potential effects of genetic modification and that the long-term effects are unpredictable anyway.*

"What do you think about these two quotes?"

"What sort of uncertainties or unforeseen consequences might there be?"
Probes - what do they feel about specific types of uncertainty, i.e.:

- Uncertainties about potential environmental impacts (e.g. cross-pollination)?
- Uncertainties about potential long-term health risks to humans?
- Uncertainties about potential 'social' risks - e.g. whether crop patenting might affect small farmers and growers?
- How do they see the role (and limits) of science in dealing with uncertainty.
- Does any particular aspect seem to cause the most concern?
- Is there a hierarchy of importance/concern?

"Should we expect absolute certainty before new developments in agricultural biotechnology are approved?"
Probes:

- Can anyone ever claim that there is 'zero risk' associated with any technology or human activity?
- Is it therefore realistic to expect zero risk?
- What can - and should - we expect (of scientists, industry and government)?

"How should we respond to these uncertainties? How should decisions be made and actions taken in the face of uncertainties about possible long-term consequences? "
Probe for specific views on how government, the food industry or citizens should respond. E.g. apply precautionary principles; rules for accountability and liability in case of harm; ensure fairness in relation to the distribution of benefits and risks; ensure the effectiveness of safety testing and regulation; etc.

8. VIEWS ON KEY INSTITUTIONS (40 minutes)

"We have been talking about some of the issues associated with genetically modified foods. Now let us think about some of the different organisations and groups that are involved in the issue. To begin with, here are a couple of statements about science:"

Science improves our quality of life Science is just another part of the economic system Science always creates problems

"Here are a few more statements about scientists:"

Scientists are motivated by curiosity about how things work Scientists are driven by self-interest for money and reputation Scientists are arrogant and overstep natural boundaries Scientists work for the good of humanity

"These statements illuminate different aspects of science in society. What is your opinion on the role of science?"
"Is there a difference between science in general and science applied to the genetic modification of food?"
"Is science at the root of the problems that have been discussing or is it the cure?"
"In some countries, the authorities have decided to carry out their experimental trials with genetically modified crops in secret. This is to prevent anyone from interfering with the experimental sites. In other countries, the location of the test sites is made public under 'open government' or public 'right-to-know' rules. What do you feel about these two approaches."

"Here are a few statements that people have made about the institutions that regulate industry":

In general, we can trust the regulatory institutions since they have performed well in the past
If there is a conflict between money and public health, regulatory institutions will always follow the money
Regulatory institutions may be well meaning but they have neither the expertise nor the power to regulate effectively

"What do you feel about these statements?"
Probe:

- *What, if anything, do people actually know about the institutional arrangements for licensing, monitoring and controlling the use of genetically modified organisms and foods?*
- *If they are aware of them, how do they feel about the effectiveness of these arrangements? Are they perceived as meeting their intended purpose?*

"What should be done to make institutions more effective?"
"What should be done to make institutions more trustworthy?"
"How can you be sure that the information that you receive from different organisations about genetically modified crops and foods is reliable?
"What would make you inclined to believe or disbelieve it?"
"Is there any source of information on GM crops and foods that you would believe more than others? Which one and why?"

9. ALIENATION/AGENCY/CONTROL OF LIFE-WORLD (30 minutes)

"Some people have mentioned that they feel that there is a lack of information and little possibility for action. Are you aware of any way in which people like you would be able to voice their opinions or exert any influence on the decision making process?"
"What about other people involved in this debate? Do you think they represent all the different interests and values that are important in this issue?"

All the people involved in this debate are biased
The most important people are missing from the debate
The people involved in the debate are open and responsive to ordinary people's interests and values
There is no need for a debate anyway

"How do you feel about these statements?"

"In our previous discussions, some people felt that this was not something that the public could have any influence over."

Companies will do whatever is most profitable - other concerns are secondary.
Scientists are the experts - only they know best how to develop genetically modified foods.
Nothing that the public says or does ever makes any difference - it's out of our hands.

"What do <u>you</u> think about this?"
"<u>Should</u> you, as members of the public, have some influence over these decisions?"
"**How should this be done?**
Probe for models of good participation (which are they implicitly using, if any?)
Prompt: some people have talked about this in terms of consumer action - what do you think about that? In what other ways could you imagine the public having some input?
"What do you think would make more people become involved in this debate?"

10. CONCLUDING STATEMENTS AND DEBRIEFING (10 minutes)

Explain (or reiterate) that the European Commission has funded the research and that the results of the studies in all five countries will be communicated to key people from a range of organisations involved in the genetically modified food issue. Emphasise the value of their contribution.
In order to round off the whole process, make a final round of all of the participants, asking each of them:
"What message would you like to give to the policy makers dealing with genetically modified foods?"
Thank them for attending and end the meeting.

Annex 4. Contacts for the research partners

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