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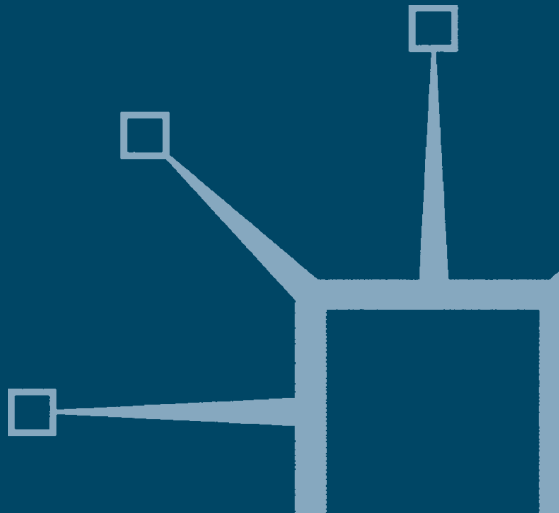
Transparency and Accountability in Science and Politics

The Awareness Principle

Kjell Andersson



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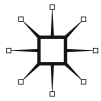

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Preface

Today our society meets tremendous challenges in many areas such as biotechnology, food safety, energy production, environmental protection and information technology. On the one hand scientific and technological advances offer huge potential benefits for health, quality of life and economic development. On the other there are new risks to the environment, health and social justice. Advances in genomics and information technology challenge basic values such as human integrity and even our perception of life itself.

Such issues are only partly of a technical and scientific nature and they constitute sources of social concern and major democratic challenges to the post-modern society. It is critical that they are not met by technocratic decision-making or simply left to market forces to solve, but are instead dealt with in a rational and transparent way that allows conscious decision-making with public insight and participation. However, our policy-making structures don't seem capable of doing this. The core of the problem is the ongoing disintegration of societal structures. We used to rely on university professors to be neutral witnesses of fact, media to be independent seekers of truth, politicians to have firm value systems and industrialists to make money. Now all these groups seem more or less to be actors on the same market of ideas and interest. As a result, ordinary citizens lose trust in them and, in the worst case, in society itself.

High level policy-makers are aware of this state of affairs but there is also much frustration since there is no solution in sight. The idea of public participation in decision-making has been launched as a way to restore trust by making citizens more involved. There are quite a number of processes that have been developed for this purpose, however, there is no way to know which one of them is the best alternative in a specific situation. Instead, public participation has become just another area on the market where different processes of participation are being launched and promoted.

This book argues that we must vitalize our processes for decision-making in order to maintain a living democracy. The awareness of societal problems must be increased among both the politicians and the citizens who elect them. To some extent, the renewal must create new institutional structures. Equally importantly, it will mean a new way of thinking and a new approach to the complex problems we have to solve within existing political structures.

To explore the problems and to investigate new ways of dealing with them we have to take a cross-disciplinary approach. This book explores experiences in different technologies and uses examples from several different societal areas. It tries to bridge the gap between theory and practice, between academic models and real decision-making problems. Too little academic research becomes accessible to its real customers – society and its citizens. This is sad since academia is capable of giving structure to problems, thereby making their solutions more effective than when they are dealt with on a case-by-case basis.

In the end it is up to us all, including the politicians themselves, to take responsibility for a living democracy. The ongoing trend of turning even political parties into market-players that sell images and feelings makes them less relevant. As a result they are being increasingly ignored. Consequently, political parties need to restore their role of being representatives of citizen values. Then, as this book will show, the political system needs to revise its supporting structure so that awareness can be enhanced to the benefit of high quality decision-making. The core of the book is the formulation of the *awareness principle,* proposed as an integral part of the representative political system. Accordingly I further suggest a practical framework for the creation of arenas that makes possible the realization of the principle.

The book builds on my experiences from a limited part of society. Being a natural scientist I am not an expert in policy science, behavioural science or mass media communication. Having devoted most of my professional life until now to nuclear safety and nuclear waste management I am no more knowledgeable in biotechnology or food safety than most people. However, during the last decade I have had the opportunity to devote much time and energy to transferring insights and approaches from my 'home area' to societal problems at large. For my own part, this has made the book inevitable. In the end there was just too much information and too many thoughts gathered in my mind and in computer documents to communicate by other means. I hope the result will contribute to the current debate about the future of democracy and give insights into some of our most urgent environmental and ethical problems.

Acknowledgements

Over the years I have had the privilege to cooperate with, learn from and share ideas with people of many different backgrounds. Without them, the ideas discussed in this book would not have seen the light of day. Among these people I am most grateful to Britt-Marie Drottz Sjöberg and Clas-Otto Wene. Britt-Marie is Professor in Social Psychology at the Norwegian University of Science and Technology. We cooperate in quite a number of projects, and we have an ongoing discussion about the policy issues addressed here. I have occasionally been astonished to realize how wide the cultural gap can be between the natural and behavioural sciences and thus the creativity in our cooperation has surprised me even more. We quite simply share basic values about how democracy should work, and how complex technical matters can be dealt with. I especially thank Britt-Marie for her courage in involving herself so deeply in the VALDOC summer schools of 2001 and 2007, which have been devoted to transparency and public participation.

One of the cornerstones in the approach to decision processes that I propose in this book is the RISCOM model of transparency. The model structure was developed by Clas-Otto Wene, Professor in Energy Systems Technology at Chalmers University of Technology, Sweden, and Professor Raul Espejo at the University of Humberside in the UK. Both also have consultant companies of their own. The research that has contributed to this book had its origin in discussions between Clas-Otto and I at the end of the 1980s, and the Dialogue project that resulted thereof. Both of us being physicists, we share an interest in applying theoretical models to the real world. It was Clas-Otto who introduced me to Raul when we were about to start the first RISCOM project, and since then the two of them have been a driving force in RISCOM. I greatly respect Raul and Clas-Otto for their intellectual integrity, and it has been a privilege to take part in their discussions and to apply their models in practical decision-making processes.

One of the key points in the RISCOM approach is that complex issues have both factual and value-laden elements and that both aspects must be made as transparent as possible. However, distinguishing between facts and values is not a straight forward task but a complex philosophical problem in itself. I was thus lucky to meet Patricia Ann Fleming, PhD in Philosophy, and now Vice President and Dean of Faculty at Saint Mary's College, Notre Dame, USA, at a conference in Stockholm. She has since been one of my most valuable sources of inspiration, and her papers and contributions to the VALDOC summer schools greatly helped me to understand what we mean by values as compared to factual issues.

Among the project funding organizations, I would especially like to mention the Swedish Nuclear Power Inspectorate (SKI), the Swedish Radiation Protection Authority (SSI), the Municipality of Oskarshamn and the European Commission. It is remarkable that a government authority with an engineering culture like SKI already had the courage to start developing towards a communicative approach in the nuclear waste programme at the end of the 1980s. Since then the research projects they have funded, often in cooperation with SSI, have given us the opportunity to increase our understanding of non-technical issues and to develop instruments for transparency and dialogue. Among the proactive and supportive persons behind these developments at SKI, I would especially like to thank Lars Högberg (former Director General), Sören Norrby (former Director of the nuclear waste division), his successor Magnus Westerlind and Josefin Päiviö Jonsson who is now continuing SKI's engagement in these matters. Josefin also helped me in reviewing the nuclear waste management chapter in the book.

Between 1993 and 2006 I was involved in the work of the Municipality of Oskarshamn to increase the transparency of the Swedish nuclear waste programme. To me this opened new perspectives on nuclear waste management issues. The politicians and the citizens in Oskarshamn have convinced me that lay people are needed to challenge the expert community and to add depth to the decision-making process. The success would not have been possible without a unique group of individuals devoted to the same goal. Torsten Carlsson, mayor in the municipality from the beginning of the nuclear waste project from the early 1990s until 2002, has been the lead person and an inspiration to us all. I am also grateful to Krister Hallberg, Kaj Nilsson, Harald Åhagen and Rigmor Eklind who have all made great contributions to the 'Oskarshamn Model'. It has been a privilege to be part of this group with almost daily exchanges of ideas and written proposals.

Björn Hedberg has involved himself deeply in the implementation of the RISCOM Model in Sweden, first in relation to the controversial risk assessment of mobile telephones with the SSI, currently with the Swedish National Council for Nuclear Waste. Without his enthusiastic involvement, progress would have been much slower. Thanks to him and his colleague Eva Simic and the Council, Sweden is now the first country to have a serious and systematic programme for transparency in nuclear waste management.

I also want to thank Isabel Runebjörk for helping me to communicate my ideas beyond academic and expert circles. She has also been of great support to me personally thanks to her belief in the importance and potential impact of the ideas put forward in this book. I am also most grateful to Andrew Coulthard who has advised me on aspects of my English formulation throughout the book.

Finally, it goes without saying that I owe a debt of thanks to my beloved wife Marita and my now grown-up children, Camilla and Per. The book has been written in my free time over a period of several years and it is only thanks to their patience and support that I have been able to maintain the levels of energy required to bring the project to a successful conclusion.

Introduction

It may be worthwhile for a moment to reflect on ideas from the enlightenment. In the 18th century the enlightenment philosophers sought to shape a collective rationalistic society with reason and scientific methods. Dogmatism and autocratic ways, in those days enforced by church and state, were criticised. Human society was to be liberated from superstition. The characteristics of the enlightenment were scepticism towards the doctrines of the church, individualism, a belief in science and the empirical method, the use of reason and a demand for political representation.

Immanuel Kant (Kant, 1784) formulated his definition of the enlightenment as the 'human withdrawal from self-imposed infancy'[1] – the individual should take responsibility for conscious and rational behaviour. Like many enlightenment thinkers, Immanuel Kant held our mental faculty of reason in high esteem; he believed that it is our reason that gives structure to the world we experience. The enlightenment also had a political agenda, best known through Jean-Jacques Rousseau (Rousseau, 1762, *The Social Contract*), based on the idea that the people hold all the power and that rulers only have temporary authority. He regarded the State as a contract in which individuals surrender none of their natural rights, but rather agree on the protection of them. Another basic idea among the enlightenment philosophers and also in liberal democracy was to make power visible – to illuminate it. Even if the enlightenment was replaced as the leading intellectual idea by 19th century German romanticism, its fundamental concepts of reason and justice have survived, and they are still prestigious terms in societal debate.

As described by the American sociologist Richard Harvey Brown (Brown, 1998, p. 2), the extension of science from nature to human affairs and society, proposed by the enlightenment, only approached realisation with industrial society and the emergence of social sciences. In the 20th century scientific and technological methods have been widely applied in social politics, economy, planning, etc. In this book I argue that this development has gone too far to the extent that we have lost the core enlightenment ideas of reason

and rationalism along the way. They need to be re-established by empowering citizens with a new enlightened direction.

Today, in western societies it is not religion and church that constitute the main obstacle to reason, rationalism and democratic 'power of the people' although there are disturbing signs of religious fundamentalism. Paradoxically it is now the experts, supposedly the guardians of science and rationality, who have partly taken over this role. During the late 20th century they possessed the privileged status that priests once enjoyed, and Brown argues that 'the empowerment of experts yields a depowerment of citizens' (Brown, 1998, p. 3). Even if we have no problem finding cases where scientists and experts act for the benefit of citizens without receiving acknowledgement from politicians, media or citizen groups, it is clear that *their power also* needs to be illuminated. However, the expert community is not the only force that a new enlightenment has to illuminate. Since the 1980s the market has taken over the role of religion in post-modern society and we all have to believe in the market, otherwise we are regarded with serious scepticism. All our activities and ideas including those of political parties, environmental protection and journalism must operate on conditions dictated by the market to the extent that we can talk about *a market democracy*. The contemporary conception of proper social order rests on faith in the two mechanisms of scientific–technological progress and the market. Together they make a very powerful combination!

Besides the expert community and the market, another major actor in society is the mass media. Today ordinary citizens are overwhelmed with information which, rather than activating us, tends to make us more passive. We are highly pressured in our daily situation, trying to achieve a compromise between work and family life. The media decides for us what we should pay attention to during the few hours or minutes we have left for personal life. What then tops the agenda is not the illumination of complex technological choices or deep political analysis, but far more emotional issues. As a consequence societal awareness, as well as the legal framework, lags behind technology as society is drifting into changes that would have been unthinkable just a few decades ago. These changes have taken place largely without any deliberate political decision, in many cases they have just been economical and cost-effective.

In many domains of policy, the public is uninvolved because the issues are generally complex and of low salience to individuals (see May, 1990, pp. 187–206). The Italian professor of politics Danilo Zolo (Zolo, 1992, pp. 133–5), referring to empirical information (Bale, 1970), explains the current lack of interest in ordinary politics at least in part by the idea that we as individuals have a limited attention span. This attention span does not vary much between individuals and can not be increased. We need to filter which information to deal with and protect ourselves from overflow, and this is only done to a limited extent in a conscious way. Emotionally

exciting information about issues such as sex, music and health has greater chance to get attention than more 'rational' issues such as political choices between technology alternatives. This explains why specialised systems, such as new technologies and the expertise, can operate more or less without being observed by society at large. One example of this phenomenon is the case of biotechnology and genetic manipulation where the technical development, with its potential impact on human values, is far ahead of public debate. The capacity of society to deal with these issues in a rational manner (including both the factual and value-laden aspects) will be severely challenged when they become major subjects for public debate, in particular because they will concern us deeply on an emotional level.[2]

The decision-making context in controversial issues is not only set up on the factual basis provided by experts, but also by stakeholder pressure groups, lobbyists and extensive media coverage. The seemingly unlimited availability of information on the Internet and the continuous information flow in media does not make it easier for the layman to gain insight and clarity.

The core of the enlightenment and democracy is that those who have the power should be illuminated and that political decision-makers should act on our behalf and represent our values. For this to work, citizens need insight and means of influence. My aim in this book is to illustrate some of the challenges offered by this fundamental requirement and to suggest a framework for how the contemporary situation can be improved.

The book is to a large extent based on experiences and research results gained from only a few areas such as cleaning-up contaminated sites, nuclear waste management and mobile telephone systems, however, they are of general significance. They relate to how decisions are made, and should be made, in complex issues. By 'complex issues' I mean those involving a large variety of technical and scientific input as well as important value-laden and ethical aspects. Complex issues are not transparent by nature. As Giandomenico Majone, Professor of Policy Analysis in Florence, has remarked, technological expertise cannot be relied upon to discover the characteristic risks and the social implications of new technologies. Majone concludes that new arenas for critical debate are needed (Majone, 1989, p. 6):

> The essential need today is an improvement in the methods and conditions of critical debate and their institutionalization at all levels of policy-making. Actually, attempts to develop methods of critical inquiry adapted to the process of public deliberation go back to the origins of democracy.

As I agree with this conclusion, this book reinforces its fundamental position with studies on contemporary trends in science, politics, journalism and practical case studies in areas of science and technology. In conclusion I am arguing for a new function in our societies, a new force with no other interest

than awareness in risk assessment and decision-making – a new enlightenment if you want to express it that way. It requires new and structured ways of achieving transparency, public participation and public discourse for which I outline practical guidance at the end of the book.

In the first chapter I describe more precisely the reasons for the democratic challenge in post-modern society. Chapter 2 deals with the role of science and expertise in setting societal agendas and political decision-making. We see there that the role of academics is far from the one of pure truth finding which we have been told. We find that the expert role has much to do with value judgments and vested interest. In Chapter 3 we go more deeply into the meaning of values as compared to factual issues. To make the picture of 'facts versus values' more complete we also have to bring in perceptions, emotions and vested interests. Based on the trends explored in the first three chapters, Chapter 3 ends with four theses of weaknesses in contemporary society. These relate to our ability to deal with societal decision-making, especially for complex issues with a high technical and scientific content.

In Chapters 4–8 we then move to a number of areas of practical decision-making and politics in order to illustrate the problems, thus testing the theses given in Chapter 3. We will see how value-laden arguments play an important role in seemingly pure technical and scientific issues. We start with nuclear waste management as a good example of how experts can fail to communicate, thereby paralysing the decision-making process. In Chapter 5 we deal with risk assessment as a general decision-supporting tool, and we discuss the use of the precautionary principle as a means for risk management. We then deal with biotechnology, which will probably be the most critical domain for transparent and democratic ways of decision-making in the next few decades. I also illustrate the problems with a number of other areas, such as global warming and nanotechnology. In Chapter 9, I summarise the lessons learned from the various example areas explored in Chapters 4–8 in the light of the themes formulated in Chapter 3.

As a result of the weaknesses in contemporary societal decision-making found in the first part of the book, I introduce the concept of awareness in Chapter 10 as a central framework of policy-making and discuss what it requires to be manifested. The *awareness principle* is formulated. We build awareness on three cornerstones: transparency, public participation and the public sphere. Chapter 11 goes more deeply into the concept of transparency and gives it structure and meaning. Chapter 12 explores public involvement and elaborates on some ways to make progress. There we find that although there are many participatory processes around – formal and informal, detailed and less detailed – we are still left with frustration and uncertainty about where participation and deliberation can actually lead us.

Chapter 12 ends with the conclusion that public participation must be put into the overall context of political decision-making in a democratic society. In Chapter 13, we therefore continue the discussion about democratic

theory we started in Chapter 10 with more recent developments in democratic models, and we explore more in depth the 'democratic paradox'. Preceding chapters also lead to the conclusion that real public involvement cannot function without a public sphere which makes the issues accessible to the public at large. In Chapter 14 we thus discuss the role of modern media that we have touched upon already in this introduction. In the remaining Chapters 15–18 we develop more detailed thoughts about how a new enlightenment and the awareness principle can be made to function. We promote a paradigm shift to setting values first, instead of expert investigation or the news market (Chapter 15). We establish principles for improved procedures (Chapter 16), and provide some ideas for how all this can be anchored institutionally in society (Chapter 17). Finally, Chapter 18 brings up potential problems and possible arguments against the new enlightenment as well as the counterarguments.

1
The Democratic Challenge

We live in the 'post-modern society'. Even if the term has a rather imprecise and diversified meaning, it describes our society as one in which we have lost our faith in religion and ideology. What is more, the ideas of the enlightenment and belief in the 'modern project' with its liberation of humanity by science, technology and rationality have also been lost. What remains are only partial, subjective and individual truths and therefore just limited and individual projects – the world has become fragmented. The mass media gives us information overflow and at the same time enforces the fragmentation. There is much more information floating around than people can handle.

The fragmentation in post-modern society can to a large extent be explained by an increasing complexity manifested in various ways. There has been a tremendous widening scope of choices for society at large as well as for the individual. Often the spectrum of choices is broader than can be handled analytically in a conscious way. Issues on the political agenda involve many scientific and technical aspects and, even more importantly, value-laden elements that are often hidden behind technocratic investigation. This complexity makes necessary a division of labour between different institutions, making the entire picture even more complex from a citizen's perspective. We have to admit that there is an increasing gap between the knowledge of the ordinary citizen and the level of specialist knowledge required to address complex issues. It is understandable that the average citizen has become increasingly marginalised. On the other hand, the growth of knowledge in science has increased specialisation to the extent that nobody has expert knowledge of more than a small part of any given problem. The distinction between 'experts' and 'lay people' therefore becomes more and more artificial.

As issues are discussed in public, various points of view crystallise; a process which has been described as 'putting the issue within a frame'. Due to interests, emotions, values, cognitive styles and certain ways of thinking, a group frames an issue by defining what the issue is about. Once a person or a group has established a frame for a disputed issue, that frame affects

their notions of what evidence is relevant and what considerations should be declared out of bounds. Framing is a special form of fragmentation, on a high level of aggregation.

There is a widely held view in the rhetoric of experts and technocratic bodies which views lay people as uninformed and ignorant, fearing the unknown. According to this view, lay people will accept proposals from decision-makers and experts if the amount of information is raised. Consequently, more efforts are put into information campaigns aimed at persuading people to change their opinions than campaigns that give them the opportunity of participating and influencing the outcome. This position can be traced back to John Stuart Mill's classical argumentation on democracy in *On Liberty* from 1859, where he argues that the right to vote should be conditional on the level of education, concluding that for barbarians, liberty is not a relevant concept at all (Mill, 1961).

Decision-making in the post-modern society takes form in a complexity of arguments with a mixture of facts and values that reach decision-makers through various channels, such as pressure from stakeholders and concerned groups. In this situation the decision-making system needs means and support for increasing insight and clarity – transparency as a counter-force to fragmentation. Furthermore, a key to effective democratic decision-making is for stakeholders and the general public get insight into the reasons behind decisions and thereby a chance to evaluate the arguments and to hold the decision-makers accountable. Thus they also need channels and procedures for better insight – transparency as a way to manage complexity.

All of us have an idea of what 'democracy' means. Freedom of citizens to express their thoughts and to criticise government are elements of our common idea of democracy. A free and critical press, religious freedom as well as the legal and equal rights of all individuals are other elements. In this book we focus on the decision-making system in society, which should, somehow, allow the 'will of the people' to become manifest. In today's democracy this is supposed to work via a system of representation which means that we elect a group of people who are given the task of making decisions on our behalf. During the 20th century a model of 'competitive leadership' emerged as the dominant view of democracy.[1] According to Joseph Schumpeter, seen as the father of this model, democracy is simply a method to involve citizens in the formal process of designating agents who will determine political questions. This process takes place through a 'competitive struggle for the people's vote' (Schumpeter, 1987, p. 269). Robert Dahl, a dominant figure in modern democratic thinking, defines democracy as the 'system of decision-making in which leaders are more or less responsible to the preferences of non-leaders' (Dahl, 1956).

In short, the model of competitive leadership, or representative democracy, means that political parties compete with each other to represent us in municipality councils, national parliaments, the US Congress, the European

parliament, etc. While representing us they are also responsible to us. This is a definition of democracy that many, perhaps a majority of, citizens in societies acknowledged as having a democratic system would agree with. The question is, however, whether our post-modern societies actually function in such a way that this very logical form of democracy still works. Somehow our institutional system has lost its capacity to hold the politicians responsible for their decisions.

Of course, if we are not satisfied with the performance of our elected politicians we can remove them at the next election. In this way, on the surface, the system works. In a deeper sense though, the notion that politicians are responsible to their voters should mean that citizens have a certain degree of awareness of the extent to which politicians follow their promises. Furthermore, citizens should be able to evaluate how well political decisions reflect the values which the elected representatives are supposed to represent.

For a normal citizen, however, gaining such insight seems to be a more or less hopeless task in today's society. We are much too exposed to information campaigns, manipulation and the fragmentation of complex issues by interest groups, industry, researchers, experts and the political parties themselves for that to be possible. On top of all this, political decision-makers are themselves exposed to the same type of lobbying activities. If, as a consequence, they themselves remain unaware of the issues, how can decisions possibly be made transparent to the voters?

A eurobarometer survey (European Commission, Standard Eurobarometer 64, June 2006) confirms the low trust in politicians. On average, only 35 per cent of EU citizens trust their national parliaments, 31 per cent trust their government, and trust is still decreasing. Political parties have, on average, the trust of only 17 per cent of European citizens compared to, for example, charitable or voluntary organisations which have 66 per cent trust, and the press which has 45 per cent trust.[2] Europeans thus seem to hold the political system in low esteem, a picture we also see when we look at specific, controversial areas. In questions of nuclear waste management, independent scientists and NGOs are most trusted (near 40 per cent) while national governments are trusted by as few as 19 per cent. Only the nuclear industry, the media and the EU are trusted by fewer (11–14 per cent).[3] In matters concerning biotechnology, another eurobarometer study (European Commission, Special Eurobarometer 64.3, July 2006) shows that governments are thought to do a poorer job than, for example, consumer organisations and newspapers, although the overall picture is that trust in all key actors was higher in 2005 than in 2002, with the exception of 'environmental groups campaigning against biotechnology' which suffered a substantial decline in trust.[4]

Another trend is the decreasing importance of national parliaments (and the prevailing low importance of the European parliament). One cause of this development is globalization; another is the fact that for leaders it is

more important to communicate with people through opinion polls, media initiatives, etc.[5] than to debate in parliament.

Citizens and political decision-makers should be the main actors in a democratic decision-making system. However, in order to explore the problems with the political systems of post-modern societies, we have to take into account other actors (industry, the market, experts, interest groups, lobby groups, media) which have invaded the decision landscape and made the presupposed primary actors into secondary ones. The limited attention span of citizens and politicians creates the market for lobbyists. Those who have economic, social and other resources can utilise them for tailoring information to impact public opinion and to gain access to politicians.

In this situation more openness in the traditional sense does not help much. Of course, it is better if the documents produced by government authorities are accessible to the public and journalists, as in Sweden, rather than being secret as is more the tradition in some other European countries. Then, if you know what you are looking for in official archives, today supported by computerised systems, you can find the appropriate documents. This makes uncomfortable facts more risky for officials and government employees and hiding them more difficult. But it does not help us against more sophisticated methods of fragmentation and lobbying. To penetrate those we need much more specialised tools than just open government files.

In the upcoming chapters we will describe three major elements in societal decision-making: science, which gives us the facts; values, which build our society and our political system; and emotions which also affect individual choices. When we have seen how these elements are treated in some major policy areas we will be ready to suggest a methodology for gaining awareness of the decision-making system.

2
Science Has Lost Its Ethos

According to the traditional view, scientists are supposed to search for the truth, provide us with objective facts, and be independent of organised interests of a political, religious or commercial nature. However, these scientific ideals, which have been a cornerstone of our societal structure and which are almost identical to the ideas of the enlightenment, are breaking apart. Before we discuss the current position of science and the establishment of expertise, we shall describe in more detail what science used to be and what scientific ideals still are.

The ideals of scientific conduct

As a point of departure we can use the four normative principles for the ideal of scientific conduct as summarised by Robert Merton (Merton, 1973, pp. 267–78).

Universalism

This principle sets the standard that 'truth-claims, whatever their source, are to be subjected to pre-established impersonal criteria – consonant with observation and with previously confirmed knowledge'. The acceptance or rejection of claims shall not be dependent on the personal or social attributes of the scientist making the claims such us race, nationality, class or religion. Personal characteristics are irrelevant. The imperative of universalism is deeply rooted in the impersonal character of science (ibid., p. 270).

Communism

In this context 'communism' means that there should not be private ownership of scientific knowledge. The substantive findings of science are a product of social collaboration and are assigned to the community. The researcher gets the credit for a scientific discovery, but the knowledge itself belongs to

the common good. The conception of science as part of the public domain is closely linked with an imperative for the communication of findings. If the results are not diffused to other scientists, further advancement of the boundaries of knowledge is hindered.

Disinterestedness

The search for truth should be unbiased and characterised by disinterestedness. An individual's economic, religious, and political or other ideological interests must not affect the results of research. 'A passion for knowledge, idle curiosity, altruistic concern with the benefit to humanity, and a host of other special motives have been attributed to the scientist' (ibid., p. 276). The extent to which this ideal has been manifested in practical scientific life is due to the characteristics of science, especially the hard scrutiny that every scientific work must pass in order to be recognised.

Organised scepticism

Scientists should maintain high standards and accuracy and not accept any conclusion without firm evidence. Everything should be questioned in a systematic way, using empirical and logical criteria.

In summary, a scientist should have no personal interest in the results of his work (disinterestedness), leave the fruits of his work to society as a whole (communism), judge his colleagues only by scientific standards (universalism) and have a sceptical attitude to new results, his own or others (organised scepticism). These are high standards indeed. Still, the four principles represent how many scientists want to be perceived and this is also how they have been perceived by the public at large. Today, however, the four principles, and thereby the identity of science itself, are seriously challenged. We shall make a 'balance sheet' of the principles after having explored some trends in contemporary science.

The commercialization of science

The main force behind the on-going disintegration of scientific identity is commercialization. This is not a new factor, of course. Partnerships between science and industry seem quite rational and reasonable. Knowledge-seeking science needs money to be invested in research. The aim of industry is to develop products for profit, but it needs a sound base of knowledge for this to be done. In other words, science and industry need each other and they have complementary interests. As the costs of basic science and clinical research have increased, and as public funds have proved insufficient to cover the cost increase, universities have become more dependent on industry money. Furthermore, politicians have encouraged scientists in academia to

collaborate more closely with business and industry for the sake of economic development.

Even if these trends are not new, something changed dramatically during the 1980s that made academia and industry come closer together. The emerging biotechnology industry, based as it was on new techniques developed from molecular and genetic biology, became the driving force behind this development. Since then the meaning of science, to seek the truth as a public good, has been gradually distorted by a drive to find profitable technologies. Today, among some academics, there is a growing concern about the commercialization of science at universities. The commercialization of American science in particular has been described by many authors such as Sheldon Krimsky, Martin Kenney and Derek Bok who are themselves part of the academic world.

Sheldon Krimsky, physicist, philosopher and policy analyst, Professor of Urban & Environmental Policy & Planning at Tufts University, was an early critique of the development in biotechnology with book titles such as *Biotechnics and Society – The Rise of Industrial Genetics* (Krimsky, 1991). In a more recent book (Krimsky, 2003) – *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?* – he contends that universities now operate under commercial conditions and argues that this is against the public interest. This is because corporations view science not as a generator of truth, but as one among other production factors, and that science can help or hinder a company's profit margins because of its impact on litigation, regulation or marketing.

Martin Kenney, Professor in Human and Community Development at the University of California, Davis, has described the birth of the biotechnology industry within American universities, the creation of 'a new economic space' and the evolution of the 'university–industrial complex' (see Kenney, 1988, 2002). He discusses the ties between industry and academic institutes, and the resulting conflicts of interest. For example, decisions made to grant universities patenting and licensing rights in the field of genetic engineering simplified the privatisation of university research by removing any claims on behalf of the public regarding ownership of government-funded research (Kenney, 2002, p. 3).

Derek Bok, Professor at Harvard university, describes the causes of commercialization in America (Bok, 2003, pp. 11–12). According to him, declining government funding had a role in making universities apply for private money, but that can only explain a small part of developments. A more important factor was the slowdown in economic growth and the challenge from strong industrial competitors in Japan and Europe which caused Congress to find new ways of stimulating the economy by linking university research with the needs of business. A milestone in that respect was the Bayh-Dole Act, passed by Congress in 1980, which allowed universities to own and licence patents on discoveries made by federally funded

research. In addition, subsidies were offered on both federal and state levels for university-business joint ventures aimed at developing new commercial products from achievements made in university research. These were successful measures and by the year 2000 US universities had increased their patenting more that tenfold.

Concurrently with these initiatives in the US (which naturally were followed by similar actions in Europe) rapid advancements in biotechnology and genetics made academic research in these areas attractive for industry investment,[1] which greatly catalysed the blurring of the boarders between academy and business. New companies were founded based on discoveries made in university laboratories, patents were licenced, scientists received stock from the new firms, they acted as consultants to business enterprises, etc.

In the UK, the Lambert Review of Business-University Collaboration of 2003 (Her Majesty's Stationery Office, 2003) could certify that the country's business research base is both narrow and fragile. Compared to other highly industrialised countries it is lower for all major sectors such as electronics and electrical, chemicals, engineering, and software and IT services. However, the UK's R&D intensity is much higher than the international average in pharmaceuticals and biotechnology, and in aerospace/defence. Already in 1996, the UK Government's 'Technology Foresight' exercise examined how science could be made to contribute best to the UK's economic competitiveness and identified 'building businesses from biology and genetics' as a generic priority for UK science, engineering and technology (Her Majesty's Stationery Office, 1996). The proposal was implemented by the major UK public funding body, Biotechnology and Biological Sciences Research Council (BBSRC), which developed a strategy for integrating science with the needs of industry. There are very strong links between the BBSRC and industry. For example, the previous chairman Peter Doyle has held leading positions in biotech companies like the Zeneca Group (which introduced the first GM food into the UK), Syngenta, Oxagen and Avidex.[2] In 2003 Peter Ringrose took over the chair of BBSRC from Peter Doyle after 32 years in the pharmaceutical industry in Europe and the USA. His industry posts have included Chief Scientific Officer at the global pharmaceutical company Bristol-Myers Squibb and Senior Vice President and Head of Pfizer Central Research UK.[3] Many members of the BBSRC committees have industrial ties.

In 1999, the UK Government introduced a specific stream of funding to support knowledge transfer in the university sector. This 'third stream funding' has enabled universities to build up their capacity to establish business liaison and technology transfer offices, market their research and teaching to business, establish spinout companies, provide entrepreneurship training for science and engineering graduates, etc.

The Lambert Review strongly supported this Government approach, suggested that the new funding stream should be allocated through existing

Regional Development Agencies, and proposed that £100–£200 m would be an appropriate level of funding.[4] Overall, the report's point of departure is that commercialization of university research is good *per se*, and very little is said about its potential negative effects on university culture. Consequently, Lambert could uncritically comment that 'the Government's commitment to funding third stream activity has generated culture change and increased capacity within the universities to engage in knowledge transfer activities' (Her Majesty's Stationery Office, 2003, p. 43).

The comments made by academic institutions and universities themselves on the Lambert report say even more about UK attitudes towards the commercialization of science than the report itself. The Royal Society says that 'successful involvement with business or other users of the output from higher education should be seen as no less of a positive factor in career progression as good teaching or fundamental research' (The Royal Society, 2004, p. 1). The Society continues: 'As the Lambert review points out, there should be strong representation of business on university governing bodies and for there to be appropriate academics on company boards' (ibid., p. 2).

The universities themselves came with similar comments in their responses to the Lambert review and they were eager to report how well they were managing commercialization. Thus Oxford University said:

> Our commercial links take many forms, from the traditional (the transfer of graduates and new technologies into industry) to the innovative (the co-location of spin-out companies with interdisciplinary research activity in purpose-built facilities at its Begbroke Science Park).[5]

and the university followed up:

> An increasing amount of its £150 million annual external research income now comes from a wide range of companies – both UK and international.

Another example is Imperial College London:

> It is increasingly important that universities are run in a businesslike way, a culture that Imperial College London has long encouraged. Therefore we particularly welcome the suggestions that universities should develop codes of governance, and model contracts and protocols for intellectual property. This will enable universities to work faster and more efficiently, so that business processes are constantly improved. These measures are already in place at Imperial, and we would encourage other institutions to share our practices.[6]

Overall, the Lambert Review and the responses from universities, showed that the 'problem' is not with the university but with the industry, which

lacks incentive for businesses to become involved in university research (with the exception of biotechnology firms). Universities themselves are highly committed to the process of commercializing their research, as remarked by Imperial College London.

As in the US, universities in the UK are increasingly run in a businesslike way. Big business is strongly represented in university-governing bodies; business liaison and technology transfer offices are increasing in number and importance; universities are marketing their research and teaching to business; they establish spinout companies; and provide entrepreneurship training for science and engineering graduates, etc.

John Ziman, a well known UK physicist and philosopher of science, argues that the erosion of traditional academic research has created a new 'post-academic science', that works under business conditions (Ziman, 2003). We cannot go back to the old academic model for science, Ziman recognises, and legislating against the commercial development of scientific research is useless. What can be done, however, is to maintain an area of science where the traditional values are safeguarded. Such an area can only be protected by organisations whose funding decisions are determined by disinterested scientists, Ziman contends.

The commercialization of science is not a phenomenon limited to the Anglo-American sphere, but a world-wide trend, though the US and the UK do seem to be the leaders. On 14 May 2006 the Swedish public service radio programme 'Kaliber' reported on a study they hade carried out in which they had questioned more than 2 000 professors in Sweden. A sixth of the subjects were involved in ethical conflicts with their funding bodies. Many described themselves as consultants rather than free scientists. Typical quotes were:[7]

> You do what you can to survive financially. Everything is really done in order to make money. We have simply become consultants and the universities consultant companies.

and:

> The professor post as guarantor of free research is a paper tiger. Today we have financial control meaning that the one who attracts the highest grants is the best researcher.

The commercialization of universities is now increasingly subject to the attention of the media and individual journalists. One example is the prominent American freelance journalist Jennifer Washburn whose book *University, Inc.: The Corporate Corruption of Higher Education* (Washburn, 2005), has received much attention in the US. She argues that while American universities remain the envy of the world, they may now be abandoning the very values and practices that have made them so successful and that

this undermines public trust. In a *Los Angeles Times* article (ibid., 2006), Washburn gives examples of the consequences of commercialization. For example, she reports that seven of ten faculty members charged with oversight on Stanford's conflict-of-interest committee have financial connections to medical companies. Another example, originally reported by *The Wall Street Journal*, was a major academic study which found that antidepressants were safe and effective for pregnant women. Despite the fact that the study was financed by the federal government, it was written by researchers who also served as paid consultants to manufacturers of antidepressants. In the *Los Angeles Times* article, Washburn also claims that professors sometimes agree, for a fee, to be named as authors on journal articles ghost-written by the drug industry and published without disclosure of company involvement.

It is obvious that the new 'post academic science' creates conflicts of interest for researchers, which can, either deliberately or unintentionally, lead to biased conduct. Even when biased conduct is not the case, conflicts of interest create an impression of dishonesty which in turn fuels suspicion in the minds of the general public. There is evidence that the university–industrial complex can compromise academic standards of research. The literature gives many examples of cases where corporations have suppressed data of studies they funded when the conclusions were not consistent with their financial interests and where they have repressed publication of research that did not support their views, for example concerning adverse effects in drug trials (for example, see e.g. Bok, 2003, pp. 67–8). There are also indications that papers in biomedical journals by company-sponsored researchers are biased towards reporting results favourable to company products. A research group at Yale University School of Medicine found a statistically significant association between industry sponsorship and pro-industry conclusions in biomedical research: 'Evidence suggests that financial ties that intertwine industry, investigators, and academic institutions can influence the research process. Strong and consistent evidence shows that industry-sponsored research tends to draw pro-industry conclusions' (Bekelman *et al*., 2003, p. 463).

In August 2006 an article published in *Nature* by medical director Robert Lanza of Advanced Cell Technology (ACT) and his research team attracted a great deal of attention (Klimanskaya *et al*., 2006). When the paper was published online, Robert Lanza said on the *Nature* podcast (23 August 2006), that 'what we have done, for the first time, is to actually create human embryonic stem cells without destroying the embryo itself'. The paper's abstract also implied that the ACT scientists had created stem-cell lines without destroying embryos, saying: 'The ability to create new stem-cell lines and therapies without destroying embryos would address the ethical concerns of many.'

The truth was that *none* of the 16 embryos involved in the study actually survived. *Nature*'s press release also stated that only one cell had been taken from each embryo, which was also untrue. Even if the paper itself was scientifically correct, and even if Lanza claims he never intended to say

more than that he had proved a principle, and that he was surprised by the reaction to the paper, many involved in this area of research objected to its overall packaging, which quickly made it world-wide news. The news had a dramatic effect on ACT business. After steadily declining for six months, ACT stock suddenly shot up several hundred percent, and just two days after the news event ACT said it had commitments to raise about $13.5 million (*Silicon Valley/San Jose Business Journal*, 2006).

The most important lesson to be drawn from this event is neither about Robert Lanza himself, nor about the quality assurance procedures of *Nature*. It is about the new research culture that *can* generate opportunities for scientists to publish research results that are far too optimistic, or even false, while creating large profits for companies or individuals. Stories like this one surely undermine the credibility of science.

Many universities now have their own offices of technology transfer which are intended to stimulate and assist in the commercialization of research results. There are also a great number of seminars and academic courses in commercialization held at universities which are either organised by universities themselves, private enterprises or combinations thereof. Typical target groups at the university are faculty members, students, intellectual property managers and business development personnel.

If the commercialization of science continues, scientific institutions will be reduced to being just another actor on the market together with big companies, small innovative companies, the media, lobbyists, etc. Then our societal structures will crumble further, the scientific ethos will be lost and we will no longer know where to turn when we want to know the truth. This is an important concern not just for the individual citizen but also for governments and EU institutions that must recruit members to scientific advisory committees who are independent of private interests (see e.g. James *et al.*, 1999).

Do we have research cartels?

In business, a cartel is a group of companies that produce goods or services and whose common goal it is to secure profits by limiting competition via means such as fixing prices and limiting supply. Cartels usually occur in business areas where there are a small number of enterprises making it feasible to reach such agreements through informal contacts. Cartels are seen as unhealthy and as unfair business practice and they are forbidden by antitrust laws in most countries.

Since parts of science have become commercialised it would not be surprising if such a degenerate form of business also appeared in areas of science where the conditions are favourable to their creation. To find such cartels we should look for research areas where a few powerful organisations can use their funding to control how research is conducted and how the results

are communicated to the media and the general public. The aim of a cartel would be to control the production of research results for certain ends, such as profits in special branches of business, sustainability of high levels of funding or political prestige. The controlling bodies might be industries, dominant research groups, governments or combinations thereof.

In this light it is interesting to take note of a paper by Henry H. Bauer, Professor Emeritus at the Virginia Polytechnic Institute & State University where he states that corporate scientific organisations and bureaucracies function as *research cartels* by co-opting and controlling science (Bauer, 2004). This takes place to the extent that minority views on technical issues are largely absent from the public arena, and that *knowledge monopolies* are formed.

Profit making is evidently a driving force behind research cartels control of the knowledge market. However, according to Bauer, national and international institutions, including agencies of the United Nations, are increasingly co-opting and controlling scientific activity for social or political purposes. The consequence is that the general public does not come to realise that there are doubts about certain 'well-known facts' such as the cause of global warming or heart disease risk factors. There is no censorship behind it, but scepticism is suppressed and 'people exposed chiefly to mainstream media will likely never suspect – will have no reason to suspect – that there could exist a credible case different from the officially accepted one' (Bauer, 2004, p. 652). As countermeasures against such knowledge monopolies, Bauer suggests the allocation of 10 per cent of government funding to competent researchers with contrarian views, and the use of science courts (in Chapter 12 we will explain the concept of science court). Above all, Bauer emphasises the need for vigorous investigative science journalism to expose scientific uncertainty to the general public and to policy makers. This is in line with my proposal in Chapter 14 for transparency journalism as a new media branch.

The idea of research cartels and knowledge monopolies is compelling. Later in this book we will find indications of their actual existence in areas such as the risk assessment of electromagnetic fields, global warming and radioactive waste management.

Balance sheet of Merton

Expressions like 'science in the private interest', the 'university–industrial complex', 'post-academic science' and 'University, Inc' are only a few of the phrases attributed by critical scientists and journalists to the transformation of academic science. After this exploration of the roots and manifestations of the commercialization of science we are ready to make a balance sheet of Merton's principles for good scientific conduct.

The first principle of *universalism* is probably the most stable one in science as it remains a general social norm as well. In fact, as Merton himself (Merton,

1973, p. 273) emphasises, the ethos of democracy includes universalism as a dominant guiding principle. When a scientific claim is evaluated within science by scientific standards, the social background of the scientist making the claim is not relevant. However, we don't treat all scientific arguments equally in society even if they are treated this way within the scientific community. Organised interests can make sure that certain research results get much higher attention than other, perhaps contradictory, results, via the media and by lobbying in political spheres. Even if this is not really a problem for science as a truth-finding endeavour, it is a problem in two respects for science-in-society. First, the part of societal decision-making which is supposed to be science-based becomes distorted since the perception among policy makers of scientific status is not consistent with the actual situation. Secondly, researchers possessing the arguments most favoured by actors with economical resources receive more resources to continue their research than others, which leads to the even greater misrepresentation of divergent scientists. One could argue that these science-in-society effects don't necessarily affect internal scientific ethics. In the extreme cases where they lead to the formation of research cartels with knowledge monopolies, however, this will be the case.

The second principle of *communism* nowadays seems old-fashioned as universities themselves are becoming major players on the commercial arena, a development which is very visible in, for example, academic patenting (Henderson *et al.*, 1998). This is of course in sharp contrast to Merton: 'Property rights in science are whittled down to a bare minimum by the rationale of the scientific ethic' (Merton, 1973, p. 273). Jason Owen Smith and Walter Powell argue that 'the rise of patenting and commercially motivated technology transfer on U.S. campuses stands to alter faculty work practices, relationships and the criteria by which success is determined and rewards are allocated' (Owen-Smith and Powell, 2002, p. 21). In the UK, there are similar concerns about patenting. The Nuffield council 'is concerned that following the sequencing of the human genome, the rush to patent new genes is now a higher priority for some companies than finding out what the genes do or how they may be useful' (*Cordis Focus*, No. 203, p. 19), thus setting potentially rewarding patenting before scientific understanding. The UK group thus proposes that the granting of patents should be subject to stricter criteria.

Traditionally there has been a division of labour between basic academic research and applied, developmental research conducted in industry. The borderline between the two, which was never completely sharp, has, during recent decades, gradually been erased. University institutions are now doing research on contract for industry, prominent academic researchers start their own companies more or less directly attached to their university institutions, prominent professors are engaged in lobby organisations, etc.

There is thus an increasing trend for academic research also to be 'in the market'. Industry is increasing its control over technological and economic research, the pharmaceutical industry over health research, etc. This is not

Norm	*Challenges*
Universalism	Research cartels with knowledge monopolies
Communism	Organised co-operation with industry, private companies, patenting
Disinterestedness	Private interest, open or hidden values
Organised scepticism	Commercialism, hidden values, research cartels

a new phenomenon, but the breakthroughs in biotechnology have made it more acute. If academic research is nothing other than knowledge production for certain commercial and political interests, then what makes university professors more respectable as possessors of knowledge than lobbyists or other professionals? Despite being unavoidable and a largely positive factor for innovative research, the fact that researchers have vested interests in the results of their work should be given more attention.

If the second principle of Merton seems to be old fashioned, so does the third principle of *disinterestedness*. With a commercial interest in their research, the authenticity of scientists as unbiased searchers for truth may be questioned. Disinterestedness is perhaps the most deeply rooted principle in scientific culture and most scientists are prepared to defend it, even at their own cost. However, the very fact that scientists are also human, and might unconsciously produce biased results, creates suspicion among the general public that vested interests lurk behind research results. In addition scientists, being humans, have deeply rooted values that can affect the way research is conducted.

The fourth principle of *organised scepticism* is also at stake since commercialism in research, vested interests and hidden values make it much more difficult to practice. As Merton points out, this principle has also earlier resulted in science being in conflict with other institutions due to 'a diffuse, frequently vague, apprehension that scepticism threatens the current distribution of power'. And, using the words of Henry H. Bauer, organised scepticism is against the will of research cartels.

A two-tiered academy?

There seems to be two alternative ways forward for science. The first one is to continue the on-going commercialization largely without restrictions. To be fair it needs to be said that commercialization is nothing completely new. A closer collaboration between academic institutions and industry has been desired by both politicians and industry, and has also gradually taken place over the last half century. In the US, free-standing research institutes have been successful models for industrial growth and they have been seen as an example for Europe to follow. Not only has an increase in the

funding of science by industry been seen as a positive contribution to societal development – it has also become more and more necessary in times of decreasing federal budgets.

Even if the current trend can be seen as just a continuation of a largely accepted and uncontroversial development that has been taking place over a long period of time, something new has impacted our perception of science during the last few decades. Academic researchers in general have become more active on the market looking for ways to commercialise their achievements. Biotechnology in which the patenting of genes has quickly become an accepted means of protecting scientific results has triggered such a general trend.

Until now, academics have to a large extent kept the respect and confidence of ordinary people, and in the media they represent the factual status of issues, with the exception of cases where real or manufactured scientific controversy becomes news. This state of affairs is based on the notion that the scientific community at large is following Merton's principles of good scientific conduct. Even if large areas of science, perhaps even the major part, still follow traditional academic norms, it is evident that this is no longer the case in important technology-driven areas where scientists have become mere ordinary actors on the market. If it is true, as Derek Bok maintains, that commercial values are taking hold and altering the priorities of university scientists, this trend will be increasingly difficult to stop. Commercial mannerisms will then gradually take over even more of scientific research. Derek Bok depicts a (not too distant?) future scenario in his book (Bok, 2003, pp. 200–1):

> One can imagine a university of the future tenuring professors because they bring in large amounts of patent royalties and industrial funding: paying high salaries to recruit 'celebrity' scholars who can attract favourable media coverage; admitting less than fully qualified students in return for handsome parental gifts: solicit corporate advertising to underwrite popular executive programmes; promoting Internet courses of inferior quality while canceling worthy condensational offerings because they cannot cover their costs; encouraging professors to spend more time delivering routine research services to attract corporate clients, while providing a variety of symposia and 'academic' conferences planned by marketing experts in their development offices to lure potential donors to the campus.

If science goes too far in this direction, scientists in general may very well soon meet the same kind of trust crises as politicians have already experienced.

The second possible route for academic science is to re-establish its integrity with stricter rules for what researchers may and may not do in combination

with more openness and transparency on the links between academic institutions and industry. It is more likely that such measures will come into force as a form of self-regulation within the academic world itself as opposed to by political initiatives, simply because an awareness of the risk of losing scientific identity seems to be greater among academics than politicians. An encouraging signal that this might actually happen came in 2004 when Harriet Wallberg-Henriksson, president of the Karolinska Institute in Sweden, one of the leading European academic establishments in biotech, could announce that the institute had implemented new and stricter routines for the involvement of its employees in industrial projects (Karolinska Institutet. Annual Report, 2004). Another indication is that steps are being taken by academic journals to make recipients of industry funding reveal their funding sources when they publish research results. Such measures increase transparency without a doubt, however, it remains to be seen what the effect will be on the credibility of academic research among in the public eye.

Some authors, among them John Ziman, are of the opinion that areas of science with traditional academic values can coexist with commercialised areas, provided the necessary steps are taken to protect the boarders between the two. Robert P. Merges, Professor of Law and Technology at U. C. Berkeley, has made similar remarks when analysing property rights in scientific research (Merges, 1996, pp. 145–67). He contends that academic 'pure' scientists have a two-tiered approach to intellectual property rights. They seek to preserve the old norms while recognizing a fundamentally altered landscape by dividing potential transactions of property rights into two classes. The first class involves transactions with other pure scientists wherein efforts are made to preserve the old rules of scientific discourse relying on informal property rights. The second involves transactions with commercial entities which are governed by formal property rights. Merges suggests ways to preserve this practice.

It is clear that we have scientific fields still following the traditional Mertonian norms of science while at the same time a commercialised post-academic science has taken over other fields of science. So far the Ziman assumption of possible coexistence has not been proven false, provided we only consider the internal scientific community. From a societal perspective, however, there are at least two major problems with such a two-tiered academy. Firstly, the commercialised areas are the ones with a high technological profile, such as biotechnology, medicine, nanotechnology, information technology, etc. These areas present great political risk management challenges and have extensive value-laden and ethical dimensions. For this reason politicians and the general public need to be well informed not only of the commercial prospects or the dominant view of the risks involved but on other issues as well. Secondly, because of their high public visibility, the practices within these fields of science will shape the perceptions of science and influence trust in science in general. Thus the traditional arm of a

two-tiered academy risks losing trust this way. Furthermore, since it will be seen as less important (as not commercially attractive) it is in danger of losing public funding on which it definitely depends. The practice now increasingly used to reveal who sponsored the research behind results published in journals, etc. is useful but will not be enough to regain trust in pure academic research, and it will certainly not help in challenging the results being presented.

Later in the book we shall introduce legitimacy and authenticity as basic elements for transparency. In a democratic society science needs to be transparent. A legitimate science addresses scientific problems of relevance for society at large, and authentic scientists behave in accordance with what they claim to be the rules of science. Our discussion about Merton's principles suggests that both the legitimacy and the authenticity of science are in danger. For example, if scientific research focuses more on the development of profitable products for big business and neglects research on the risks they might entail, the result will be a low level of legitimacy. And if the general apprehension of scientific conduct among citizens is in line with Merton, but the driving force of scientists (in certain areas) is in reality mainly commercial interest, then they are not authentic. In the long run this is of course an unsustainable situation. In fact, it seems clear that academics are in danger of losing their unique position of trust in the public sphere.

Realistically, there is no way back to the pure academic science. The commercial forces described by Derek Bok, Sheldon Krimsky and others have created a historic paradigm shift of the scientific ethos. However, there continue to exist islands of pure science in areas which cannot 'benefit' from commercialization. Even more importantly, society's citizens still need ways of gaining insight into the status of knowledge in techno-scientific areas, as well as in other complex policy areas. Since science has lost its original ethos one can no longer trust that scientific advisory committees, individual scientists or even what seems to be a unanimous scientific community, will give us unbiased facts, unaffected by personal, industrial or political interests. This means that society needs arenas where scientists and other kinds of expertise are challenged so that unasked question are asked, uncertainties are exposed, hidden assumptions and values are revealed and vested interests are made public. Such arenas would serve two purposes. First, they would provide the general public and politicians with the necessary means to understand the values and limitations of factual and scientific claims. Secondly, they would offer an opportunity, perhaps the only one, for scientists following traditional academic norms to defend their position in the public eye.

Narrow expert framing

In *representative democracy* it is the citizens and their elected representatives who should be setting the agendas. In complex issues requiring detailed

knowledge the experts provide the factual material, but the final decisions are made by the policy makers. In a *technocratic society* the relationship between experts and policy makers is reversed. The experts have the initiative and set agendas, and the politicians are agents of a scientific intelligentsia providing nothing more than a rational administration for expert decisions. Of course, scientists will always be responsible for sounding the alarm when threats to human health or to the environment occur. But a reduction of political power to the extent of being nothing more than a rational administration is one which takes place at the expense of democratic values.

Even if we have a pluralistic rather than a technocratic society, we do have certain characteristic features of the latter. Expert elites often succeed in setting the agendas and the dominance of expertise has led to important issues being narrowly framed as technical/scientific while awareness of the social aspects and value-laden issues often remains very limited. As we shall see later, this is very evident in areas such as biotechnology and nuclear waste management. For example, according to the *expert agenda paradigm*,[8] genetically modified foods are acceptable if it can be shown that they are safe to eat and do not give rise to unacceptable environmental risks, whereas the general public may have other concerns of an ethical and political nature. This is just one among an infinite number of cases where experts let their own values influence the assessments or, to be more precise, the underlying assumptions in the assessments, so that an issue becomes framed as purely technical and scientific.

It needs to be remarked that science is sometimes pushed back by anti-scientific forces such as the idea of 'intelligent design' which has gained support in the Unites States in particular. This is naturally not a proper way to challenge expert dominance in a democratic society, since it doesn't aim to give science its *proper place*, but rather to put it aside by means of pseudoscientific arguments. Even if this trend is alarming we must not take it as an excuse not to challenge expert agendas. It may even be the case that transparency arenas of the kind I will suggest later in this book and which are independent of the expert community, would be more efficient than science itself in unmasking pseudoscience.

As the American philosopher Patricia Ann Fleming has shown, expert values don't only have an influence on which issues to address but also on the conduct of the actual assessments. When Fleming examined how the Nuclear Regulatory Commission used the formal expert judgment method in seismic hazard analysis for a nuclear waste repository she found that outlier judgments were given extra low weight (Fleming, 1999). An outlier in this case refers to those opinions which lie apart from the views or expected (average) views of other experts. This means that one's expertise is assigned a credibility quotient in relation to its nearness to the agreement of other experts. Thus the value of novel or anomalous knowledge is overridden by other values at work, perhaps ease and simplicity. In general, experts may also

have their own interest in the assessment results. Therefore, in a transparent decision-making system, the public must have the possibility to evaluate the arguments of the experts.

During the decades that followed the Second World War societal decision-making increasingly followed the experts-agenda paradigm and the complexity of expert systems increased steadily. The nature of the problems analysts were investigating became broader, and the organisational and political context in which they operated also increased in complexity and range. There is a continuous and logical line of development from the wartime studies of military operations, of logistics and tactics, to industrial applications, to systems analysis, and then to policy analysis with a wide range of applications. The cumulative effect of this development 'is to produce an over intellectualised version of policy analysis which gives undue emphasis to the more technical aspects of a subject that in fact should be concerned with the whole of the policy process' (Majone, 1989, p. 19). Brown has expressed the consequences of the expert dominance that followed quite clearly: 'The technicist[9] discourse reverses the democratic impulse by encouraging citizens to occupy themselves with private matters while remaining beholden to their expert representatives in public affairs. Technicists are successful in cultivating such civic incompetence to the extent that ordinary citizens come to regard, for example, foreign policy or scientific research as remote from their daily concerns' (Brown, 1998, p. 5). Brown could have given many other examples of issues that should be on the true political agenda much more often than is actually the case. Furthermore, during the 1980s and 1990s market forces joined with the expert culture to largely take over the agendas previously controlled by politicians. The distance between those in power and ordinary people then increased to hitherto unseen levels.

Here we are dealing with the interface between science and politics. In a famous paper from 1972 (Weinberg, 1972) Alvin Weinberg introduced the concept of trans-science – the discussion on issues that may be given to science but cannot be answered by science – they transcend science. These are issues that arise in technically complex systems but for which science is inadequate – they also contain value-laden aspects. Weinberg identified two institutional mechanisms for dealing with trans-scientific issues: the ordinary political process and adversary procedures. According to Weinberg, adversary procedures have merit in forcing scientists to be more honest and to say where science ends and trans-science begins. Where there is no consensus on values, the decision process must be political.

One may argue that it will never be possible to entirely distinguish between facts and values, however, in order to deal with societal matters in a structured way we must try and do our best. Another matter is to make the scientific status of an issue as clear as possible for the public at large. It is not uncommon in controversial societal problems that opposing points of view exist on what the scientific facts are. In 1967 Arthur Kantrowitz (Kantrowitz, 1967)

proposed an institution – later to be called the 'Science Court' – for scientific judgement. Later Kantrowitz chaired a Task Force for President Ford that studied ways of subjecting scientific claims to public scrutiny with a panel of competent neutral scientists. Science courts would report on points of agreement and reach judgements on disputed statements of fact (The Science Court Experiment: An Interim Report, 1976; see also Mazur, 1977). Although Kantrowitz's idea was never realised, the discussion about it is still of great value for studies on the role of experts in decision-making. Chapter 12 includes a more detailed description of the science court idea.

Expert attitudes towards citizens

The European Commission has recognised the gap between science and civil society, and steps have been taken to break down barriers and forge closer links between the two. There is a commitment to construct new and more active forms of 'scientific citizenship'. Speaking at a conference in Vienna on 7 December 2002, the Commission President Romano Prodi said (*Cordis Focus*, No. 211, 16 December 2002, p. 21):

> The relationship between science and society is an example of how we conceive of relations between politics and morality. The moral dimension of the political choices concerning scientific research and its applications has become a topical and controversial area as a result of new scientific breakthroughs over the last ten years.

An Action Plan for Science and Society has been presented by the Commission,[10] and many different actors are being urged to participate including 'member states, regions, local authorities, business, civil society organisations and individual citizens'. Guidelines will be given for dealing with risk communication, particularly when faced with scientific uncertainty. However, the Action Plan does not go far enough in opening up for real communication originating from peoples' concerns, as opposed to working within the traditional paradigm of having experts setting the agenda with the aim of informing. The Action Plan simply aims 'to encourage scientists to gain and maintain public trust by making their work more accessible'.

The *Cordis Focus* newsletter is a very informative source of news about European research. In a concise form the reader gets regular updates on progress in various research fields, the EU research programme and debates on controversial research issues that take place within the framework of the European Union. As a result, the newsletter also conveys attitudes held by researchers, research administrators and experts in a broader sense in Europe. A typical example is found in the issue of 12 January 2004 (*Cordis Focus*, No. 236, 2004). On page 4 there is an article under the heading 'Experts examine the barriers to public acceptance of nanotechnologies', which refers to the

EuroNanoForum in Trieste on 10 December 2003. The heading sets the scene. Nanotechnologies should be 'accepted' by the public – it is not a matter of employing the public's values to decide which nanotechnologies should be implemented. There are 'barriers' to acceptance, thus clearly the experts should have a strategy to break those barriers – not to understand the underlying reasons behind the concerns and take them into account. There are not only experts in nanotechnology, but also experts who can help to get acceptance. A professor in medical ethics has the solution: 'The public should be told enough so that additional information would make no difference to their decisions. The idea is saturation.' Further on, the article refers to a US expert in nanotechnology who regrets that the polarised debate in the media is dominated by those with little knowledge and consequently those with knowledge should make their voices heard.

On the very same page of Cordis (ibid., p. 4) we find another illustrative example, an article which refers to a report from the Europäische Akademie, a German foundation for the study of the social implications of science and technology. According to this article, the academy states that the interest of clinical research outweighs society's general interest in protecting embryos. The report also concludes that a large majority of the European population base their attitudes towards embryo research not on concrete evidence but on 'images of fear, stereotypes and beliefs'. The report proposes a European-wide harmonised regulation, based on 'sound scientific evidence' which should provide for a long term and stable research environment. However, the very point of departure for the argument, that the interest of research outweighs society's interest, is not scientific but value-laden.

Can it be said better than in these two articles? Even if, I am sure, most scientists would like citizens to know more about how science works the two examples from the European research arena show a very manifest attitude to the general public among experts and scientists in disputed areas. The use of terms like 'barriers against acceptance' and 'sound science' excludes the value of dialogue or participation from the beginning. In particular, 'sound science' can be used as a heavy hammer to suppress open and unbiased discussion about the implementation of new technologies possibly having that effect even when it is not intended. Of course, factual evidence and arguments should be based on sound science. Scientific discourse, however, deals with the question *of whether things have been done right* by following the rules of science. It does not address whether *the right things* have been done in accordance with societal values. For example, the question of whether the interest in clinical research on stem cells with its potential to cure diseases outweighs citizens' ethical concerns is not scientific but political.

My impression is that these two examples of expert attitudes are more typical than not. Often, scientists and experts are only interested in communicating with the public from their ivory towers without being prepared

to relinquish their control over the situation. However, there is no doubt that there is a sincere concern among social scientists and policy makers about the lack of trust in expertise and the need to open new forms of dialogue. As the House of Lords have concluded (House of Lords, 2000, summary recommendation 1): 'Direct dialogue with the public should move from being an optional add-on to science-based policy-making and to the activities of research organisations and learned institutions, and should become a normal and integral part of the process[11]'. Another example is the French Academy of Science which has created a scientific information and communication department to help bridge the gap between science and society. The department's principal mission will be 'to fill, as far as possible, the gulf between scientific discovery and society's perception thereof'.[12] And the EU White Paper on Governance (CEC, 2001, p. 3) has acknowledged that 'people increasingly distrust institutions and politics or are simply not interested in them'. The problem is recognised by research funding agencies who demand that recipients of research funding communicate their work. For example, in the US the research grant proposal criteria of the National Science Foundation require that proposers include statements about the broader impact of their research (National Science Foundation, 2004, p. 39) and many researchers attempt to show broader impact through efforts such as outreach to high schools, exhibits in museums, and other public education efforts.

It is a common idea among experts and scientists that more information will help to create greater acceptance and trust in scientific and technological progress. A study made in Italy by Massimiano Bucci at the University of Trento and Federico Neresini at the University of Padova, however, showed that information through the media does not necessarily lead to greater trust in scientists, and this is particularly so in biotechnology.[13] Believing that the media are ineffective in that respect, Bucci and Neresini draw the conclusion that more attention should be given to science education.

In the beginning it was scientific reason that inspired enlightenment as a relationship between science and society. As time went by, the enlightenment model was hijacked by scientists and they were themselves the only scientific citizens. One means for experts to maintain their position in power has been, consciously or unconsciously, to avoid highlighting the values behind research and analysis, thereby maintaining the appearance of objectivity for their professions. We will deal with this in study cases later on. Here we will only note that this is not a new discussion, at least not in disciplines other than the natural sciences. Already in 1929, the Swedish economist Gunnar Myrdal wrote (Myrdal, 1953, quotation in Sen, 1983):

> There is an inescapable a priori element in all scientific work. Questions must be asked before the answers can be given. The questions are an expression of our interest in the world, they are bottom valuations.

Myrdal later became known for his opinion that researchers should account for their values and points of departure for their research.[14] This may, however, not be sufficient to uncover hidden values in research and expert investigations. In addition, we must find ways of challenging scientists' and experts' assumptions so that their analyses become truly transparent.

Social construction?

The underlying idea of this book is founded on the notion that there are factual and value-laden issues and that both should be made clearly visible in the decision-making process. Not everyone agrees with this notion. Certainly this is the case with social constructivists who assert that science is socially constructed and thus there is no such thing as an objective truth or scientific fact. We must admit that science is part of a larger social and political context and facts are dependent on their acceptance by the scientific community. However, the arguments of social constructivism go further; 'Facts and theories are not discovered eternal truths but, at least in part, are the products of a specialised social setting' (Foltz, 1999, p. 121). Scientific facts are socially constructed and thus science is in itself a political process. 'This social construction undermines scientific authority by demonstrating the impossibility of separating science from values in the political arena', says Foltz.

The easy argument against social constructionism is the absurdity of the assertion that the world is whatever we agree it is. For example, you might believe that the idea that smoking causes cancer is just a social construction. If, on the other hand, a larger part of the population starts to smoke more, the number of deaths from lung cancer will increase. To put the matter differently, the factual world always intervenes, regardless of what opinions and beliefs we have.

However, the issue is not quite as simple as that. An extreme realist position is also problematic. History shows that apparently rational people have believed in 'facts' now known to be non-existent or false. Who now measures phlogiston?[15] Who still attempts to turn lead into gold? The constructivist argument is that some of the things we now believe to be true will be shown to be false at some future time. Therefore, no matter how good the evidence might now seem, the world may well be otherwise than we think it is.

The arguments of social construction gain support from the claim that we often cannot separate facts from values in the claims of knowledge in policy-making, and that knowledge in such situations seems to be a complete mixture of facts and values that will resist being untangled (see e.g. Laird, 1999) – there is no natural boundary between the two (Jasanoff, 1990).

It is clear that arguments based on science and technology are often value-laden or based on hidden values. However, this does not mean that science is of no use or that there are no valid factual claims. We just have to be more precise in defining what we mean by the statement that 'scientific facts

usually cannot be separated from values'. This becomes easier to understand when we leave the more philosophical realm to discuss practical impact on policy-making in specific areas. Let us thus take three concrete examples.

The first example is genetically modified organisms (GMO). The extent, and the mechanisms for how, they can harm the surrounding environment may be the subject of uncertainty and discussion. Therefore one can claim that they should not be allowed or their use should be severely restricted but such a claim would be based on a mixture of factual and value-laden issues. The value-laden part has to do with the precautionary principle meaning that we should not avoid precautionary measures (restricting use) because of the uncertainty in harmful effects. It is reasonable, though, that the extent of precaution should depend on the extent of uncertainty, the possible negative consequences and the positive consequences of using GMO. This weighting is a value-laden task for politicians to practice. However, the uncertainties in the factual part can still be addressed by scientific methods. When the uncertainty is decreased there will be less room for precaution. If the harm is found to be negligibly small no action is needed. If it is large, action *is* needed, however then it will no longer be a question of *precautionary* measures.

The same kind of analysis can be made for CO_2 emissions and global warming. There is still some uncertainty whether CO_2 actually causes global warming or not. The extent of the uncertainty and its implications needs to be illuminated for policy-making. The extent of any counter-measures must achieve a balance between, on one hand, the probability and the extent of the negative consequences of CO_2 release and, on the other hand, the positive consequences of using coal for industrial and heating purposes. Again, the weighting is a matter of values and politics. The uncertainties that still exist, including those about the causes of global warming, can be addressed and hopefully reduced by a number of scientific methods.

The management of high level nuclear waste is our third example. Whether to store it under controlled conditions for an unspecified amount of time or to build a repository for final disposal is a matter of both science and values. The consequences for future scenarios can in both alternatives be addressed by risk assessment methods – there still remains a value-laden element for the political decision. It must also be recognised that the relevance of different future scenarios (such as future ice ages or intentional human intrusion) is also a matter of values and should not be decided by the experts.

These examples illustrate that obviously there are issues that are addressable with the scientific method and there are issues which are not. The fact that there are uncertainties in data and models does not mean they cannot be resolved or at least decreased with science and technology. However, here we have another important point where values enter the policy-making process. Politics and values still have a large influence on which uncertainties and issues are being investigated by science and risk assessment. Society can accept a certain level of uncertainty and different issues may be considered

more or less relevant for the decisions to be made. This is a crucial point where the experts and scientists should not have too much power over setting the agenda to determine which issues are being investigated and which are not.

The policy-making process outlined here means that values determine what issues should be addressed by science and technology, that these issues can and should be investigated by scientific methodology and that the final decisions should made in the political sphere. The examples given show this to be in fact a workable model which defines the role of values and the role of factual issues i.e. issues that can and should be addressed by scientific methods.

There are at least two other arguments against social constructionism. The first one is that if there are no scientific facts and if that which is referred to as scientific fact is always socially constructed, as are values, then we lose the ability to build a societal structure. Science loses its justification – so do ethics and politics. We thus have to avoid the idea of social constructionism for the simple sake of survival. Perhaps the most striking counterargument is that the notion of social construction backfires on those who assert it. If all claims are socially constructed – so are the claims of social constructionists! They too lose their identity and their existence loses justification.[16]

Science in a democratic society

In this chapter I have argued that parts of science have joined with commercial forces, that this puts scientific identity in danger of losing societal trust, that many scientists and experts see 'the public' as ignorant and as 'barriers against acceptance' instead of recognizing the legitimacy of citizen views and concerns.[17] Here it needs to be emphasised that this does not mean that science should be ignored or that the views of activist or interest groups should be given priority in societal agenda setting. Their views and arguments also need to be challenged in the eyes of the general public.

Contrary to the social constructivists, I believe that there is an 'objective world' that can be investigated with scientific methods, and it is crucial that society has methods to clarify what the scientific status is in issues of importance for policy-making. If we act as social constructivists, the real world will sooner or later make itself known, something that might be very painful if our state of unawareness goes on for too long. Or if political decision-makers simply ignore expert warnings we have learnt, not least from hurricane Katrina, that there can be severe consequences indeed.

It is also true that technology, supported by scientific progress, is the strongest driving force in society since the industrial revolution started, and this is mostly to the benefit of humans. The marriage between science and industrial development and the increasing commercialization of science, however, seriously challenges a fundamental cornerstone in society, namely

that we can rely on scientists to tell the truth and that they are independent of commercial and political interests. We don't want to see scientists acting like any other market-oriented group lobbying for themselves or for others.

The current popular concept of 'democratisation of science' may, however, also be misleading if it makes scientists engaged in societal debates at the expense of scientific conduct. Equally, citizen involvement may not always give societal benefit if it means certain activist groups taking over the agendas. Invading antinuclear groups can paralyse local dialogues about nuclear waste repositories, animal rights activists can constrain medical research and religious activists can hinder embryonic stem cell research. Everyone has the right to tell his opinion of course but sometimes society seems defenceless against aggressive campaigns affecting the political reality without being challenged. As is the case for the narrow framing by expertise, the same need for awareness and transparency holds for situations where stakeholder groups frame issues at the expense of scientific facts.

Furthermore, there are areas where scientists and technical experts act on their sense of public interest with advice and warning but where they are simply ignored by society at large and by policy makers who have other, to their minds, more pressing problems to deal with until reality catches up. One such area is pre-disaster planning, in which experts often point out organisational weaknesses but where little is done. For example, as Thomas A. Birkland, Director of the Center for Policy Analysis at the University of Albany, pointed out long before hurricane Katrina (Birkland, 1998), researchers have consistently warned that the USA needed improved policies to deal with coastal and hurricane hazards. This is a case where expert advice, if it had been taken seriously, would have empowered the citizens of New Orleans. There may be many other areas, 'policies without publics' (May, 1990), where scientists, without being heard by politicians or citizen groups, rightly warn about hazards and consequences of contemporary societal practices that in the future may cause great negative effects. Even if the focus of this book is the negative aspects of expert framing we must not forget the positive role scientists play in trying to raise awareness of such problems.

3
Values, Emotions, Interests and Rationality

In the previous chapter we dealt with 'the objective world' that science and experts investigate. The main conclusion was that the scientists and the experts certainly have their proper roles to play, but which issues they address in their investigations and how the results are used in policy-making are value-laden aspects that must be made transparent for the sake of democracy. This leads us to a closer look into what we mean by 'values', their relevance in technological choices and how they relate to emotions and interests. This is a very complex area that concerns for example philosophers and psychologists (what values and emotions really are) and political scientists (how they are taken care of in the political process). Being an amateur in these areas, I am unable to give anything approaching a comprehensive overview of these research fields. The aim of this chapter is much more limited: it gives my view on how the world can be structured for increased awareness and transparency in policy-making. It thus lays the foundations for the forthcoming chapters where we go deeper into certain complex and controversial policy areas and for the ideas presented later in the book on how awareness and transparency can be enhanced.

What do we mean by values?

Values are beliefs about goals in life that are desirable for an individual or for society. As individuals we maintain our values across situations; when we are at home, at the office or with friends. In the words of John Burton, Australian diplomat and academic who devoted his life to conflict resolution, values can be defined as follows (Burton, 1990):

> Ideas, habits, customs and beliefs that are a characteristic of particular social communities. They are features that lead to separate cultures and identity groups. Values are not for trading and changing values is a long process.

Some values are shared by almost everyone, others are cultivated within certain social groups. Experts, for example, are people rooted in different contexts, ranging from the social context where they were brought up and where they live, to the expert culture in their professional area, the larger commercial culture, and often the ivory towers of academia.

There are several possible angles adopted by philosophers when it comes to analysing values. The American philosopher of science, Helen Longino delineates values as *contextual* and *constitutive*. Contextual values are defined by Longino as 'personal, social, and cultural values, those group and individual preferences about what ought to be done' (Longino, 1990, p. 4), whereas constitutive values are related for example to the goals of science, such as truth, accuracy, simplicity, predictability and breadth. According to the Israeli psychologist Shalom Schwartz (see e.g. Schwartz, 1992, 1994), people's values are organised in *hierarchies of relative importance*. These relations are crucial to decisions we make. They motivate choice of behaviour, justify our past behaviour, serve as standards by which to evaluate people and events and direct attention and perceptions. For example, if values of achievement and stimulation have higher or lower priority for you than security and benevolence, you will make different choices in life, and you will probably also prefer different alternatives in societal issues.

Our values are not only stable across situations but also over time. They form during childhood and become stable in adolescence. In adulthood they normally change only slowly, but can change more rapidly in response to dramatic experiences, such as the death of a partner, sudden poverty or therapy. They can also change in a long-term perspective due to general societal developments in which technology plays an important part. The language of values is socially approved goals. However, they may also serve interests of individuals, groups or both, an aspect to which we shall return shortly.

In areas driven by technology, values are often hidden in the policy-making process. This may be so because some values are supposed, perhaps erroneously, to be so deeply held and commonly shared that they appear to require no articulation. It is also possible that experts in scientifically sophisticated areas more or less unconsciously induce certain values in their assessments by selecting which issues to address, and (more importantly) which ones not to address. Technocratic and regulatory cultures may actively discourage the discussion of values, partly because they do not have the mechanisms by which to deal with them. The explicit articulation of values may also be against the interest of agenda setting organisations, including industry and NGOs.

For high quality policy-making we should exert ourselves to create a broad framing of alternatives and issues to be explored so that no matters of importance are neglected or forgotten. If, as is often the case, the agenda is set by the ideas and beliefs of an expert community, the frames for investigating alternative solutions and for risk assessment are set too narrowly. Certain issues

that may be relevant for political decisions are simply not explored. We will see many examples of this when we go into our case studies in biotechnology, nuclear waste and other areas of risk assessment.

Perception and emotions

Emotions have long been regarded as the enemy of reason, and among natural scientists this is still a common view. Certainly most of us would agree that rational judgement can be clouded by fear, passion, envy and so on. However, it is becoming increasingly clear that the contribution of emotions to rational response is normally not detrimental, instead they can be seen as part of the mechanism of reason itself (Griffiths, 2003). In fact, it seems as if analytic reasoning cannot be effective unless it is guided by emotion and effect. As Andy Clark, professor of philosophy, who has studied artificial intelligence and neural networks, writes (Clark, 2003): 'Rational behaviour is the result of a complex and iterated series of interactions in which deliberative reason and subtle affect-laden responses conspire to guide action and choice. Emotional elements function, in fact, to help rational choice operate across temporal disconnections.'

However, emotions can also be used by others to guide, or perhaps misguide, us. This is done on a daily basis in advertising and marketing by those who want to impact our behaviours. Emotions can be seen as 'biases in cognition that direct attention at some sources of information rather than others or lead to a higher weighting for one consideration than for another and thus lead to actions that would not have eventuated in the absence of the emotion'.[1] It is reasonable to assume that emotion in certain situations can lead us to extremely narrow framing where there is no room for wider value-laden perspectives for analytical thinking.

The impact of emotion on our daily life and its interplay with rationality is thus complicated. Emotions are a necessary part of rational behaviour but they can also mislead us into seeing only a very small part of reality. There is probably also a complex interplay between values and emotions. Our basic values are important for which emotions we feel in different situations or for which alternative futures we hope for or fear. And even if values are relatively stable, emotions related to dramatic experiences may change our values. For example, it seems reasonable to suggest that the September 11 attack has impacted the values of citizens, especially in the United States.

These issues about the relationship between values, emotions and rationality form a very interesting and huge field of research in psychology and social psychology. To return, however, to the theme of this book, we need to look at the role of emotions in societal policy shaping processes. If emotions are short-lived when compared with values and are subject to short-sighted marketing campaigns, etc. one could draw the conclusion that they should not really be relevant for longer term decisions in society. What is clear though is

that actors wanting to influence the policy-making process can play on our emotions with marketing methods such as advertising to steer the process in a certain direction.

In societal debate, values play either a fundamental role directly as arguments or lie behind the factual issues that are raised as arguments. Emotions can influence how strongly and in what form the arguments are exposed. Opinions expressed with strong emotion are often seen as less legitimate than opinions supported by factual or value-laden arguments given with more logical reasoning, i.e. they 'can not be taken seriously'. On the other hand, the emotional opinion holder is easily seen as authentic; he or she expresses his/her real feelings without any deliberate manipulation of the arguments. However, we must be aware that the ancient art of rhetoric, as formulated by Aristotle, includes logical arguments, but also allows appeals to the character of the speaker and the emotions of the audience.

The situation becomes especially tricky when the existence of emotions in public opinion as such becomes an argument for or against a certain policy alterative. The subjective emotions of many become a reality in the real world. As we shall see in Chapter 5, a special case is the concept of risk perception which contains both value-laden and emotional elements. Here attributes of risk such as being involuntary (which typically is valued as being worse than voluntary risk) are lumped together with emotional attributes like dread. This is very convenient for those who want to see any argument not based on science as subjective and irrational. It is a way to decouple value-laden arguments from the agenda. The same goes for expressions like 'public outrage' which can denote anything from opinions based on fundamental ethical principles to fear of the unknown or might simply be expressions of vested interest.

When comparing with values, it is easier to specify *what emotions are not* than to define what they are. For our continued discussions, we will stick to the concept of values that we introduced at the beginning of the previous subsection. There we said that 'values are beliefs about goals in life that are desirable for an individual or for society' and further on: values are 'ideas, habits, customs and beliefs that are a characteristic of particular social communities. They are features that lead to separate cultures and identity groups'. Emotions like fear, dread, joy or love don't qualify for this definition. Between private subjective perception and science lies society and culture, a middle ground of beliefs and values.

We easily fall into the trap of disparaging value-laden arguments in public debate for two reasons; one is the rhetorical trick often used by scientists and experts to lump them together with emotions so that they are seen as subjective and irrational; the second reason is the careless use of words like perception and outrage that unconsciously mix values and emotions. Therefore, even if it is not possible to draw a strict borderline between values and emotions we should make an effort to separate the two concepts for the

sake of clarity and to avoid depolitization of the debate about important matters.

Vested interest

In this book we are interested in seeing how the quality of decision-making in society can be improved. For that purpose, we have already discussed the role of science and facts and most recently the role of values in forming the basis for decisions. We have seen that traditional societal structures are weakening in the market democracy leading to decreasing awareness and decreased quality in the decision-making process. We should thus find ways to strengthen societal structures in order to increase clarity. Our exploration of the structural prerequisites is, however, not complete until we have also dealt with the role of *vested interest*. As for values, we can follow the definition by Burton. According to him, interests are (Burton, 1990):

> The occupational, social, political and economic aspirations of the individual, and of identity groups of individuals within a social system. Interests are held in common within groups in a society, but are less likely to be held in common nationally. Interests are transitory, altering with circumstances. They are not in anyway an inherent part of the individuals as are needs and as values might be. They typically relate to material goods or role occupancy. Interests are negotiable.

Individual interests may include aspects such as money and property, personal integrity, social network, social status, and professional success. Company interests are likely to encompass market share and profit. NGO groups may have interests related to increasing member numbers, public trust and a positive image, and influence over politics. Research organisations may have interest in high academic status, recruiting students, public funding, corporate funding and political influence.

Sometimes values and interests go hand in hand. A scientist may have chosen his/her area of research based on deeply seated values but when he/she becomes a prominent scientist gaining more research funds to his/her particular area also becomes a matter of personal interest. If you regard the preservation of nature as very important you may join a certain NGO organization, but once you are an active member it may prove to be in your personal interest to rank certain environmental problems as especially important. This coalition between value and interest can become an important part of your identity and you may not be aware of the extent to which either or both factors motivate your actions. It seems reasonable to assume that interests also affect how people perceive issues. This is, however, a matter which has been little investigated. As we shall see later, the role of emotions and values for risk perception has been given considerable attention in

research projects whereas little attention has been given to the role of vested interest.

There is a complex relationship between how values and interests become arguments for policy decisions. Often value systems and stakeholder interests frame which issues are addressed in research programmes and which facts are used as arguments in the policy-making process. This kind of strategic action is only to be expected from a responsible stakeholder representative, however, it should be up to the overall policy-making system to reveal it. As Anne Bruce and Joyce Tait have pointed out there is also the possibility that opposing stakeholder interests question the legitimacy of, for example, research results with the argument that they have been produced with industry funding. These two researchers are among the few who have seriously addressed the controversial and sensitive issue of vested interest in policy-making. They give the example that the evidence suggesting that GM technology can offer environmental benefits when managed in particular ways can be rejected on the basis that the scientists have received industry funding and therefore have a vested interest in the GM industry (Bruce and Tait, 2003).

In a political context, some interest based arguments are legitimate parts of policy-making, others are not. For example, labour, consumer, farmer and industry organisations have every right to express the interests of the groups they represent. The weighting of these different interests against each other is an inescapable part of politics. The key word here is *authenticity* meaning that there should be consistency between what a person or an organization says (the role he takes in the public arena) and what he does. For example, a representative of a consumer organization (his role) is authentic when he brings up concerns about GM food safety (what he says). A scientist paid by an NGO is not authentic (in his role as scientist) if he only talks about negative results from GM crop trials (what he says) but does not mention positive results of which he is fully aware. Again the overall policy-making system should have the capacity to reveal when this happens.

Awareness in policy-making thus includes awareness of vested interest. To achieve that, arguments and conclusions must be analysed and challenged. It is then useful to distinguish between the considerations on which a stakeholder acts and the reasons he uses in interpersonal communication for explaining and justifying his arguments and conclusions. Clearly, if vested interest and personal motives were important factors guiding a stakeholder they would be inadequate to explain his decisions to others or to persuade them.

Interests naturally have their role in setting agendas for policy-making in society and they impact which factual and value-laden issues are brought up in the public sphere – it would be naïve to believe otherwise. The question is how we want that to take place. When considering current trends in the globalised market economy and the market democracy which has emerged with the loosening up of traditional structures, the answer seems

almost trivial – let market forces work it out! However, this is not the way democracy is supposed to work, and this is not the way to gain clarity and awareness in decisions. Basically this is a question about efficient institutional structures in our democratic society, to which we shall come back later on.

The elitist view of ordinary people

Ordinary citizens have respected science and admired scientists for their increasing knowledge which during the 20th century made technological and medical progress possible with unexpected speed. They have also relied on the political system which has given them leadership that well represents their values, whether they have been oriented towards individual responsibility or social welfare. Industry leaders have used capital, the work force, and technological progress to create unparalleled economic growth, within limits set by the political system. The media have been entrusted with communicating technological progress and the political debate.

All this has taken place with the spirit of the enlightenment and, more importantly, within a societal structure that has been trusted by citizens. Now, however, the citizen's trust in politicians, expertise and journalists, even in academic research, is decreasing at the same rate as the structures are dissolving. The rise of expertise to its dominant position after the second world war, the increasing scope for market forces which came into being during the last decades of the previous century, and finally the marriage of these two factors have given us a new situation.

By and large, we see an elitist view of citizens that invites them to the policy-making process in theory but gives them little or no influence in practice. The attitude of experts towards the public, and all too often of politicians, is evident from language such as 'sound science, barriers to public acceptance, polarised debate in the media dominated by those with little knowledge, images of fear', etc. In spite of all the contradictory evidence we shall see in the following chapters, they maintain the view that citizen involvement really must mean one-way information and that this will lead to acceptance of pre-decided solutions. Many understand better. More than a decade ago, the American political scientist Daniel Fiorino gave three arguments against such a technocratic approach (Fiorino, 1990):

> A substantive argument is that lay judgments about risk are as sound or more so than those of experts. . . . A normative argument is that a technocratic orientation is incompatible with democratic ideals. It is to 'ignore the value dimension of policy analysis and to disenfranchise the public who, in a democracy, ought to control that policy'. . . . An instrumental argument is that effective lay participation in risk decisions makes them more legitimate and leads to better results.

Fiorino and others have also outlined why lay participation can lead to better results:[2]

- lay citizens frame problems in a broader manner that is not constrained by disciplinary boundaries and may see problems experts do not;
- lay participation can bring a broader range of expertise and experience into decision processes;
- lay participation can expose limitations in 'expert models';
- lay judgments reflect a sensitivity to values and common sense;
- citizens are more likely than experts to identify alternatives and solutions;
- citizens are more likely to 'institutionalise regret – accommodate uncertainty and consider potential errors in decisions'.

As Mary Douglas and Aaron Wildavsky suggest, is it plausible that 'people's first and fundamental choices are personal, moral and political; the intellectual arguments justify what has been decided; first the good society, the good life, and a place in it; explanations later' (Douglas and Wildavsky, 1982, p. 82). The good society, the good life, and a place in it includes all that we have discussed in this chapter; values, emotions and interest. After all, we are all human beings. On the other hand, we don't want to see scientists acting like any other market oriented group lobbying for themselves or for others. If we turn the argument of Douglas and Wildavsky around, it will mean that in order to make the intellectual arguments transparent we need to understand the personal choices that lie behind them. In addition, we must find ways to challenge the assumptions made by scientists and experts so that their analyses become really transparent.

Would an approach like the one suggested by Fiorino be irrational? Rationality is a word with positive associations. Who can argue for an irrational decision-making process? Among experts and many others there is a tendency to accept only factual issues as relevant in decision-making – values and intrinsic ethical objections are then seen as irrational and are therefore to be discounted. This is, however, a simple and dirty trick employed to exclude other equally legitimate considerations and to frame an issue for your own purpose.

The German sociologist Max Weber (Weber, 1978) distinguished between 'value rationality' and 'instrumental rationality' where value rationality is behaviour consistent with a particular value position and instrumental or scientific rationality looks at the consequences of various actions and carries out cost–benefit types of assessments. In other words, instrumental rationality is the working methodology for experts and scientists whereas value rationality is a principle for politicians. A rational decision-making process obviously must include both these types of rationality. Furthermore, a prerequisite for rational decision-making is awareness of all the relevant aspects, which includes not only the factual but also the value-laden issues. We have

to understand, though, that there are limits to rationality. Herbert Simon, one of the most influential social scientists of the 20th century, introduced the notion of 'bounded rationality' already in the 1950s (Simon, 1955, 1972) , an idea that has later especially influenced mainstream economics. In reality, Simon claims, individuals in their choices face uncertainty about the future and costs in acquiring information in the present. Therefore, they have only 'bounded rationality' and are forced to make decisions not by 'maximisation' but by 'satisficing'. This means that emotional and irrational elements influence decisions by setting aspiration levels. If these levels are achieved, the individual is happy enough about taking complexity and uncertainty into account.

Four themes

In this chapter and in the previous one we have dealt with the roles of science and expertise, values, emotions and interests in policy-making and we have seen that the real state of affairs is far from the ideals most of us have. Our findings so far can be summarised by the following four themes.

First theme – narrow framing

- In issues which include a scientific and technological content agendas are set with a narrow framing intended for choices to be made in a seemingly scientific way but with hidden values involved. However, a technocratic approach with little public insight leads to the framing of issues which ends up being irrelevant for citizens at large and thereby also for political decisions. This leads to frustration and an inability to solve important societal problems.
- Most often narrow framing is referred to as a result of expert culture in technology and natural sciences. However, there can also be social narrow framing if dominant stakeholder groups, grounded in their value systems or vested interests, succeed in placing, for example, ethical aspects at the top of the agenda and scientific arguments are suppressed in the public debate.

Second theme – instrumental rationality

- There is an understanding among leaders in politics and industry that new technologies and risk assessments need to be communicated to 'the public'. However, neither the expert and scientific communities, nor industry, are willing to relinquish control. Processes of public participation are thus in danger of being used as sophisticated instruments for the legitimization of ready-made decisions.

Third theme – commercialization of science

- Science is being increasingly commercialised, especially in high profile technology driven areas. The consequences are that science loses its

identity as a truth seeking endeavour, commercial mannerisms take over and scientists become ordinary actors on a market of ideas.

Fourth theme – research cartels and knowledge monopolies

- In certain areas research cartels exist that control the knowledge market for reasons such as profit-making, sustainability of high levels of funding or political prestige. The controlling bodies are industries, dominant research groups, governments or combinations thereof. The consequence is that the general public is not exposed to arguments and research that question 'well-known facts'.

From a democratic perspective these themes, if they reflect real trends in society, are no good. Achieving participation, insight and transparency would mean widening the framing to societal needs, putting a stop to treating citizen concerns as irrational, revealing vested interest in factual claims and challenging alleged consensus in scientific issues.

Let us keep these themes about the roles of science, expertise, values, and vested interest in societal decision-making in mind when we examine how some contentious issues, such as nuclear waste, genetic testing, other issues in biotechnology, nanotechnology and electromagnetic fields are dealt with from a democratic point of view. In Chapter 9, where I summarise experiences from these areas, we shall see that the themes have been validated 'in the field'. We will then be prepared to put them into the context of contemporary democratic thought and to examine more in detail how the policy-making system can be enforced to help democracy work better.

4
Radioactive Waste Management

There are several reasons for giving the area of radioactive waste management (rwm) much attention when we study societal decision processes for complex issues. First of all rwm is the very prototype of a scientifically complex problem that needs political solutions. It contains a wide range of disciplines in natural sciences and technology, such as geology, hydrology, mechanics, chemistry and metal corrosion. It also contains social sciences and a very high level of ethical and value-laden considerations. There have been many failures and even a few success stories over a 30-year period during which numerous rwm programmes have commenced, made some progress, been halted and failed, and then been re-started with new approaches sometimes only to encounter new sets of problems. The issue of nuclear waste, being part of the overall debate about nuclear energy, has at times been extremely controversial – it has even caused governments to fall.

As we shall see, rwm programmes contain all the problems we have discussed so far with expert dominance, narrow framing, social distrust in expertise and industry, and fragmentation by stakeholders. There have thus been many failures but there is another side to the coin. The rwm community has realized that there are fundamental problems with its decision-making processes which has led to much research in risk communication[1] and related areas. Risk perception research has for example to a large extent developed from nuclear and radioactive waste applications. Generally speaking, there have been relatively rich resources available for research and the testing of new approaches, not just within the nuclear industry but also for government agencies, and sometimes also municipalities and other stakeholders have gained resources to develop their own approaches. All this has created a rich knowledge base from which much can be learned that is of relevance for other areas. Entirely new concepts for risk communication have been developed, even if the conservative nuclear industry itself has shown a great deal of hesitation in actually applying them.

Areas like mobile phone systems and GM crops have characteristics similar to those in rwm, one example being that national or corporate goals

frequently come into conflict with local stakeholders. Indeed, we now see the kind of mistakes that the nuclear industry has made over the course of several decades being repeated in these new areas. This could, however, perhaps be avoided by learning from failures, success stories and new insights gleaned from the vast wealth of experience in the rwm field.

Ideally, a radioactive waste management programme develops through different phases from basic research to more focused and applied research and development and finally to the design and siting of proposed solutions. Experiences vary, however, and countries are at different stages in the development of long-term solutions to their waste problems. There are a few examples of significant progress being made all the way to the siting of a final repository. For high level waste, one site has been selected in Finland, and in Sweden two sites are currently being investigated in detail, with the approval of the host municipalities. There are also examples of countries where the rwm programmes initially made good progress but were then forced to take several steps back due to local resistance or other social factors.

In this chapter we first give an overview of all the setbacks suffered by the rwm programmes. We then turn to programmes where initiatives have been introduced to take citizen values more into account so that more acceptable and stable programmes can be built. Some examples are mentioned where problems met have resulted in a re-evaluation of the programmes, and we also go more deeply into the Finnish and Swedish cases. We also describe some initiatives of a research character that have been made in the European Union and others in the international arena. Finally, we summarise the status of rwm and key findings with respect to the future of this and other controversial areas.[2]

Setbacks in nuclear waste management programmes

The UK Sellafield planning inquiry and its consequences

The focus in the United Kingdom is on intermediate level waste from nuclear power plants and from reprocessing at Sellafield, rather than high level waste and spent fuel. In the case of high-level waste, the UK policy has been to store it for at least 50 years before seeking a permanent solution.

For intermediate level waste, Nirex Ltd was formed during the 1980s to provide radioactive waste disposal services and the company started investigations into a deep repository. In 1987, Nirex presented the report 'The Way Forward' (Nirex, 1987) which set the stage for a site selection process. A number of geological characteristics were considered. In 1989 Nirex had moved several progressive steps further in the site selection process, narrowing the choices down to two main UK nuclear sites: Sellafield and Dounreay. As a step in the site investigation programme, Nirex sought planning permission in 1995 for a Rock Characterization Facility (RCF) near Sellafield, West Cumbria.

The Cumbria County Council, however, refused this application. Nirex appealed against the refusal, which forced a Planning Inquiry to take place.

The Inquiry was held according to normal UK procedure, using an adversary format with Nirex and Cumbria County Council as opponents. The inquiry covered a large range of issues including the site selection process and 'the safety case'. The inspector who led the proceedings reported in March 1997 to the Secretary of State for the Environment. Based on the report, the government decided to refuse the Nirex application for the RCF (Government Office for the North West, 1997).

There are probably many possible explanations for the Nirex failure at Sellafield. One procedural argument of the Cumbria County Council was that Nirex had entered into a site selection process without allowing any public or regulatory involvement. Formally, the application from Nirex was for permission to build an underground research laboratory at Sellafield, which did not require a licensing approval from the nuclear safety authorities. The RCF, however, was designed to add to Nirex's information about a possible repository site in advance of the company deciding to apply for development authorisation. Therefore, it was in fact a major step in selecting a site for a repository and not just for a laboratory, as was the formal ('material') argument put forward by Nirex.

Nirex had furthermore used multi-attribute decision analysis (MADA) for its site selection, which is a quantitative decision analysis method that arrives at a preferred decision among a number of alternatives based on the importance and values of different factors. The weighting of the attributes which were put into MADA was negotiated by an expert panel drawn together by Nirex. It was clear though that this weighting, which included transport costs, geology, safety and local experience, was more a matter of value judgements than of science. If geological attributes (especially the geological predictability of the site) had been given higher values, Sellafield would have scored low in comparison with other sites. The County Council could thus argue that Nirex had followed an indefensible site selection process that involved the loss of sites with the most promising geology. The MADA exercise is a perfect example of a method which looks very scientific but which was applied with more or less hidden value-laden assumptions (Andersson, ed., 1998).

The refusal of the application for the Rock Characterization Facility at Sellafield led Nirex to a new Transparency Policy with dialogue on the future long-term management of waste (Nirex, 2003). The new approach included preview (OECD, 2003), which is a process by which opinion is sought about a research project, or a research programme, before the research is carried out. The purpose of preview at Nirex was to allow internal and external stakeholders to provide input to the research programme at the planning stage and to increase the transparency of decision-making. The new approach received an initial positive response and stakeholders sought a dialogue with Nirex on the future long-term management of waste.

The UK Government then appointed an independent Committee on Radioactive Waste Management (CoRWM) to consult and recommend a long-term solution which would protect people and the environment. The CoRWM presented its recommendations to ministers in July 2006 (Committee on Radioactive Waste Management, 2006). In its response to the CoRWM report the UK Government (Department for Environment, 2006), confirmed that it will lead in identifying the future process and criteria to be used in deciding the siting of facilities. This will include exploration of the concept of voluntarism and partnership arrangements suggested by the committee. The UK Government agrees that previous experience in the UK and abroad has demonstrated the failures of earlier non-consensual approaches to implementing long-term waste management facilities. Instead the UK Government is committed to seeking a solution based on a partnership approach.

The details of exactly what a voluntarist and partnership approach might entail, and how it would operate in practice, need to be considered and developed into the proposed Government framework for future stages of the programme. These matters will be considered in the Government's work to develop a siting process framework which will engage stakeholders and include consultation. There is also a commitment to flexibility, which means that other long-term management options (for example, borehole disposal) could emerge as practical alternatives.

By and large progress in the UK is slow, the country being still seemingly paralysed by the failure in Sellafield. Frustration is expressed for example by the UK House of Lords Science and Technology Committee, which in December 2004 criticised the slow progress towards developing a policy for radioactive waste management (UK House of Lords Science and Technology Committee, December, 2004). The committee was astonished that CoRWM was asked to start from a 'blank sheet of paper' when several of the options being considered had already in effect been ruled out by the Government and numerous authoritative bodies. CoRWM must waste no more time considering infeasible strategies. The House of Lords committee also thought that 'the amount of time and money CoRWM gives to discussing its methodology of engagement and ways of working is disproportionate to the public engagement that is likely to be generated by its work'.

The development and implementation of the UK programme will require commitment by the Government, other bodies directly involved in its delivery as well as continued public and stakeholder support over many decades. Examples from other countries, e.g. Sweden, however, indicate it will be difficult to maintain any level of involvement over such a long period of time. Although the new UK programme seems to have similarities with the Swedish example, in practice it does not seem target oriented. Furthermore, the idea of reaching consensus by means of dialogue and partnerships seems doubtful, if not doomed to failure. Even if consensus is achieved between the Nuclear Decommissioning Authority, which has now taken over the responsibility

for the UK's nuclear legacy, the appropriate county council and NGO organisations at some point in time, it may not prevail when the agreements are tested in practical reality and the question of licensing would in any case still remain.

The French site selection programme

In France, a period of successive problems in searching for a disposal site led to a law in 1991 that instituted a new approach to waste management in general, and site selection in particular, with responsibility, transparency and democracy as lead principles (OECD, 2003, p. 24). The new approach to site selection looked for consensus with and the active involvement of responsible territorial communities. A mediation mission by Mr Christian Bataille, Member of Parliament, led eventually to the appointment of one site for an underground laboratory in Bure, northeast France. However, the intention was that there should also be a second site in granitic rock somewhere else in the country. Furthermore, the legislation stipulated three major alternative research options for the management of rwm (deep disposal, transmutation[3] and sub-surface long-term storage) coupled to a foreseen decision by Parliament in 2006. The existence of three alternative waste management methods, together with the fact that at least two alternative disposal sites were looked for, had a high potential for inspiring trust. However, with time people started to perceive the one research site in Bure as an 'operation to be' and the two research axes of transmutation and sub-surface long-term storage as being much less viable and less advanced than geological disposal (Andersson and Westerlind *et al.*, 2004).

The Law instituted a Local Information and Oversight Committee (CLIS) to be chaired by the Prefect of Department where an underground laboratory project (URL) is implemented. That committee shall be responsible for ensuring that all information concerning the evolution of the URL project is addressed. In particular, it shall be entitled to commission hearings or independent audits by certified laboratories. The CLIS was a new element in the French process which must demonstrate its capacity for managing the debate and influencing the process – its success or failure is important for the future of the project.

After the successful change in the French approach to site selection and the establishment of the CLIS committee, a new siting project followed for a granite site. Although it followed the same legal process, the project reverted, paradoxically, to a more technocratic process and anti-nuclear movements gave rise to refusal reactions from the local population. Local politicians preferred not to back the project, which is now standing still.

The Parliamentary Office for the Evaluation of Science & Technology Options held three days of public hearings on radioactive waste management in early 2005. Following these debates a new law was adopted by parliament in June 2006. Deep geological disposal has been selected as the

preferred option for HLW, at a site to be selected by 2015. Research will continue in the underground laboratory at Bure, meaning that implementation there seems to be the idea. Parliament will continue to oversee the decision-making process. An important component is that 'reversibility' will be retained at every stage including that of disposal. Debates and periodical consultations concerning the sustainable management of radioactive materials will be organised.

It might be added that in France a real dialogue between citizens and experts in the area of rwm is difficult to achieve because of the tradition of secrecy in the nuclear industry. This was common in the past and still remains a factor today, even if the communication style of nuclear institutions has changed (Andersson and Westerlind *et al.*, 2004).

Germany – the Gorleben case

In 1977, a salt dome in Gorleben was selected as a final repository for radioactive waste in Germany. This was mainly a product of geo-scientific and economical criteria (Bräuer, 2003). Public involvement in a transparent site selection procedure was not a matter of concern at that time. Site investigations from the surface and underground exploration together with an extensive laboratory programme resulted in a comprehensive database that confirmed the potential suitability of the site at Gorleben. However, many local citizens in their distrust of the 'officials' saw the selection of Gorleben as politically motivated but with scientific justification.

Information activities used traditional methods, but meetings were also held to allow for discussions of controversial aspects of the programme. Lectures were held by scientists and technicians belonging to the organisations involved in the Gorleben process as well as scientists from universities and environmental organisations. During each meeting there was an extended contentious discussion between the 'officials' and the audience.

The heated general debate relating to nuclear energy in Germany combined with the fact that there was no real participation made further progress impossible. The exploration at the potential repository site at Gorleben was stopped in the year 2000 following an agreement between the German government and the utility companies, a moratorium of up to ten years was adopted and the entire radioactive waste management programme had to be reviewed. A group of experts (AkEnd) was appointed by the Federal Ministry for the Environment to develop a new site selection procedure (Bräuer, 2003). A report describing a new process was issued in December 2002. The recommended site selection procedure takes greater account of social science aspects, such as the involvement of the public. In addition, proposals for an Information Platform and a Control Committee to be active during the entire process were put forward. However, so far little progress has been made since 2002, and as long as there is no operational final repository, radioactive waste has to be put into interim storage.

Referenda in Switzerland

Switzerland, with its traditional federalist structure, has a long tradition of involvement of the public in decision-making on all political levels. The public decides on factual questions in communal, cantonal and federal referenda, which are conclusive for the final decision.

Following detailed investigations at various locations, the Swiss nuclear waste management organisation NAGRA proposed Wellenberg in Canton Nidwalden as the site for a deep geological repository for low- and intermediate-level waste in 1993. Due to the negative result of the cantonal referendum in June 1995 on the mining concession for the repository, the project was politically blocked for several years. In March 2000 the federal energy minister and the government of the Canton set the conditions for the continuation of the project. These included a stepwise approach with a first step to be a concession for an exploratory gallery and later for the repository itself. The implementer NAGRA could thus apply for the mining concession for the exploratory gallery in January 2001. The cantonal government granted the concession in September 2001, but this decision was subject to a cantonal public referendum. After an intense campaign the mining concession was rejected at a referendum on 22 September 2002, the Wellenberg site had to be abandoned, and the project was blocked (OECD, 2003).

The efforts made to achieve citizen participation in Switzerland seem to have been of a relatively traditional character with public reports, media conferences, information brochures, etc. One element has been the safety authority HSK's increasing efforts to enhance awareness of its existence and functions among the public. HSK has also become better recognised as a separate entity from implementers and policy makers (OECD, 2003).

Canada: deep disposal technically sound but not socially accepted

In Canada, in a 1978 joint statement, the governments of Canada and Ontario directed Atomic Energy of Canada Limited (AECL) to develop the concept of deep geological disposal of nuclear fuel wastes. Canada was then for two decades one of the leading countries in developing the concept. However, the Canadian programme is apparently just another example of expert narrow framing which in the end turned out to be irrelevant for policy decisions.

A subsequent joint statement in 1981 established that disposal site selection would not begin until after a full federal public hearing and approval of the concept by the government. In 1988, the federal Minister of Energy, Mines and Resources referred the concept, along with a broad range of nuclear fuel waste management issues, for public review. In 1989, the federal Minister of the Environment appointed an independent environmental assessment panel to conduct the review. The subsequent report (Environmental Assessment Panel, 1998), called the Seaborn Report after the

review panel chairman Blair Seaborn, was published in 1998. The conclusions of the panel were strikingly clear:

- From a technical perspective, safety of the AECL concept had been adequately demonstrated for a conceptual stage of development, but from a social perspective, it had not.
- The AECL concept of deep geological disposal had not been demonstrated to have broad public support. The concept did not have the required level of acceptability to be adopted as Canada's approach for managing nuclear fuel wastes.

Until a number of measures have been completed and broad public acceptance of a nuclear fuel waste management approach has been achieved, the search for a specific site should not proceed. Consequently, in Canada it was officially acknowledged that even if the disposal concept was technically sound, social concerns had to stop the siting programme. The management of Canada's nuclear fuel waste had thus reached a critical juncture at which new legislation was required from the Canadian government. In November 2002, a new act on the long term management of nuclear fuel waste, came into force (Government of Canada, 2002), and the Nuclear Waste Management Organisation (NWMO) was established with its first task to recommend a plan to the federal government. The NWMO conducted wide ranging consultations with numerous stakeholders across eastern Canada and commissioned a series of background papers on the technical and social aspects. The NWMO released its final study in November 2005 (Nuclear Waste Management Organisation, 2005). The study proposed a three stage 'adaptive phased approach', according to which it will take 60 years to arrive at an operating licence for a deep repository. In the meantime a shallow underground storage facility should be brought into operation. The Canadian timescale for a high level nuclear waste solution is thus now well beyond the foreseeable future!

The Canadian story is comparable to certain others, e.g. the UK site selection programme in the sense that a technical programme had come a long way before being stopped when it was reviewed in a broader societal framework. One difference is that the Nirex programme went all the way to site selection before being halted whereas the Canadian programme did not reach that stage.

Progress in Sweden, Finland and Europe

As a result of the negative experiences in the implementation of radioactive waste management programmes, the international community in general, and individual countries and the European Commission in particular, have identified public perception and confidence as the area in which progress would be most significant for future developments. We have already

discussed attempts made in the UK, France, Germany and Canada in this direction as a result of their negative experiences. The overall picture, with the possible exception of France, is that progress is very limited indeed, and that the dominant trend is to postpone real development, particularly site selection, to unspecified future points in time. However, despite this Sweden and Finland are still making substantial progress, and we shall now give these two countries our particular attention. Research into citizen participation and transparency at European and international radioactive waste management arenas which may stimulate future progress are then described.

Sweden

In Sweden, a new initiative towards a more communicative approach was taken by the Swedish Nuclear Power Inspectorate (SKI) in 1990 with the Dialogue Project (J. Andersson, K. Andersson and Wene, 1993). This was at a time when the Swedish Nuclear Fuel and Waste Management Co (SKB) site selection programme had not yet taken form. However, it was already evident that nuclear waste experts would soon, within a few years, have to deal with new 'customers', most notably potential host communities for a final repository. The core of the Dialogue project was a simulated licensing process which gave the participants a great deal of insight into the procedures and arguments involved in real decision-making processes. The project also resulted in a recommendation to the government that NGOs should be given financial support in order to empower them.

After the Dialogue project it was clear that transparency and public participation would be core issues for research and development for years to come. SKI and the Swedish Radiation Protection Authority (SSI) thus launched the RISCOM Pilot Project (Andersson, Espejo and Wene, 1998) which was followed by the EU RISCOM II project (Andersson and Westerlind *et al.*, 2004). Within these projects the RISCOM Model for transparency, to which we will return later, was developed and tested.

In 1992, SKB announced Oskarshamn as the preferred site for an encapsulation plant for spent nuclear fuel and in 1995, SKB sent a request for a feasibility study for final disposal which was approved by the municipality. Now Oskarshamn is one of the two municipalities where SKB is conducting deep drilling to find a suitable site. Just after the 1992 announcement by SKB, the municipality leadership made the decision to be an active part in the programme by demanding a completely open process with full participation and influence for the municipality and the public. Independent funding for the municipality's involvement was a pre-condition for participation and funding was established by the government in 1994. The very active involvement of the municipality has been summarised in what has been called the Oskarshamn Model (Carlsson *et al.*, 2001) to which we return in Chapter 12.

One interesting aspect of the Swedish process is that the early initiatives towards participation and transparency were not taken by the implementing

organisation SKB or by the government. Instead the regulators and one of the municipalities involved took the lead. The new initiatives were initially regarded with doubt by SKB, and in the case of the early Oskarshamn initiatives also by SKI. Now SKB has the legal responsibility to carry on the environmental impact assessment (EIA) process while at the same time the municipalities maintain a strong position. Internationally, the Swedish regulators SKI and SSI have been forerunners demonstrating that active regulatory involvement in communities can be consistent with an independent licensing role.

Despite all this, it needs to be said that the Swedish programme has not yet passed the test of siting a repository. One issue of concern is the fact that licensing will take place according to both the Nuclear Activities Act and the new Environmental Code but the interaction between the two laws has not yet been tested. Furthermore, ten years after the Dialogue Project, the rules were changed so that NGOs can now get funding for their participation in the EIA process. This should be beneficial for the process, but NGO empowerment has made them a dominant actor sometimes at the expense of other, less outspoken, stakeholders and members of the general public.

There are other elements of concern relating to the Swedish programme. One is the increasing EU involvement with directives and also research projects into the possibility of having repositories at an EU, or international, level. Swedish experts and stakeholders are unanimously agreed that if anything can stop a repository in Sweden it is a serious discussion about international solutions. Citizens in Sweden, Finland and most other countries will not agree to taking care of nuclear waste from abroad. The link between the opposition to nuclear power and the resistance to disposal has gradually weakened, simply because Sweden still has the policy of phasing out nuclear power. Should that change, and there are clear signals that it will, finding a solution to nuclear waste could become even more problematic.

Finally, not all comments on the SKB site selection programme are positive. For example, critics claim that SKB has modified site selection factors at a late stage to better fit the company's choice of a site where a repository would most likely get public acceptance. Could it be, as the sociologist Göran Sundqvist claims, that SKB has looked for a 'bedrock of opinion' (Sundqvist, 2002), rather than the geologically best site? In fact, it is unreasonable to expect SKB to find the geologically best site. It could be, as SKB argues, that there are many potential sites in Sweden which fulfil the safety requirements by a large margin. If this is the case, the final choice can be made using other criteria, such as public opinion, economical and practical factors. My point is, however, that people have been given the impression that SKB uses mainly geological criteria, while it is now clear that this is not the case – there is a lack of transparency in how the site selection criteria are being used.

Will SKB succeed in its efforts to find a disposal site? Of course, we cannot say for sure but at least the conditions are better in Sweden than in most other

countries. There is already a tradition of public involvement, SKB builds the site selection programme with the voluntary involvement of municipalities, the municipalities have the resources to play a competent role, the authorities are involved as 'the peoples' experts', environmental organisations now have their own resources, procedures for transparency are in place, etc. However, due to its still being a completely expert dominated organisation, there is a risk that SKB might, after a period of relatively good communication with the citizens, return to a technocratic route which lacks engagement and authenticity in its dialogue with citizens. Having now two nuclear communities which have volunteered for deep drilling programmes and with a favourable public opinion, such a route might be a great temptation for SKB. In such a case, the authorities and the municipalities will have the responsibility of putting pressure on SKB to keep the process on the democratic track. However, the municipalities' legitimacy as independent scrutinisers of the process is decreasing since they have both declared that they want the repository to be established in their respective communities.

Now there is another element being introduced into the Swedish programme. In 2006, the Swedish National Council for Nuclear Waste, KASAM, decided to start a transparency programme. It has the objective of increasing the transparency of the decision-making process and the basis for decisions on the SKB licence application for a final repository. Key issues will be selected for public hearings following the RISCOM model (Andersson, 2007). We shall return to this in Chapter 11.

Finland

In Finland, in December 2000 the government made a favourable policy decision (which was later ratified by the Parliament) on the basis of the application of Posiva (the nuclear waste management organisation in Finland), to construct a final disposal facility close to the nuclear power plant in Olkiluoto. The Municipality of Eurajoki had supported the construction of the facility in Olkiluoto and the preliminary safety assessment of the Radiation and Nuclear Authority (STUK) also supported the project. The government decision followed an EIA process during 1997–99 with communication with the public, including interaction on the local level between the implementer, residents, entrepreneurs, politicians, officials of the municipal government, as well as members of associations (Leskinen and Turtiainen, 2002).

The Finnish programme is often referred to as the most successful one in the world, since there is now one site selected for detailed investigation with government and community approval. The EIA process took into account international conventions since neighbouring countries were informed and they were able to provide comments. The EIA was regarded by Posiva as a major breakthrough in bringing about discussion of the merits and disadvantages of alternatives in nuclear waste management. Posiva also

emphasises the importance of having a stepwise process relying on a clear legal background and a long-term commitment from the government.

The Posiva process had high ambitions with regard to participation and transparency. Concerns and fears were taken seriously and Posiva took into account and analysed in practice all the impacts put forward by residents in the candidate municipalities. Reasons were given for including certain impacts in the analysis and excluding others. The involvement by residents was, however, not as active as Posiva had wished, and it was concluded that NGO representatives could have put more energy into the 'stretching' process (Andersson and Westerlind *et al.*, 2004). There are also critical voices among researchers and opposing groups about the EIA process that took place in Finland. Participation has been described as negligible and decreasing throughout the process, which has been attributed to the lack of such participatory traditions, lack of familiarity with the EIA instrument and a lack of confidence in the effectiveness of participation. According to these criticisms, the process served only to legitimise the decisions that were in fact taken in other arenas. One weakness, also recognised by Posiva, was a lack of alternatives to the basic option of geologic disposal.

European and international programmes

Because of the problems associated with achieving acceptance for proposed solutions for radioactive waste, public participation and transparency became a major theme in the fifth research programme of the European Commission between 1998 and 2002, in particular with the two projects, RISCOM II and COWAM. RISCOM II was a three year research project involving twelve organisations from Sweden, France, the UK, Finland and the Czech Republic. The aim was to support the participating organisations in developing transparency in their radioactive waste programmes by including a greater degree of public participation. Issues about rwm were analysed, especially with respect to their value-laden aspects, and procedures for citizen participation were tested. The focus on values and a multi-disciplinary approach in the otherwise very technically dominated area of radioactive waste management, opened new perspectives. In Sweden the project has supported the design of a new hearing format as part of the regulatory review in a critical phase of the site selection programme for a spent nuclear fuel repository. The project also evaluated how the hearing worked with respect to transparency (Andersson, Wene, Drottz Sjöberg and Westerlind, 2003).

COWAM was a three year collective learning process conducted as a concerted action within the EC programme which focussed on community needs. Four seminars hosted by local communities provided observations that can be used for improving the quality of decision-making in nuclear waste management. There were good conditions for local actors to participate actively and to bring their views and concerns into the work (COWAM European Concerted Action, www.cowam.com, June 2003).

Almost in parallel with these two EU projects, The Forum for Stakeholder Confidence (FSC) was created under a mandate from the OECD Nuclear Energy Agency to facilitate the sharing of international experience in addressing the societal dimension of radioactive waste management (OECD, 2001). The Forum was launched in August 2000. It explores means of ensuring an effective dialogue with the public, and considers ways to strengthen confidence in decision-making processes.

The three projects are quite different in approach. RISCOM used a theoretical model to analyse certain aspects of nuclear waste management while at the same time testing the applicability of the model. COWAM gave practical examples concerning how programmes have engaged citizens at the local level and provided data on the needs of the communities with respect to the waste programmes. The FSC was set up to serve the four NEA constituencies (implementers, regulators, policy makers and R&D specialists) but turns toward social sciences and local representatives to understand different perspectives.

The three studies, however, give similar results in many respects. For example, they emphasise that:

1. Radioactive waste management, due to its long-term nature, uncertainties, and emotive nature is not exclusively the domain of technical expertise.
2. Wider stakeholder concerns should be addressed at the same level as technical issues.
3. The decision-making process must be open, transparent, fair and participatory.
4. Radioactive waste management programmes should provide sufficient time, resources and commitment for the meaningful involvement of stakeholders.

The need for early involvement and empowerment of local actors in the decision-making process is emphasised in COWAM. The project also highlighted that local participation requires a defined national decision-making process with clear decision-making points (a step-wise process). Furthermore, the roles of the participating parties must be clear from the start – who makes the decision, when and on what basis. The FSC work has recognised that the decision-making process should embody competing social values, while the approaches to achieve this may change over time. The Forum also recognises that active regulator involvement is needed and is achievable without compromising integrity, independence and credibility.

Even if there are hardly any contradictions in the results of the three studies, the focus of results reflects their differing points of departure. In RISCOM, the transparency model was used as an instrument to analyse certain aspects of nuclear waste management, COWAM gave practical examples

from the local level, and FSC evaluates a number of cases with citizen participation from the perspectives of implementers and regulators. Now under the sixth framework programme the Commission moves forward with three complementary projects aiming at implementation of the ideas and models recommended in COWAM and RISCOM II.[4]

United States

Is the US nwm programme to be regarded as a success or a failure? As I write this the licence application for final repository for the nation's commercial nuclear waste should be very close at hand, but the issue is still full of controversy and I cannot honestly even try to give an answer to the question.

The story

We start our story in 1982 when the US Congress established a national policy to solve the problem of nuclear waste disposal with the Nuclear Waste Policy Act (NWPA). The act adopted geologic disposal as the nation's long-term strategy for the safe isolation of radioactive waste. Congress based this policy on what most scientists worldwide agreed was the best way to dispose nuclear waste. The act also confirmed the federal government's responsibility for managing and disposing of the spent commercial fuel by establishing the Office of Civilian Radioactive Waste Management (OCRWM) within the Department of Energy (DOE). The DOE was made responsible for finding a site as well as building and operating an underground disposal facility called a geologic repository.

In 1983, the US Department of Energy selected nine locations in six states for consideration as potential repository sites. This was based on data collected for nearly ten years. The nine sites were studied and results of these preliminary studies were reported in 1985. Based on these reports, the president approved three sites for intensive scientific study called site characterization. The three sites were Hanford in the state of Washington, Deaf Smith County in Texas and Yucca Mountain in Nevada. The three sites were in three different geological media; bedded salt (Deaf Smith County), basalt (Hanford) and volcanic tuff (Yucca Mountain) and they were far apart in different parts of the country. Geology, socio-economic factors and transportation routes were all different. Certainly selecting between these alternatives would not have been a matter of science only but would also have included value-laden and ethical factors. Looking retrospectively, this could have been the start of an ideal site selection process.

However, in 1987, motivated to a great extent by concerns about the programme costs, Congress amended the Nuclear Waste Policy Act and directed the DOE to study only Yucca Mountain. It is widely recognised that the site selection made by Congress was not made on geological grounds but was realist politics since Nevada was a state with relatively little population and

therefore also relatively weak in Washington, DC. Having made the site selection, Congress only had to direct the arms of government in the DOE to show that the site is suitable and to give a time schedule for the programme. In July 2002, the US Senate cast the final legislative vote approving the development of a repository at Yucca Mountain and President Bush signed a House Joint Resolution allowing the DOE to take the next step in establishing a safe repository in which to store the nation's nuclear waste. Accordingly the Yucca Mountain Project is currently (June 2007) focused on preparing an application to obtain a licence from the Nuclear Regulatory Commission (NRC) to construct a repository. In July 2006, the Department announced plans to submit a licence application to NRC by 30 June 2008, and to initiate repository operations in 2017. As a result of this decision, the time limits were moved forward several years compared to earlier plans.

The regulatory and licensing process provides the framework for the entire United States' nuclear waste management programme. The NRC is ultimately responsible for determining whether Yucca Mountain will be licenced as a repository. If so, the Secretary of Energy must decide whether to recommend to the President that Yucca Mountain should be developed as a nuclear waste repository. The President must then decide whether to recommend it to Congress.

In the national arena, the Nuclear Waste Technical Review Board (NWTRB) plays an important role in the process. The Board evaluates the technical and scientific validity of the DOE programme, specifically its site characterization activities at the Yucca Mountain site. The Board also evaluates the design of the repository, risk assessment, environmental impacts, and the packing and transportation of spent nuclear fuel and high-level nuclear waste. Often these reviews are quite critical of specific technical aspects of the DOE programme.

Important stakeholders in the ongoing process are the State of Nevada, local governments, and Native American tribes, and the NWPA also requires interaction with them and for them to be provided with financial assistance. Furthermore, the NWPA requires an open, public process for the establishment of standards and regulations.

The opposing State of Nevada

The State of Nevada has never accepted Congress's decision from 1987 and the state is still opposed to the proposed repository. Nevada, apparently in contrast to some of the local communities close to the site, cannot see any advantages to the DOE plans. The state is concerned that the repository, and the attendant transportation of nuclear waste through the state, will have a negative impact on the State's image as Las Vegas tourism is the major industry. Nevada argues that the federal government cannot force a state, against its will, to accept nuclear waste which is piling up at power plants in 31 other states. It needs to be said that Nevada has no commercial nuclear power plant within its boarders.

Nevada has now been preparing for the technical and legal battle over Yucca Mountain for over 15 years. The state argues that:[5]

> the DOE has gone to great lengths to avoid making formal decisions that the State could contest, putting off each subsequent controversy to yet another study or another interim programme milestone. The upcoming federal decisions regarding the Yucca Mountain programme provide Nevada with ready-made legal challenges and opportunities that will determine the ultimate fate of the project. For the first time, Nevada will be able to formally challenge final federal agency actions ...

The state also distrusts the NRC (Malsch, 2004):

> And there is a disturbing trend of NRC secrecy. Recently, NRC staff insisted on meeting in secret with DOE to discuss DOE documents that will support the licence application. NRC's Chairman candidly advised Nevada that the meetings in question couldn't be public, because the Staff evaluation 'could be substantively hampered if the evaluations had to be conducted in such a venue'. This approach will only undermine public confidence in NRC.

With this climate of discussions, the Yucca Mountain case will probably face court procedures of as yet unforeseen complexity. A DOE decision to recommend Yucca Mountain as a high-level waste repository does not mark the end of Nevada's battle. It is just the beginning. Another possibility would be that in the end the DOE and Nevada come to some sort of settlement involving large compensation to the state for receiving the entire nation's nuclear waste. However, considering the current state of affairs, this does not seem the most likely outcome. In December 2000 the Nevada Commission on Nuclear Projects recommended 'in the strongest possible sense that the governor and legislature reject any efforts to negotiate for benefits tied to the Yucca Mountain programme or to any scheme to locate an interim spent fuel storage facility at the Nevada Test Site'.[6] Furthermore,

> The Commission recommends that the governor and legislature support efforts on the part of the State to carry out a national information campaign to raise awareness of the risks and impacts associated with the unprecedented radiological transportation campaign required to implement a Yucca Mountain repository.

If the State of Nevada, supported by a number of non-governmental organisations, holds to this line of policy, the US nwm programme faces a period of major controversy with the State challenging the US Government in a series of formal, legal processes.

An example of political framing

In contrast to Canada, the UK, Germany and Switzerland, the US programme has not been framed by experts in the agenda setting phase. Instead the US Congress took responsibility on a national level and decided that Yucca Mountain should be the only site for further investigation. The selection of Yucca Mountain was also transparent in the sense that the US programme could not afford to have several sites investigated in parallel and that the State of Nevada was easy to select for political reasons.

Since I have blamed failures in the European and the Canadian programmes on their narrow expert framing and for not being transparent, one would imagine that the US programme should be a great success. However, it still has technical problems to solve, for example the potential corrosion of waste packages during the period of the first 1 000 years when temperatures would be above boiling inside the repository (Nuclear Waste Technical review Board, 2004). Also, the positions of the State and Federal Governments are highly polarised and the programme will probably encounter complex licensing and legal processes. The early national-level political decision has put the implementing organisation, which in this case is the government itself, in a difficult situation. Certainly there is political pressure on the OCRWM to meet expectations that Yucca Mountain will solve the nuclear waste problem, at the same time as the office must present a satisfactory safety case for NRC licensing, including engineered barriers and the geology of the site. The legitimacy and authenticity of OCRWM as a body for scientific investigations and risk assessment can be brought into question. The fact that an arm of government is submitting the licence application and not the nuclear industry makes it easier for Nevada to challenge the integrity of the NRC during the licensing process. From the point of view of the principle of awareness put forward in this book, the major problem in the US site selection process has been the lack of participation from those affected, notably Nevada and the local communities concerned.

Before we leave the US arena, we should note that the most advanced repository programme, which has come further than both the Swedish and Finnish efforts, is the choice of a final repository for long-lived, military, radioactive waste sited in a salt formation at the Waste Isolation Pilot Plant (WIPP) in New Mexico, USA. This is one case where the siting of a repository has been met with public acceptance.

Some lessons learned

Broadly speaking there is an overwhelming consensus among government agencies, policy makers and stakeholders that we need more participation and transparency in decision-making processes and more direct dialogue between decision-makers, experts and the public. This is reflected in policy statements, programme plans and research programmes. However, there

seems to be much less know-how in actual implementation of this general understanding and less readiness to apply available knowledge about risk communication. Here we summarise key findings from rwm programmes:

Regulators' role

It is important to have an independent regulator, with the capability of reviewing the safety assessment of the implementer, but experiences have shown that there is also a need to bring in the regulator early in the process (e.g. for site selection) and to maintain this involvement. There is a strong connection between the regulator's role and the needs of the communities. In Sweden, communities want the authorities to be involved and they see the regulator's experts as the people's experts whose role is to advise and help both the people and the politicians. SKI and SSI have been involved from an early stage. They participate in the EIA groups and play an active role in providing information on a community level. It is disturbing, though, that they appear to have insufficient resources to allow for continued active involvement in the communities while being occupied by pressing licensing issues.

Furthermore, because regulatory standards and criteria set the framework for risk assessment, it is important to let them be the subject of public input too. The efforts made by the SSI in Sweden to encourage a dialogue on regulatory guidelines for a HLW repository with the citizens of potential host communities are therefore a logical, but perhaps unique, step in this direction. We shall return to these issues in Chapter 5 in the context of radiation protection as part of risk management.

Alternative options

It may not be possible to make an objective assessment of the true risk of final disposal, but stakeholders may be able to compare the consequences of alternative actions. Such comparisons can be made using value-laden considerations and ethical principles rather than risk assessment in detail.[7] After all, decision-makers will need to choose between alternatives on the basis of incomplete and uncertain knowledge.

Resources

There can be a number of reasons for stakeholder participation, including legal requirements; the rights of those directly affected to have their say; the legitimacy of the decision-making process, etc. Participants from outside the establishment are needed as a resource in stretching the implementer and official stakeholders. Once it has been said that participation is required or desired, the issue of resourcing immediately comes up. A rwm programme must be resourced to allow meaningful participation. Proper resourcing will encourage positive involvement, improve decision-making and increase public confidence.

Values and expert dominance

So far experts have dominated the decision process in the nuclear waste field. In Sweden this has occasionally been criticised. In the R&D Programme of 1995 (SKB, 1995),[8] it was said by SKB that 'scenario selection, or the selection of premises for different scenarios, is done by experts'. KASAM criticised this (KASAM, 1996): 'The selection of scenarios is not a science but a question of deciding which hypothetical future events need to be included in the safety assessment. This is a decision which cannot be considered to be reserved exclusively for "experts".' Views had not changed eleven years later when KASAM started its transparency programme. When commenting on a draft report I had written for KASAM, SKB maintained their position that the safety assessment was objective and did not contain any value judgements (Andersson, 2007, p. 41).

The choice of overall approach to the long-term management of high level nuclear waste must rely on a number of value-based considerations. The very question of whether to act to achieve a permanent solution in our lifetimes, typically including a deep repository, or whether to wait for potential breakthroughs in new technologies, such as transmutation, is perhaps the most obvious value-laden issue. Another example is that of the retrievability of the waste which would lead to a repository being left open for an undefined period of time – in which case flexibility would be more highly valued than a safe final solution since the consequences for future generations cannot be foreseen.

The Oskarshamn model for public participation attempts to apply the RISCOM principles for transparency in practice (Åhagen *et al.*, 1999). The overall goal has been to prepare the municipality for a decision on whether SKB should be allowed to start site investigations. To get an independent review of the process an 'ethical and democratic audit' has been conducted by professor Carl Reinhold Bråkenhielm, Department of Theology, Uppsala university (Bråkenhielm, 2001). Although Bråkenhielm in general concludes with a positive evaluation of the Oskarshamn process, he also remarks that the value-laden issues have been dealt with implicitly, whereas they in fact could have been more explicit.

These experiences from recent events in the Swedish programme, with actors devoted to transparency and participation, reflect strong barriers to overcoming the extremely strong framing within the experts-agenda paradigm, barriers which have arisen over a period of more than twenty years.

Clear roles of actors

As has already been emphasised, successful experiences in facility siting have shown that active regulatory involvement is needed, and also possible without endangering the independence and integrity of regulatory authorities.

The involvement of the regulators must, however, be conducted in a way that avoids possible bias due to an involvement that is too close. Rules could be established for the nature of their involvement to prevent inadequate consent to implementers' proposals before the formal licensing process begins. In general, a system with clearly defined roles for all actors, including NGO's, benefits transparency and awareness.

A research cartel?

Nuclear waste management looks like an ideal candidate area for research cartels and knowledge monopolies to emerge, since most of the funding for research and development comes from the responsible implementing organisations. This is the case irrespective of whether these organisations are formed by the nuclear industry or are parts of government. In general, however, in this area people seem to be aware of divergent opinions and scientific controversies. This may be due to the high profile of the nuclear debate and strong NGOs. It is also crucial that the results of the implementer's research and development activities are challenged in order to avoid the bad consequences of knowledge monopolies. A particularity healthy feature in this area is the existence of relatively strong nuclear regulatory bodies. These often have independent research programmes which make them competent to review and question results produced by organisations with an interest in finding timely and inexpensive solutions. Many other industrial sectors lack the critical and demanding regulators possessed of a high level of integrity which are needed to counteract research monopolies.

The importance of a process guardian

Ideally, communicative action from all parties, as opposed to strategic action, would be to the benefit of radioactive waste management. However, the implementer (or any other stakeholder with control over the decision-making process) could use an apparently communicative approach for concealed strategic action. This is why there needs to be a guardian of the process, with the task of maintaining dialogue and transparency. Obviously this must be someone in possession of both authenticity and societal trust. Who can that be? In our exploration of nuclear waste management programmes, we have not found a country where a programme has been set up in a perfect way. Experiences indicate that a court system is not the best way. One reason is that courts create polarised situations in which all stakeholders act strategically to 'win the case', which may mean that certain pieces of information are not handled openly until the court process opens.

In Sweden, it was first the regulatory authorities, then the Oskarshamn municipality that in practice took this on role with a great deal of public trust. One can argue that this is not an ideal situation since the authorities, and certainly a municipality, are to be considered stakeholders with an interest in the outcome of the process. The KASAM initiative with its transparency

programme was welcomed at its timely launch in 2006 and is the subject of great expectations. Seemingly, this committee can provide an arena for transparency which other stakeholders can trust as not having hidden agendas or vested interests in the results. How the issue of process guardian will be handled is very much a matter of tradition and culture and will therefore differ between countries.

Experts learn slowly

By and large, experiences from the national radioactive waste management programmes conducted so far are not encouraging:

- In the UK, the Government decided in 1997 to refuse Nirex's application to build a Rock Characterization Facility (RCF) near Sellafield. The site selection was completed in a seemingly scientific way without transparency. There were hidden values in the assessment, little public insight and almost no regulatory involvement. The UK programme is still paralysed by this event.
- In France there have been significant problems finding a second site for an underground laboratory, and the expert community and citizens at large still hold polarised views. The approach has been technocratic with little public influence, despite current references to transparency and consultations, except for the bright effort made by Mr Bataille.
- In Germany, the Gorleben site was chosen essentially without public involvement, and the project was stopped.
- In Canada it has been officially acknowledged that even if the radioactive waste disposal concept was technically sound, social concerns were not addressed enough to be able to proceed with site selection. The technical narrow framing was not relevant for political decisions.
- In Switzerland the waste management organisations used traditional information methods. The programme was stopped a second time in 2001 by a local referendum.
- In the US there was one disposal site selected for the civilian waste programme but the decision was made in the US Congress and was purely political. Now the programme faces court procedures with an opposing State of Nevada.
- In Finland, often referred to as the most successful country in the field, there is one selected site with government and community approval for detailed investigation. However, the actual selection of the site was made in negotiations behind closed doors.
- In Sweden, site investigations are progressing in two municipalities which have both approved. Although significant progress has been made with transparency and citizen participation, there are obvious weaknesses in the transparency of the site selection.

For the most part, we see that a technocratic approach with little public influence leads to a framing of the issue which later comes up as irrelevant for political decisions. Almost all rwm programmes are now trying to change course. The new approach adopted in the UK and the new Canadian Nuclear Waste Act with the Nuclear Waste Management Organisation are interesting examples. Programmes have also become more communicative through the introduction of Environmental Impact Assessment (EIA) processes. National and international programmes have produced much knowledge about risk communication, transparency and public participation. On the European arena, the RISCOM project has made significant contributions to knowledge and understanding about how transparency can be achieved with a greater degree of participation. In this regard the area of radioactive waste management is a forerunner in research and methodological development.

There is now an excellent opportunity to apply this insight and knowledge in practical reality, which in many cases can be done without any need for new law-making. The progress in national programmes world-wide is still disappointing, however. If we consider the extensive research efforts which have been made, the measurable impact on programmes has been very limited. In countries like France and Finland, the reluctance to involve citizens more actively is obvious. In the UK, there is a good deal of research and development in public participation, but since the actual nuclear waste programme is standing still, there is hardly any chance to use the results seriously. The new Canadian approach looked promising but the outlined time schedule is too long for layperson involvement. In Sweden there is a strong driving force for transparency through the initiatives taken by the authorities, the municipality of Oskarshamn, and now KASAM, but with a great degree of passive resistance from the traditional expert community.

In summary, with the possible exceptions of Canada and Sweden, the nuclear waste management programmes are still controlled by an expert community not willing to change more than absolutely necessary. The mere use of terms like 'public acceptance' and 'confidence building', instead of 'public insight' and 'awareness building' confirms this. For real dialogue and transparency in decision processes to take place, the expert community will have to give up its control over the programmes. Concerns raised must be taken seriously, the public must be given instruments to evaluate stakeholders' authenticity, etc. This is part of the price that must be paid if trust is to be earned.

5
Risk Assessment and Risk Management

Societal decisions in any of the areas we deal with in this book, such as radioactive waste disposal, genetic testing, stem cell research, food safety or carbon dioxide disposal, include factual and value-laden elements relating to both risks and benefits. In all decisions, positive and negative factors have to be taken into account and be weighted against each other. The more aware the decision-makers and the public are about both, the better the decisions. In terms of the development of analytical instruments and research in social and natural sciences, much more attention has been given to risks than to benefits. This should not be surprising, nor is it illogical. The driving force for technology development, or in fact most kinds of human action, is potential benefits, and they are often quite obvious. More analysis is needed to identify, assess and manage the risks of these technologies. Moreover, in many cases the risks of new technologies are not discovered and fully understood until the technologies have been implemented and established in the market economy. Managing risk then comes up on the political agenda and becomes a government responsibility. The increasing understanding of this mechanism of delay in risk identification is one reason for the introduction of the precautionary principle as a means of reducing risks. Before exploring new areas of controversy it will be worthwhile to explore some principles of risk assessment and risk management that are of general relevance for all areas of decision-making subject to risk.

Risk informed decision-making

Although it is obvious that the identification, assessment and management of risk are activities related to each other and closely linked to policy-making, the concept of 'risk' as such has been the subject of much confusion and controversy. It has been the main instrument for the narrow framing of complex issues as a matter only for the expert community. This is so since 'risk' can be defined as a mathematic construct, the product of probability and the consequence of an undesired event (often also called 'scenario').

Typically, there are many possible undesired events that can take place in, for example, a nuclear reactor. The total risk is then the sum of all products of probability and consequences of these events. It is easy to understand that risk is closely associated with uncertainty. For example, there is a completeness problem in risk assessment since the risk analyst may not be capable of identifying all possible undesired events. There is also uncertainty about how well the analyst can assign the probability of events and describe their consequences. Over time it has been increasingly acknowledged that there are subjective elements in how the experts conduct their risk assessments, especially how uncertainties are handled.

In spite of the limitations in completeness, ability to assign probabilities and consequence analysis, the *quantitative risk assessment* (QRA) has enjoyed great success in nuclear safety. Initially, however, reactor safety was assessed using a *deterministic approach*. It established a specific set of events (called 'design basis events') which can lead to severe accidents, and then required that the reactor design has safety systems capable of preventing and/or mitigating the consequences of these events in order to protect public health and safety. Contrary to QRA, a deterministic analysis does not assign probabilities to events, it assumes that certain events can happen and requires necessary safety measures to cope with them. The Reactor Safety Study, WASH-1400, published in 1975 (Nuclear Regulatory Commission, 1975), was a significant step forward in quantifying probabilities in a systematic way. In 1991, the US Nuclear Regulatory Commission (NRC) published NUREG-1150 (Nuclear Regulatory Commission, 1991) in which the Commission used QRA techniques to assess the risk associated with five nuclear power plants in the US.

The confidence in the QRA method grew to the extent that the NRC established a policy for implementing *risk-informed regulation* in the 1995 policy statement on the use of quantitative risk assessment (QRA) methods in nuclear regulatory activities (Nuclear Regulatory Commission, 1995) . The NRC's policy statement on the use of QRA methods[1] calls for the use of QRA technology in all regulatory matters in a manner that complements the NRC's deterministic approach and supports the traditional defence-in-depth philosophy. It formalised the Commission's commitment to risk-informed regulation through the expanded use of QRA. Now the NRC is implementing risk-informed regulation (Nuclear Regulatory Commission, 2003).

QRA is a systematic methodology for the application of the mathematical construct of risk which tries to identify all possible initiating events that can lead to an undesired end state, thus evaluating an overall estimate of risk for the system being analysed (e.g. a nuclear reactor). The QRA is a powerful instrument for finding risk dominant sequences in technical systems which then can be taken care of to prevent the sequences from occurring. QRA is best suited to large technical systems where the failure probabilities of the components in the system can be estimated with relatively large certainty.

It is important to realise what differentiates the *risk-informed* approach from decision-making with a *risk-based* approach in which a safety decision is solely based on the numerical results of risk assessment. This would place heavier reliance on risk assessment results than is practicable. However, in spite of its success story as part of reactor safety work, risk-informed decision-making using QRA as an important element also has limitations when it comes to decisions on a political level, e.g. concerning the use of nuclear power as opposed to other energy sources, or the siting of reactor power plants. For these decisions, the mathematical construct of risk is not sufficient. Other dimensions in a more comprehensive risk assessment which takes into account social and perceptive factors then appear on the scene. For example the risk from nuclear power as calculated with QRA techniques may be lower than for many other energy sources. In addition, nuclear power is environmentally clean during normal operation. However, the consequences of a severe accident, however low the probability may be, are still severe. *The potential harm may thus outweigh the QRA risk* in policy-making.

Another limitation of QRA is the difficulty to communicate its results to laypeople. This is a concrete problem, especially since the meaning of QRA results is sometimes a matter for discussion even among the experts themselves. In 1998 results from a new quantitative risk analysis of the Swedish nuclear power plant Oskarshamn 2 was unfavorably compared with the QRA of the Ignalina nuclear power plant in the media, since the calculated core damage frequency was higher than for the Lithuanian plant. The media attention caused concern at the national level and even more so in the local community of Oskarshamn. Local government politicians, and in particular the members of the local safety council, were suddenly and rather forcefully faced with complex technical questions involving QRA results and risk comparisons, as well as questions about their own work regarding the safety of the power plant.

In subsequent discussions organised as part of a research project involving participants from the utility, the reactor site, the safety authority and municipality representatives it became evident that there was disagreement among the experts about how the QRA results could be used. Are they an objective measure of risk such as can be understood by the power company which had an official specific target for core damage frequency? Or can they only be used for optimizing safety measures within the same plant as was stated by the regulator? Clearly, with such disagreement existing between the experts, communicating the issue to the general public becomes impossible!

Can risks be compared and controlled?

The concept of risk informed decision-making implies that different risks can be compared. To what extent is that possible? As human beings, we take risky decisions all the time, from the hour we get up in the morning until we fall

asleep. Those of us who smoke cigarettes take risks on a well-informed basis. Driving our car or to taking a ride on our motorcycle are also quite well-informed risky decisions (in these cases risk is also directly measurable by the size of our insurance premium). On a societal level, annual individual occupational risks are other well known statistical facts, although as individuals we may not have the same freedom to avoid them as we have for avoiding risks associated with smoking, driving motorcycles or mounting climbing. Certain risks, notably the probability of dying as a result of certain activities, are thus statistically well known. And, as we have seen, QRA methods can often help in quantifying risks and providing information on how they can be reduced.

One of the major tasks for governments and authorities is to protect us from unacceptable risks. This is done with legislation and regulation in practically all areas of our lives. Rules are given for us as individuals, society builds ever safer infrastructures, industrial activities are regulated, etc. Many of these societal decisions are risk informed in the sense that they rest on QRA assessments, others are not. Approaches vary between different areas of society and between different countries. Moreover, some areas are well regulated but others are hardly regulated at all. As you have probably guessed by now, we are gradually leaving the area well suited to risk informed decision-making, to discuss complex areas where dimensions of risk other than the mathematical construct dominate. As an intermediate example we will take a look at the regulation of the European chemical industry.

Kozine and others (Kozine *et al.*, 2000) explored risk analysis and risk regulation in Europe with the focus on the chemical industry with the purpose of informing the 'Nordic nuclear community' about the status of risk management in non-nuclear industrial areas. It was found that the general regulations of the chemical industry are based on similar criteria as those of the nuclear industry. Accordingly, there is broad agreement that risks of death above 1 chance in 100,000 per year are 'unacceptable' for the general public in both areas, and that risk levels of less than 1 chance in 100 million per year are 'acceptable', in the sense that no action is needed to reduce them. Generally, the level of 'unacceptable' risk corresponds to about 10% of the risk level associated with normal 'voluntary' risks (driving, working, etc.).

Legislation usually stipulates that measures must be taken to mitigate those risks that are regarded as 'unacceptable'. Similarly, the presence of trivial risks is accepted as a matter of course. The issue is then what approaches are used in mitigating the non-trivial risks, which fall into the 'grey area' where a balance needs to be reached between risks, costs and benefits, and other wider decision criteria. For substances identified as potentially damaging, a range of regulatory controls exists at both national and international levels. The approaches adopted in setting such controls vary across countries and regulatory agencies. In some countries, regulation is based on a precautionary stance, which requires that risks be minimised if the causes and mechanisms are unknown when human health or the environment is under threat.

In the extreme, such an approach implies that many hazardous chemicals and activities are considered unacceptable because of the uncertain nature of associated risks. This type of approach to the management of chemical risks may neglect the benefits that the chemicals could confer on society. A less strict interpretation of the precautionary principle stresses the cost of taking precautionary measures. Other approaches to risk reduction are technology-led. For example, they can be based on the concepts of making emissions 'as low as reasonably practicable' or the use of 'best available techniques not entailing excessive costs'. Both these concepts recognise, at least implicitly, that a balance should be found between the costs involved in reducing risks and the benefits gained from risk reductions. To find the balance point is a matter of values and thus a political task. This was recently very clearly demonstrated by the proposed new EU policy for the management of chemical risk with the system for Registration, Evaluation and Authorisation of Chemicals, called REACH. The original relatively strong proposal put forward by the Swedish EU commissioner Margot Wallström was successively weakened following pressure from the chemical industry, most notably the German.

Although there is wide consensus about the limits of acceptable and unacceptable risks, the practical applications of risk management differ significantly between different countries. In particular, the extent to which QRA has gained acceptance in addressing major accident hazards varies between industries. Within Europe some regulators are quite enthusiastic requiring QRA studies by law, e.g. the UK and the Netherlands. Other countries, e.g. France and Germany, prefer a consequence based approach. The Netherlands has a clearly defined policy on the maximum levels of risk that are acceptable in land-use decisions (a risk informed approach). In Germany, deterministic approaches are extensively used in the chemical process industry to demonstrate the quality of measures taken to avoid risk inside and outside the installation.

The reason that countries have different approaches to risk assessment and different acceptance criteria may be sought in national traditions for the handling of safety matters and national accident experience. An important element is the fact that the chemical industry has developed over many years from small enterprises with only limited potential for harming people in their immediate surroundings to very large factories and industrial complexes with a substantial hazard potential. Thus the basis for the regulations was laid at a time when no international collaboration existed in the area. It is, therefore, easy to understand that regulation has developed in different ways in different countries, and that the present very large regulatory systems are not easy to harmonise. Contrary to the chemical industry, the regulation of the relatively 'young' nuclear industry has developed in a much more uniform way. From the very beginning the potential risk from nuclear power plants was recognised and risk analyses were undertaken. Furthermore, there has always been an extensive international exchange of ideas within the field,

and international organisations such as the IAEA have supported common approaches to safety.

The case of radiation protection

Radiation protection is a special case of risk management where the roles of experts and societal values are worth close examination. Receiving a dose of 15 milliSievert per year directly corresponds to a one per thousand probability of getting cancer. This is the result of stochastic effects in the human body which can result in cancer after many years. For an individual it will never be possible to derive a certain cancer sickness from a specific radiation exposure – it is only a matter of probabilities. However, linearity between dose and risk is the foundation for regulators when setting dose constraints for low doses. A ten times higher (lower) dose is thus assumed to correspond to a ten times increased (reduced) risk. For doses in the order of 1000 milliSievert, however, the risk increases steeply and for very high doses the risk of death is 100 per cent from acute radiation sickness.

The International Commission on Radiological Protection, ICRP, is an independent registered charity 'established to advance for the public benefit the science of radiological protection, in particular by providing recommendations and guidance on all aspects of protection against ionising radiation'.[2] The ICRP, established in 1928, plays an important role by issuing guidelines on radiation protection. In each country the radiation protection authorities set standards and criteria referring to the ICRP recommendations. The system of protection recommended by the Commission is based on the following general principles:

(a) Justification: Practices involving radiation exposure should produce sufficient benefit to offset the radiation detriment it causes
(b) Optimisation: Individual doses, the number of people exposed and the likelihood of being exposed, should be as low as reasonably achievable
(c) Limitation: Radiation exposure to individuals should be controlled by dose limits

The general picture is that radiation protection is the archetype of an area dedicated to international expertise and academia where the layperson has no real contribution to make. However, it is obvious that the practical application of these general principles, especially justification and optimisation, involves a great degree of value judgment. This was fully recognised in 2003 by Roger Clarke, then Chairman of ICRP, as he said (International Commission on Radiological Protection, 2003, p. 133):

> All those concerned with radiological protection have to make value judgements about the relative importance of different kinds of risk and about

the balancing of risks and benefits. In this, they are no different from those working in other fields concerned with the control of hazards.

The value-laden judgments made by ICRP in recent years are quite visible in relation to two issues, namely a new approach to optimisation and the increasing focus on the protection of the environment.

Protection of the individual or the collective?

Earlier, optimisation was supposed to be carried out using collective doses. In this practice a dose is multiplied by the number of individuals receiving it. In this way, very small doses can be summed up over very large populations to become a large number of calculated deaths. Minimizing the collective dose means optimizing the protection of society. In essence the principle was to protect society rather than the individual. Recommendations from the ICRP in the last ten years have, however, been made in terms of controlling doses to the individual[3] and there has been a corresponding reduction in the emphasis on collective doses. In practical terms, the application of an individual dose instead of a collective dose for radioactive releases makes dilution a more acceptable method for radiation protection than before. For example a repository for radioactive waste could be at a coastal site or in inland. A coastal site would provide higher dilution in the sea for any radionuclides eventually leaking out, therefore giving lower individual doses in the risk assessment. Whether that should be a factor of importance for site selection is fundamentally a value issue.

During his chairmanship Roger Clarke outlined a new and much more individualistic philosophy for discussion by the ICRP committee, which reflected a shift from societal-based values to an individual-based policy, in line with changing values in society. Clarke wanted to optimise with the help of stakeholder involvement: Optimisation 'may in future best be carried out by involving all the bodies most directly concerned, including representatives of those exposed, in determining, or in negotiating, the best level of protection in the circumstances' (ICRP, 2003, p. 135). This statement, consistent with a modern understanding of risk communication, must be seen as quite radical in the eyes of the traditional radiation protection experts. However, the involvement of stakeholders is regarded as an important input to the optimisation process in an ICRP Task Group report from 2006 (ICRP, 2006, p. 21). The Swedish Radiation Protection Authority, which is also affected by the RISCOM project, has taken initiatives in this direction too, even if the response from the public has been quite limited.

The second area where the ICRP, and with them national authorities, follows contemporary societal values is the protection of the living environment. Earlier it was assumed that protecting human individuals would also protect the environment, especially biological diversity. However, that

assumption has never been proved to be correct, and now environment protection is explicitly addressed.

Nuclear waste disposal

When an individual has been exposed to a dose of radiation, the corresponding risk can easily be calculated. But when it comes to possible future exposures, in order to calculate a risk figure we first have to know the probability of the dose occurring. Or, to be more precise, in order to calculate the risk we need to know the probability and dose for all events that can lead to a dose. We are thus back to the problems of completeness and probabilities in quantitative risk assessment and risk informed decision-making we have already discussed. Calculating risk to future individuals from a nuclear waste repository seems to be an impossible task due to the large uncertainties of events in the far distant future. If you have a risk target to meet, as is the case in some countries like the United Kingdom and Sweden, what you can do is to assess a number of scenarios and then make it plausible that they together cover all the events that would have been included in a real risk assessment. If you have a dose target, you need to decide to which scenarios it should be applied. In both cases value-laden assumptions have to be made.

Is human action part of risk assessment?

To continue with the case of radioactive waste disposal, one issue is how human intrusion into a repository should be dealt with in radiation protection requirements and risk assessment. One approach would simply be to say that if a future society is capable of such intrusion, either by humans at the repository depth, or for example by drilling, it will also have the techniques to assess the risks and therefore there is no need for us to take the issue into account. One could also say that future generations should not be prevented from using spent nuclear fuel as the resource it is, or one could say that we must do all we can to restrict its use in manufacturing nuclear weapons.

It is not difficult to come up with human intrusion scenarios that give much higher doses than normal dose constraints. However, such scenarios for a deep repository should always be compared to the equivalent scenarios for alternative waste management options. If this is done, many other methods will perform even worse. Deliberations about such issues would increase transparency and thereby the quality of decisions in nuclear waste management.

However, the experts seem reluctant to present cases of risk assessment that involve high doses. In fact, earlier human intrusion scenarios were ignored by risk assessors. And now, when this is no longer possible they persist in giving us results well below dose limits by constructing quite special cases of human intrusion. For example, when the Swedish industry implementer SKB analysed a drilling scenario (SKB, 1999), the distance between the drill core

with the radioactive material and the personnel taking care of it was large enough for a low dose. Why? Alternatives to the proposed disposal method, including continued near surface storage, would give doses that are at least as high – therefore there should not be any problem presenting such cases. The reason seems to be that they would show very clearly that expert analysis is not enough. To handle such cases, a more deliberative assessment would be needed, and this is something the experts do not like. This is thus just another example of narrow expert framing.

From the point of view of radiation protection regulation, the Swedish authority SSI seems to be on the right track when they simply say in the regulations that 'The consequences of intrusion into a repository shall be reported for the different time periods specified. The protective capability of the repository after intrusion shall be described' (Swedish Radiation Protection Authority, 1998. §9). They say nothing about dose constraints in this context. Hopefully the SSI can be clear in their regulatory guidance about the need for the SKB to be more open-minded and courageous enough to analyse cases which can give high doses. In the US, however, it must be demonstrated 'that there is a reasonable expectation that the reasonably maximally exposed individual receives no more than an annual dose of 0.15 milliSievert as a result of a human intrusion, at or before 10,000 years after disposal' (Federal Register. 10 CFR Part 63. §63.321). The US regulations, however, only deal with human intrusion as a result of exploratory drilling for ground water. One could ask oneself why this is the case.

Will the new approach prevail?

Radiation protection is a matter of value-laden judgments from the top level of overriding principles to the implementation in risk assessment practices. Accordingly the new approaches by the ICRP with increasing focus on the individual and less on the collective, as well as the emphasis on protection of the natural environment, reflect value shifts in our society. The ICRP has thus in a way been successful in meeting societal demands. It would have been even better if the commission had been more communicative and had organised discussions outwith expert circles in order to increase public awareness.

On a practical level, the move in the ICRP towards public communication as a means of optimisation has not been met with enthusiasm by regulators. The old narrow framing produced by the expert community is much too strong for that to take place. This raises concerns that passive resistance will make the ICRP gradually move back to the old position. If this happens, the commission will lose the opportunity to change its image from that of an organisation situated at the top of its ivory tower to that of a communicative and receptive body.

It is not good enough for radiation protection authorities to set standards and criteria. They must be involved in a process with public insight and public participation which commences with a dialogue about the standards and criteria themselves (their foundations in facts and values), then continues with their application in practical situations. Only then will the public have the opportunity of evaluating the radiation protection authorities' authenticity.

The evolving risk concept

There are severe limitations in the use of quantitative risk assessment for risk informed decision-making and risk regulation. First of all, in the eyes of lay people, risk is a multi-dimensional concept which not only includes probability and outcome but also a complex mixture of values and perceptions possessing psychological, social and cultural dimensions. At a meeting with the European RISCOM project, different stakeholders agreed that (Andersson, Espejo and Wene, 2004):

> Although there are established methods of assessing risk by the nuclear industry and regulators, risk is a complex mixture of values and perceptions incapable of reduction to a simple mathematical formulae, perceived differently from individual to individual. Both society and the communities affected must be empowered to develop their own understanding of risk and be encouraged to accept, reject or negotiate developments accordingly, taking into consideration issues such as the social and economic benefits or costs that such developments may bring.

It is not only a matter of bringing social and other factors into risk assessment, in fact the statement hints at a new practice in conducting the assessment. Instead of letting the experts set the agenda, affected parties should develop their own understanding of risk thereby bringing in issues such as social and economic costs and benefits. This is a radical way of looking at how risk assessment should be performed which is no doubt met with dubiousness and resistance from the expert groups. The statement, however, reflects a growing concern that risk assessment, as normally performed, does not produce the information that is needed for societal decisions.

Even if the doubts are more outspoken among officials in Europe than in the US, the evolving concepts in risk assessment and risk management can be seen in major risk studies published by the US National Academy of Sciences. In 1983, the 'Red Book' (National Research Council, 1983) was published after a study that sought 'institutional mechanisms that best foster a constructive partnership between science and government'. The study made the important distinction between risk assessment and risk management and

raised the issue of how to best keep the two functions separate but coordinated. Research would lead to risk assessment, which would then lead to risk management – in that sense the Red Book was a forerunner to the concept of risk informed decision making. However, the basic problem of uncertainties in scientific knowledge was well acknowledged as was the scope for subjectivity which exists in risk assessment.

In 1989, in *Improving Risk Communication* (National Research Council, 1989), the National Academy stressed the need for a two-way dialogue between the government and the public. Although this report still relied on traditional risk analysis, the report went beyond the usual framework by identifying the need for early and sustained dialogue. The report recognised that disputes are often not about facts but about values, and that a good two-way dialogue might not lead to consensus, since improving understanding might solidify opposing views.

In 1996, *Understanding Risk* (National Research Council, 1996), the third risk study by the Academy, gave little space to traditional analysis, but concentrated on working with interested and affected parties to decide what should be examined, how it should be examined, and how decisions should be made. This report stressed the need to bring in value issues from the beginning and to iterate them throughout the decision-making process. This is what the report calls an analytic-deliberative process. Significant concerns among citizens should be addressed early in risk assessment.

The views of the RISCOM group are thus not new. The three US reports represent three steps in the understanding on how risks should be managed in society: first, acknowledgement of subjectivity in risk assessment, then emphasis on dialogue instead of one-way information, and finally the conclusion that one should first address the concerns of laypeople. In spite of these insightful recommendations, which have developed over twenty years, the actual practice of risk assessment has not changed accordingly. As we have seen from the examples given in nuclear waste management, biotechnology development etc, the experts (with a few exceptions) are still not willing to open a real two-way dialogue to include 'stakeholder' concerns from the beginning and thereby avoid later setbacks. What can be the reasons for this? Is the gap between the cultures of the natural sciences (where risk assessment is most often done) and the social sciences (where risk communication is most often dealt with) so big that the experts simply don't believe in good advice? Are recommendations only 'fine words' without content? Are the experts simply unwilling to let go of their control over the process? Are we stuck in institutional structures that don't allow a new paradigm of risk assessment and risk management to develop?

Of course we cannot just blame one party (the expert community) for a broad societal problem. We cannot expect the experts to change their way of working and thereby to a large extent give up their identity; it simply isn't that easy. In order to improve the situation, we should instead take a look at

society's wider decision-making structures, an issue to which we will return later on. There is, however, yet another piece of the 'risk puzzle' to explore first. We have already discussed the role of emotions versus more deeply held values in the context of decision-making. As we shall see in the next section, this aspect goes to the heart of risk perception, another major current of risk research.

Risk perception and politics

In this chapter we first approached the risk concept with a technological perspective, then we acknowledged its limitations and we ended up with a much broader view of the assessment and management of risk. Another dominant direction of risk research relates to how people perceive different kinds of risk in order to understand what factors lie behind these perceptions. This research has taken place within the social and behavioural sciences, most notably by psychologists. In the 1970s a number of publications started to emerge in the area of behavioural decision-making and the psychology of risk perception with the American Professor Baruch Fischhoff as one of the pioneers (see e.g. Slovic *et al.*, 1977, Fischhoff *et al.*, 1981, and Fischhoff, 1989). In 1978 Fischhoff *et al.* published an important psychological analysis of the concepts proposed as important in understanding perceived risk (Fischhoff, Slovic, Lichtenstein, Read and Combs, 1978).

The psychology of risk perception is of interest since it plays an important role in the policy-making process. By using information on risk perception, stakeholders can improve their risk communication for strategic purposes. For example, if people perceive the risk from nuclear waste, GMO or mobile phones as less severe when they can control the consequences, proponents can emphasise that aspect of the particular technology. And if involuntariness increases perceived risk, opponents can emphasise that aspect. Sometimes the interest of academic research coincides with the strategic purposes of stakeholders. For example, results from surveys carried out as part of risk perception research can be used in a similar way as opinion polls by stakeholders. As we know, such results are used not only to increase knowledge of what people think, but they are also used as arguments in the policy-making process (especially when they are favourable to a preferred position). Possessing knowledge of whether the factors behind risk perception are emotional or value-laden is also valuable from a democratic point of view.

For a long time risk perception research was dominated by the 'psychometric paradigm' developed by the US group of psychologists, led by Paul Slovic, Professor of Psychology and Baruch Fischoff (see e.g. Fischhoff, Slovic, Lichtenstein, Read and Combs, 1978; and Slovic, Fischhoff and Lichtenstein, 1979). Most risk managers are familiar with Slovic's four quadrant risk diagram, also published in *Understanding Risk* (National Research Council, 1996, p. 62). The 'x' axis going horizontal in the diagram includes such attributes

as uncontrollable, involuntary, dreaded. The 'y' axis going vertical includes attributes such as not observable, delayed effect, and novelty of risk. The factors on the axes have often been summarised as Dread and Novelty. The more to the upper right corner (Dread and Novelty), a hazard or activity is, the more risky it is perceived to be. This is where you find nuclear reactors, radioactive waste and DNA technology. The more to the left downward corner (Not Dread and Known) activities are, the less risky they are perceived to be. Examples found there are cycling, downhill skiing and smoking (!).[4]

It is easy to understand how knowledge about the psychometric paradigm can be used in risk management for strategic purposes, since it essentially says that laypeople perceive certain technologies as risky for two reasons; first they are ignorant (Novelty) and secondly they react emotionally (Dread). This means that if you want to introduce a technology into society, you can ignore public resistance since it will cease with time. And anyway, when people get involved they do so motivated by emotions, which should have little value in rational policy-making.

The psychometric paradigm has, however, been criticised by Lennart Sjöberg, a Swedish professor of psychology. He says that the paradigm is built on an illusion, based on misleading data analysis (see e.g. Sjöberg, 1999, 2002a). The effect, called the *ecological fallacy*, appears when data on individuals is averaged on an aggregated level.[5] For example, if you want to know how white and black citizens voted for Bush or Gore in the 2000 election you cannot use statistical data aggregated on state level. Such data will tell you the voting results from each state and we also know the proportion of blacks and whites in each state. But it would be wrong to conclude the voting behaviour of blacks and whites from that data. For that you need survey data on individual respondents from all over the US. Sjöberg contends that this type of averaging on an aggregated level has been done in risk perception research, which has led to unsupported generalisations from group data to individual perceptions.[6]

When Sjöberg reuses the raw data from which the diagram has been derived on the individual level, the statistical evidence of Dread and Novelty as an explanatory factor for perceived risk decreases dramatically from 70–80 per cent to 20 per cent. Instead he finds that factors of a more value-laden and ideological character, such as 'Tampering with Nature', have a much higher explanatory force (see e.g. Sjöberg, 2000a, 2002b). From a democratic point of view these results are very encouraging. They tell us that when the public judges technological risks they do that on the basis of values rather than emotions and ignorance. If this is confirmed and recognised as a scientific fact, it will no longer be possible to ignore public opinion in risk-related decisions. This is not to say that policy-makers should always follow public opinion, but it does mean that risk should be dealt with as any other issue in politics. Our elected representatives should represent citizens' value systems, including what they have to say about risk.[7]

The temptation to ignore ordinary people's risk perception because of the belief that it rests on ignorance and emotion has been enforced by the view, also based on psychometric paradigm research, that experts have quite a different risk perception structure. Contrary to the public at large the experts' risk perception has been seen as objective and rational, based upon *the real risk* and unaffected by 'Dread and Novelty' factors (see e.g. Slovic, 1997).

However, this notion of the psychometric paradigm has also been criticised. The British researchers Gene Rowe and George Wright evaluated nine empirical studies conducted on expert versus lay judgment of risk (Rowe and Wright, 2001). They found that the conventional wisdom that experts judge risk differently from members of the public has little empirical evidence to support it, indeed they documented methodological weaknesses in studies showing that this was the case. Studies by Lennart Sjöberg show that while experts tend to give lower risk estimates than the public in their own area of expertise and responsibility, the structure of their risk perceptions is similar to that of the public (Sjöberg *et al.*, 2000).

Can we include public values in risk assessment?

In this chapter we have basically explored two main currents of risk research; risk perception and the mathematical construct of risk applied in risk informed decision-making. Despite all the efforts made in technology, natural sciences, social sciences and psychology in this area we are left in confusion when it comes to how risk management can best be carried out in a rational and democratic fashion. These are some of the remaining challenges:

- Seemingly objective quantitative risk assessments contain value-laden and subjective elements.
- Experts disagree about the meaning of results in quantitative risk assessment.
- Risk is assessed, managed and regulated differently between countries and between different policy areas due to historical and cultural traditions.
- The prevailing paradigm in risk perception research, which has given support to policy-making, has been seriously challenged.
- The expert community persists in failing to use good advice based on sound risk communication research.
- As a result we get irrational policy-making processes with unnecessary misunderstanding, controversy and setbacks.

In summary there are large uncertainties about how to deal with the interfaces between the mathematical construct of risk, risk perception and policy-making. The insight that risk can on the one hand be defined in a technically precise manner, and on the other be defined in a wider and politically more relevant context, is a source of frustration among experts and

policy-makers. The mathematical definition is suitable for expert analysis and quantitative regulations, but is often too narrow for policy formulation since it does not take societal values into account. On the other hand, a broad definition of risk as given by the RISCOM group takes these values into account but is hard to apply as practical support in policy-making. An attempt to give the problem of risk management a structured framework is the approach to strategic risk assessment developed by the UK Environment Agency (see e.g. Pollard *et al.*, 2001). This approach takes into account the technical part but also 17 attributes of social and economic perspectives of risk. It could offer better possibilities for risk communication and a systematic and comparative basis for selecting between risk management options.

Risk management approaches like this can help to increase awareness about different aspects of complex risk issues, provided there are suitable societal functions in place which are able to use them for this purpose. If such functions are not in place, the use of structured and broad tools that are nonetheless still technical will remain within expert circles. There is also a danger that widening technical risk assessment tools to include social and economic values in the weighting of risk attributes will make the entire risk management endeavour seem scientific when it is ultimately a value-laden and political matter. It looks like the UK Environment Agency could fall into this trap since its scoring process of the risk attributes involves 'expertise that covers the physical, social, and economic arenas of the environmental harm being assessed, and should preferably be facilitated by an individual who has experience of the tool and its application' (Pollard *et al.*, 2001, p. 297). It can only be beneficial, of course, if the approach supports an analysis in a structured fashion and if it allows a presentation of the results so as to better inform risk management decisions. What may be a problem is if the agency itself, assisted by different kinds of expertise, does the scoring. In such a case, different societal values are dealt with using technical tools not accessible to ordinary citizens and political decision-makers.

In a democratic society not all issues of a value-laden character can be decided upon by politicians. There must me some division of labour, by which I mean that government agencies acting on behalf of the people can make such decisions to a certain extent, for example, on issues in risk management. In such cases, though, the decisions should be made transparent and accessible for public insight. The use of strategic risk assessment tools does not guarantee that this will actually be the case per se. If it is purely expert driven, the outcome and the process itself can be irrelevant and fall outside the realm of societal and democratic goals as was the case with the Nirex site selection for a radioactive waste repository using a similar methodology (multi-attribute decision analysis, see Chapter 4).

In the UK, Her Majesty's Treasury, has published a document containing appraisal guidance for managing risks to the public (Her Majesty's Treasury, 2005). The document provides guidance for developing and assessing

proposals that affect the risk of fatalities, injury and other harm to the public. It confirms that communication, public involvement, and risk management should be integrated into the decision-making process at an early stage. There is also a commitment that government will explain how views obtained through consultation have been reflected in its decisions. However, even here, the overall risk management framework is rather technical using cost benefit analysis with a survey of people's 'willingness to pay' and cost effectiveness analysis which compares the costs of alternative ways of producing the same or similar results.

A great deal of the UK document is devoted to the management of public involvement – in particular there is an appendix that sets out a framework for understanding people's concerns. The framework is based on the psychometric model of risk perception developed by Fischoff, Slovic and others, in which Dread and Novelty are key characteristics for how risks are perceived. The critique to this approach we discussed in the previous section seems well justified here since for example ethical concerns and religious factors are included as part of the Dread factor (Her Majesty's Treasury, 2005, p. 41), whereas it would be more appropriate to include them in another group, that could have been called value-laden factors.

One problem with the approach to public concern taken by the Treasury is that experts are given a high profile in setting the agenda: 'Measuring and evaluating public concern requires expertise and understanding of risk perception' (ibid., p. 35). Information *from experts* on likely public concerns 'can be used to streamline the public consultation process' (ibid., p. 37). On page 12 it is said that 'some concerns will be valid; others will be unsubstantiated by the scientific, or other, evidence; still others will be generated by uncertainties about which there is little evidence either way'. The question is who determines what the valid concerns are. However, one advantage of the HM Treasury approach when compared to strategic risk assessment is that it does not attempt to integrate or aggregate scores from different indicators into an estimate of 'total concern'. This makes the framework less technical and less expert oriented but more open for public communication.

Methodologies like strategic risk assessment, multi-attribute decision analysis, cost–benefit analysis and cost-effectiveness analysis can be useful in giving risk related decision problems a wider frame, but they raise two concerns. First, they can be used by expert groups to apparently include public and stakeholder values while still retaining expert control of the process. Secondly, the instruments themselves may be deterrent to laypeople involvement and the dialogues will not be held on equal terms.

The conclusion is that we should not try to include public values in risk assessment by transforming them into quantitative elements that fit into a technical framework used by experts. Instead we must change perspective and view the problem from the other side, from the point of view of the citizens and the politicians. We will then see a need for insight and transparency

as a first prerequisite of high quality decisions that take societal values into account. The core issue is thus how risk assessment can be made more transparent and what needs to be done to make it more accessible to the general public. To incorporate the value judgements of stakeholders into risk assessment would involve conducting risk assessment by starting from the issues of concern among stakeholders and communicating with them during the entire risk assessment process. Risk assessment needs to incorporate citizens' values and concerns and the experts need to engage themselves in that dialogue. At the same time, the technical risk assessment also needs to keep its identity as a scientific and engineering enterprise. Engaging in public dialogue must not dilute the science and steer experts away (in focus or time-wise) too much from their core activity.

The precautionary principle

This chapter about risk assessment and risk management will not be complete until we have dealt with the precautionary principle. It comes into force when there is the potential for serious risks with a large scientific uncertainty. The precautionary principle is listed as Principle 15 of the Rio Declaration of 1992 among the principles of general rights and obligations of national authorities (United Nations, 1992):

> In order to protect the environment, the precautionary approach should be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Since 1992, the principle has been implemented in various legal environmental instruments for many areas such as genetically modified organisms and electromagnetic fields. It is action oriented meaning that persistent dissent among scientists cannot be used as an excuse for not taking action.

The precautionary principle is not thought to replace risk informed decision-making, but to be used when it cannot be applied because of too much scientific uncertainty (provided there is a threat of serious or irreversible damage). What we said earlier about the need for insight and transparency as a prerequisite for high quality decisions goes for the application of the precautionary principle as well. On the factual side, we need to evaluate the scientific status of the area to see if the requirement of scientific uncertainty is fulfilled. On the value-laden side we need to evaluate the nature of the threat and compare it with some sort of standard in order to decide if action shall be taken or not. As René von Schomberg at the Science and Technology Foresight Unit of the European Commission points out (von Schomberg, 2004), such standards have a normative character and

cannot be set by science alone. For example, for the GMO case he gives three possible standards: reduction of biodiversity, comparison with conventional agricultural practices and compatibility with sustainable agricultural practice. Divergence from any of these standards could set the precautionary principle into action. Which one of them (if any, or which combination of them) to use is, however, a matter of societal values and politics.

The precautionary principle as cited above deals with protection of the environment, however, in different forms it is used also for human health protection. The principle is the subject of much deliberation and controversy both on a philosophical level and when it comes to practical applications in specific areas. Often the battle goes on between an industry wanting to introduce a new technology and opposing groups using the precautionary principle as an argument for a moratorium until more is known about uncertain risks. Typically, regulatory authorities find themselves caught in the crossfire between these two major stakeholder groups. They have to make decisions based on scientific evidence but they also need to take public values into account. One area where this dilemma is especially difficult in a number of countries is that of mobile telephone systems.

In this area the World Health Organisation (WHO) has been very active. In February 2003, WHO organised a conference in Luxembourg together with the European Commission on the application of the precautionary principle to electromagnetic fields (EMF). As a result of the meeting the WHO published a draft *Precautionary Framework for Public Health Protection* on its web site (World Health Organisation, 2003). The web site paper notes that precautionary decisions have been controversial, and that the principle itself lacks clear definition. Furthermore, 'actions by some countries, in the name of the precautionary principle, suggest that there is widespread confusion about what the principle means and how it should be applied'.

The WHO sees two objectives of its Precautionary Framework for public health protection (ibid., p. 3). The first objective is 'to anticipate possible threats to health and respond appropriately in order to reduce exposures before introduction of an agent'. Thinking within the precautionary framework means shifting attention to addressing questions about risks as a priority before deciding on whether to proceed with a new technology. The second objective is 'to address public concerns that a potential or perceived but unproven health problem is taken into account after introduction of an agent'.

Both these objectives of the precautionary framework are of course controversial. It can be argued that in this form the precautionary principle is no longer action-oriented, but can instead be used to prevent the introduction of any new technology without there being any real factual justifications. And can it be justified to use the mere existence of public concern as a reason for precautionary measures when there is no real risk at hand?

The American risk communication specialist Peter Sandman has discussed this in some detail in a paper about the application of the precautionary principle for mobile telephone systems. He opposes the idea that public concern itself should be seen as almost identical to real hazards, and his bottom line is that one should 'use hazard mitigation strategies for serious hazards, and outrage mitigation strategies – sharing control, acknowledging mistakes and problems, giving away credit, and the like – for serious outrages' (Sandman, 2004, p. 10).

Indeed the WHO says in its official web site fact sheet on mobile telephones and public health (World Health Organisation, 2000, Fact sheet No. 193):

> If regulatory authorities have adopted health-based guidelines but, because of public concerns, would like to introduce additional precautionary measures to reduce exposure to radiofrequency fields, they should not undermine the science base of the guidelines by incorporating arbitrary additional safety factors into the exposure limits. Precautionary measures should be introduced as a separate policy that encourages, through voluntary means, the reduction of radiofrequency fields by equipment manufacturers and the public.

Such a distinction between science-based regulatory guidelines on the one hand and encouragement of additional precautionary measures due to pubic concerns on the other seems to be a double-edged policy that may in fact undermine the scientific approach that was the point of departure. Of course, as we said earlier, public dialogue about risk assessment must not dilute or undermine science. But it should contribute to the understanding of what the concerns are and thereby which risks are relevant for policy-making. As von Schomberg has pointed out, science alone cannot determine which types of threat are most important.

With the precautionary principle, the international community has agreed on the standpoint that a lack of full scientific certainty should not be used as a reason for postponing preventive measures when there are serious possible threats. This is a principle which people in general understand and which most probably harmonises with their values. So far, so good! However, as time goes on there are two threats to the intentions of the precautionary principle. The first one is that the principle gets undermined by groups who see it as an obstacle to economic and technological development since it is used as an argument to retard the introduction of new technologies on the market. The fact that there are many definitions of the precautionary principle in existence suits those following this line as it helps them to fight against it.

The second threat is that the application of the principle is taken over by scientists and regulators. Then it becomes just another tool in technocratic risk assessment. People with a pure scientific approach want to see the existence of a substantial risk before they take action. This can easily lead to

misunderstanding of the precautionary principle or even reversal of it. The principle requires action as soon as one can conclude that there is *a potential harmful effect and perhaps scientific controversy* – by the time there is scientific consensus about the effects we have left the area of precaution.

The politicians need to understand that it is not enough to have established the precautionary principle for environmental protection and public health. They have to take continued responsibility for the application of the principle in all policy areas, for the very simple reason that it is their responsibility to determine what the relevant risks are. The European Commission has made it perfectly clear where the expert role ends and where political responsibility takes over (European Commission, 2000, p. 2):

> The precautionary principle should be considered within a structured approach to the analysis of risk which comprises three elements: risk assessment, risk management, risk communication. The precautionary principle is particularly relevant to the management of risk.

And further on (ibid., p. 3):

> The implementation of an approach based on the precautionary principle should start with a scientific evaluation, as complete as possible, and where possible, identifying at each stage the degree of scientific uncertainty.
>
> Decision-makers need to be aware of the degree of uncertainty attached to the results of the evaluation of the available scientific information. Judging what is an "acceptable" level of risk for society is an eminently **political** responsibility. Decision-makers faced with an unacceptable risk, scientific uncertainty and public concerns have a duty to find answers. Therefore, all these factors have to be taken into consideration.

The Commission also states that 'The decision-making procedure should be transparent and should involve as early as possible and to the extent reasonably possible all interested parties' (ibid., p. 3).

In this case, the European Commission takes side against technocratic risk management and emphasises the role of politicians not only in the management of risk but also in making it transparent and participatory. In practice, however, the question is whether the political system has really understood what this requires and if it has the muscles to live up to its responsibility. In order to manage risk using the results of risk assessment politicians need to see if the assessment rests on technocratic assumptions about what is worth assessing, which questions need answers and if scientific controversy has been appropriately included in the assessment. It may well be the case that the risk assessment has excluded research deviating from the main stream

and thus outframed the real meaning of the precautionary principle from the beginning.

To attain that sort of insight, however, politicians need support from bodies that can help them to structure the 'risk world', to stretch the risk assessors, to set agendas not in the hands of technocratic risk analysts, etc. – in other words to make them aware! It is one of the major themes in this book that contemporary society is lacking such functions.

6
Biotechnology and Nanotechnologies

The term *biotechnology* covers a very wide range of areas with intimate links to academic research, health care, food supply, industrial development, and so forth. It also contains a wide range of highly controversial ethical and political issues. The issues currently discussed reflect social concerns, ethical dilemmas, and major democratic challenges to the postmodern society. The Biotechnology Strategy of the European Commission (European Commission, COM(2002), p. 27) contains many different areas such as stem cell research, bio banks, xenotransplantation, genetic testing and the use of genetically modified organisms for food production. For example, genetic testing raises concerns about privacy and personal integrity. At the core is a question about the ownership of our genome. All these areas have ethical and political elements and policies should not be formed by the experts alone as they tend to present risk assessment results with a perceived but misleading image of scientific correctness (Caruso, 2006). Nor should politicians be too receptive to pressure from lobbying by interest groups, either they represent industry or NGOs, without being able to challenge their arguments.

We are unable to deal with all biotechnology applications here as that itself would require an entire book. Instead, in the first part of this chapter we shall focus on the case of genetically modified organisms (GMOs) for food production.

In the second part of the chapter we leave biotechnology as a separate area and take a look at nanotechnology which is even less a subject for public and media debate, a situation that is likely to change in the near future. In nanotechnology organic and inorganic materials are manipulated at the smallest possible scale to develop new properties. According to our definition, nanotechnology is not a separate technology but rather a collection of *nanotechnologies* in plural which can be put to many different uses, among them biotechnological applications. The merger of nanotechnology with biotechnology and information technology into *converging technologies* opens quite new perspectives for the future, which we shall only briefly indicate in the last part of the chapter.

The case of GMO

One branch of biotechnology is to select, or improve, specific traits of organisms. A GMO has its genome altered by the insertion of genetic material from a different species. Genetically modified plants have been developed for various purposes such as resistance to pests, herbicides or harsh environmental conditions. Genetically modified foods, foodstuffs produced from GMOs, have been available since the 1990s, the most common ones are derived from plants such as soybean, corn and maize. For example, insect-protected cotton and herbicide-tolerant soybeans were commercially released in 1996. GM crops have been widely adopted in the United States. They have also been extensively planted in several other countries (Argentina, Brazil, South Africa, India, and China) where agriculture is a major part of the total economy.

In the United States, the use of biotech crops increases rapidly. For example, the fraction of soybeans being genetically modified increased from 54 per cent the year 2000 to 86 per cent the year 2004.[1] During the same period the use GM cotton increased from 61 per cent to 76 per cent and GM corn from 25 per cent to 46 per cent. Ten years after the first commercial release, 90 per cent of GMOs remain cultivated in four countries: USA (55 per cent), Argentina (19 per cent), Brazil (10 per cent) and Canada (6 per cent) (European Commission, MEMO 06/61, 2006). In Europe, being far behind the United States, more than 30 GMOs or derived food and feed products had been approved for marketing in the EU by early 2006 and some forty were in the pipeline. As an example, in early January 2006, the EU granted approvals to three new GM maize products 'after a rigorous safety assessment' (ibid.). In the future, GM technology is likely to increase it applications for industrial processes. For example, sectors such as the production of biofuels and paper share an interest in higher yielding plants, and genetically modified trees are already a reality.

The introduction of GMOs and GM foods in particular has involved serious controversies over a broad frame of issues such as food safety, environmental safety, labelling and consumer choice, intellectual property rights, different forms of agriculture and international trade. As always in the case of debates on whether new technologies should be used or not and what restrictions should be set, etc. the critical point of departure is *how the issue is framed*. It is important to ensure that the broad spectrum of values and interests are represented in the early framing. From an expert's perspective, GM foods would be acceptable if it can be shown that they are safe to eat and do not give rise to unacceptable environmental risks while the general public has other concerns of an ethical and political nature. Here we shall give some perspectives on the social context and policy-making framework and conclude with reflections on the heated debate between the USA and EU which highlights how different framings (trade and commerce, science, precaution) can create conflict.

Farming cultures and the biotech industry

In the discussion on whether GMOs should be allowed, and if so under what conditions, the expert framing is, as usual, too narrow to take into account the relevant range of public values. The GMO issue also allows us to study framing in more specific contexts, such as agriculture and intellectual property. Is has been said that the emergenre of agricultural biotechnology has transformed agriculture from its traditional forms into a corporate driven enterprise. There are, of course, many variations within 'traditional agriculture' that make such a statement over simplistic and too drastic. For example, agriculture became much larger scaled during the twentieth century, in some countries farmers' associations have been strong players sometimes at the expense of small scale farmers and national politics have shaped farming conditions, etc. It is also difficult, if not impossible, to place small scale farmers in industrial countries on an equal footing with farmers in rural areas in developing countries. Another important factor is the emergence of organic farming during the last few decades which must be distinguished from today's 'traditional agriculture'.

Despite these reservations, it is possible to claim that agricultural biotechnology is a new factor that represents a threat to other models of agriculture, as for example Chidi Oguamanam at the Law and Technology Institute in Halifax, Canada, argues (Oguamanam, 2007). His analysis sets genetic contamination and intellectual property rights at the core of this development. Many countries have different legislations for transgenic and conventional plants as well as the derived food, and consumers demand the freedom of choice to buy GM-derived or conventional products. Therefore, the two production chains must be separated. This is especially critical for organic farmers who can lose their certifications as GM free producers if their fields become contaminated from nearby GM fields. This requires coexistence on the fields as well as traceability measures throughout the whole food processing chain. Especially in Europe, the coexistence of GM plants with conventional organic crops has raised many concerns.

With the introduction of GMOs, the meaning of property rights in agriculture has shifted from classic property, such as a farmer's ownership of his or her crops, to intellectual property rights of the genetic information of crops (Oguamanam, 2007, p. 263). This means for example that farmers' customary practices to save seeds are circumscribed by the intellectual property of international biotech companies. This decreases indigenous and local communities' self-determination and threatens their cultural survival.

Chidi Oguamanam highlights the link between genetic contamination and property rights as a problem for traditional and organic farmers. Intellectual property rights protect the interests of biotech companies (and set restrictions on biotech farmers) but they don't protect the properties (GM free fields) of

traditional and organic farmers. To protect their interests other legislative measures are needed. However, in early 2004 the EU agriculture commissioner Franz Fischler warned the delegates at a conference on organic farming that food which is completely free of genetically modified organisms is a thing of the past. According to *Cordis Focus* (No. 237, 26 January, 2004, p. 18), Dr Fischler said that 'we have been banished from paradise. The idea of a zero percent threshold was no doubt possible in the garden of Eden, but not in the real world'. He then concluded that when it comes to setting acceptable levels of GMO, Europe must take guidance from scientists, rather than from politicians. Was the real message from the Commission in this case that the battle has already been lost, that there is no longer any point in citizens or NGOs opposing more GMO and that there is no need for politicians to bother?

The environment

Since GM plants are grown on open fields, they are often associated with environmental risks. Therefore, most countries require biosafety studies prior to the approval of a new GM plant, usually followed by a monitoring programme to detect possible environmental impacts.

It must not be forgotten that the environmental risk assessment of GMOs is in an early stage of development and that little is yet known about the mechanisms that govern genes, particularly regarding interactions across various biological systems. In January 2004, the Advisory Committee on Releases to the Environment (2002), which guides U.K. government policy on commercializing GM crops, concluded that two out of three GM varieties assessed during farm scale trials posed a possible threat to the environment. The scientific committee concluded that if GM herbicide-tolerant beet and oilseed rape were grown in the same way as during the trials, this would result in adverse effects on arable weed populations. This is an example in which early, but largely neglected, public concern has been verified by new scientific investigation.

Another similar example, although concerning animals rather than crops, is the Animal Biotechnology Report of the National Academy of Sciences (2002), which confirmed the ability of certain genetically engineered organisms to escape and reproduce in the natural environment. Genetically engineered insects, shellfish, fish, and other highly mobile animals that can easily escape are of particular concern, especially if they are more successful at reproduction than their natural counterparts.

Pollution of the natural environment by the migration of genetically engineered organisms into wild populations has long been an issue of major public concern. Both these cases indicate environmental risks more significant than the public had earlier been led to believe. The sound skepticism from the

general public in the face of reassuring messages from industrial experts should therefore be valued.

Are GMO foods safe to eat?

There is a lack of public confidence in research results supporting GM crop development. Indeed, there are also results that suggest otherwise. A study by scientists in Norway and Denmark shows a serious lack of published research into the health effects of GMOs. The study by professors Ian Pryme and Rolf Lembecke was published in the journal *Nutrition and Health* in 2003 (Pryme and Lembcke, 2003, p. 5). Surprisingly, it says that there had only been ten published studies of the health effects of GM food or feed. Over half of the published studies were carried out in collaboration with private companies, and none of those studies found any negative effects on humans. In the studies considered independent, however, adverse effects were reported. Furthermore, the quality of some of the published research was found to be poor and inadequate (ibid., p. 6):

> Although very many have voiced their opinions both in the popular and scientific press there is only very limited data published in peer reviewed journals concerning the safety of GM food. It would seem apparent that GM food regulation is currently based on a series of extremely insufficient guidelines.

The researchers conclude that:

> we feel that much more scientific effort and investigation is necessary before we can be satisfied that eating foods containing GM material in the long term is not likely to provoke any form of health problems. It will be essential to adequately test in a transparent manner each individual GM product before its introduction into the market.

If the Scandinavian researchers are correct, the statement that GM foods are safe had actually not been proven in 2003, in spite of reassuring statements by representatives of industry and, among others, US agencies. However, there are considerable measures taken within the European Union to secure and enhance food safety. These include safety assessment. procedures laid down in regulations on GM food and feed, the task of the European Food Safety Authority to provide scientific advice to European Union institutions and member states and efforts by the European Commission to increase transparency in the risk assessment procedures (European Commission, SEC(2007), 441).

Public values and perceptions

In spite of a gradual EU acceptance of various GM crops, GM food continues to be an issue of debate and uncertainty in Europe. And as Peter Sandoe

at the Centre for Bioethics in Copenhagen points out (Sandoe, 2001), it cannot be taken as a given that acceptability of biotechnologies among citizens increases with increasing knowledge. Instead, evidence suggests (Gaskell *et al.*, 2001) that having more information is not at all or just slightly correlated with support for the technology. One explanation may be that people mistrust the evidence put forward; another may be that other social factors than traditional risk assessment play an important role. The point here is that both policy makers and the public need tools to make themselves aware of all aspects of an issue as complex as GM organisms, including scientific evidence with attached uncertainty, ethical considerations, value-laden arguments, and the vested interests of investigators. Already in 1997 a Eurobarometer survey concluded (Biotechnology and the European Public Concerted Action Group, 1997, pp. 845–7):

> First, usefulness is a precondition of support; second, people seem prepared to accept some risk as long as there is a perception of usefulness and no moral concern; but third, and crucially, moral doubts act as a veto irrespective of people's views on use and risk.

A Eurobarometer of 2005 (Eurobarometer 64.3) shows that although optimism about biotechnology has increased in general, 58 per cent of the European respondents still oppose GM food while 42 per cent do not. A survey on public opinion in biotechnologies in Italy gives the same picture (*Cordis Focus*, No. 237, 2004, p. 18). More than two thirds of the Italian population (68 per cent) considered GMOs to be unsafe. In spite of the widespread skepticism about GMOs, 57 per cent of the population in Italy believed that research into agricultural biotechnologies should continue, with its potential to solve the world hunger problem as one of the main reasons. Such results from several studies support the view that ordinary people (1) have a sound skeptical attitude to risk assessment carried out by experts, (2) are against being exposed to risks without obvious benefits, but (3) can accept reasonable risk if there are big advantages. The rationality of lay people is confirmed in many studies such as the European PABE (Public Perceptions of Agricultural Biotechnologies in Europe) report. In this study it was, contrary to the common expert view, concluded that citizen's perceptions of GMOs were based on empirical knowledge rather than subjective and emotional responses. *The kind of knowledge* used by lay people, however, differed from experts and promoters – it was about past behavior of official institutions responsible for regulation and risk assessment (Marris *et al.*, 2001)!

Policy-making should reflect enlightened public values and concerns and most probably, the general public has a broader spectrum than mere technical risk criteria in mind. All the perspectives described here including farming cultures, the environment and food safety would be relevant in an open and transparent decision-making process addressing public values. The new EU regulations have also acknowledged the broader precautionary aspect of

GMO regulation, hence the European Commission Regulation 1829/2003 states that:

> It is recognized that, in some cases, scientific risk assessment alone cannot provide all the information on which a risk management decision should be based, and that other legitimate factors relevant to the matter under consideration may be taken into account.

As we shall see in the next section, the US, however, seems to have done a very narrow framing ultimately taking only one aspect into account, namely food safety.

United States and Europe – international trade and democracy

The commercial introduction of GMOs has caused intense controversy between United States and the European Union. Here are some examples from a European Commission press release from 7 February 2006 that illustrate the tension between two leading economic powers (European Commission, MEMO 06/61, February 2006):

> The EU approval process may appear to be lengthy for some countries which adopt a more lenient approach towards food and environmental safety issues. The longer times to assess the safety of GMOs in the EU are due to the complexity of the science involved as well as to delays incurred by biotech companies to provide suitable data demonstrating the safety of the products.
>
> The claim that the there is a moratorium on approval of GM products in Europe is self-evidently untrue.
>
> The US also opposes GMO traceability rules because it considers that they constitute an obstacle to US commodity exports, despite the fact that US traders can in fact meet those requirements without difficulties.
>
> The US is also adamantly opposed to labelling rules for food products produced from GMOs, even though these rules are designed to help ensure that customers are well-informed about what they are buying.
>
> The EU considers that major GMO producers such as the US should adopt a co-operative approach to the development of a sound international legal framework for these products, instead of taking hostile steps at the WTO.

The differences between the US and EU over the authorization of commercial growing of GM crops and the conditions under which GM food can be traded became obvious when the EU *de facto moratorium* on GM crops came into effect in 1998. This happened when a number of EU states made it clear that they would block further authorization of GM crops in the absence of a new labelling regime.

In August 2003, the US, Canada and Argentina formally took the issue to a WTO Dispute Panel after the failure of initial consultations. They claimed that the EU had breached WTO law and harmed the complainants' exports to the EU. The US has argued that the new EU labelling and traceability rules that came into force in 2003 are inconsistent with the WTO agreements, and that they are unscientific and an illegal restraint on trade.

As several authors have concluded (see e.g. Rigby, 2004) the dispute between the EU and US is based on 'process-based' versus 'product-based' regulation respectively. The former means that the process of production is the focus of legislation whereas the latter means that only the product is the subject of scrutiny. Clearly the product-based approach is much narrower than the process-based approach since among the many factors involved in a broad societal framework, of which we have touched upon only a few here, it only considers one – food safety (which is claimed to be proven).

The dispute has taken place in spite of the fact that both the EU and the US have taken a typical scientific approach to the decision-making on GM crops, based on risk assessment. What differs is that the US scientific approach takes place within a much narrower frame than the EU applies for environmental impact and human health. As compared to the United States, the European Union has a more precautionary response to agricultural biotechnology. This would not necessarily have been the case without EU citizen distrust of expertise and government agencies. In fact, a major factor for the introduction of GM crops in Europe has been the desire of international corporations to find a major new market, but it is also the goal of the EU and countries such as the United Kingdom to be able to compete with US research and development in the area. In that respect, the European skepticism has its price. As a consequence of the resistance in many EU countries, biotech companies hesitate to establish themselves and there is even a trend for withdrawal. A striking example is the UK where major companies with biotech crop capabilities have reduced their presence or withdrawn. One is Syngenta which in 2004 announced that it would move its UK research to the US which has a more favorable regulatory and business climate (*Cordis Focus*, No. 249, 2004, p. 22).

For the purpose of this book we can only observe that a democratic approach that includes citizen values and concerns by applying the precautionary principle is challenged by a commercial framing which sees the broader approach as not only violating international trade but also as unscientific. In the press release of 7 February 2006 the EU said:

> The US appears not to like the EU authorization regime, which it considers to be too stringent, simply because it takes longer to approve a GMO in Europe than in the US. The US appears to believe that GMOs that are considered to be safe in the US should be de facto deemed to be safe for the rest of the world. The EU has argued that a sovereign body like the EU and its Member States, or indeed any country in the world, has the

> right to enact its own regulations on the food that its citizens would eat, providing that the measures are compatible with existing international rules and based on clear scientific evidence.

As we have made clear on several occasions in this book, risks are defined within social and political contexts. As Rigby points out, this means that different standards and emphases between different countries may be entirely justified rather than one or more of them inevitably being unscientific or irrational (Rigby, 2004, p. 8).

Nanotechnologies

The scientific ability to measure, manipulate and organise matter at super small scales which has recently emerged has led to the possibility of nanotechnology. This is a hybrid science combining engineering, physics and chemistry at the scale of nanometres. A nanometre (nm) is a billionth of a meter, or a millionth of a millimetre. In nanotechnology, atoms are individually placed in patterns to produce a desired structure.

As millions of atoms are pieced together by *nanomachines*, a specific product will begin to take shape. One way of doing this is *self-assembly*, in which the atoms or molecules arrange themselves into a certain structure. It is theoretically possible to create mechanical nano-machines which would be capable of producing materials, including themselves, in a self-replicating manner. Such nanoreplicators have been the subject of much concern due to fears that they could go out of control, however, they are not yet in sight and will probably not be developed in the foreseeable future.

In the future we may have assemblers, and eventually replicators, working together to automatically construct products, and they will eventually replace traditional labour methods. This has the potential to vastly decrease manufacturing costs, and eventually consumer goods will be both cheaper and of a higher quality. Many believe that nanotechnology will result in a new industrial revolution that will change the way almost everything, including medicine, computers and cars, are designed and constructed. Such a revolution is still far ahead of us, may be 15–20 years, but when and if it is in fact realised, it will be one of the greatest scientific achievements ever with huge consequences for us all, especially when combined with achievements made in other sciences like biotechnology that are already in progress.

Huge investments

Research in nanoscale technologies is growing worldwide. Huge investments are made in competition between the financially strongest actors, including USA, Europe and Japan. In January 2000, US President Bill Clinton requested a $227 million increase in the government's investment in nanotechnology research and development, which included a major initiative

called the National Nanotechnology Initiative (NNI). This initiative nearly doubled the US budget investment in nanotechnology up to $464 million for the 2001 national budget and funds projects of several governmental agencies, including the National Science Foundation, the Department of Defence, the Department of Energy, the National Institute of Health, NASA and the National Institute of Standards and Technology. In a written statement, White House officials said that 'nanotechnology is the new frontier and its potential impact is compelling'. Nanotechnology then became a top research priority of the Bush administration and the NNI budget had nearly doubled once again to an estimated $961 million in 2004.[2] The budget for 2008 is nearly $1.5 billion, thus it has more than tripled since 2001.

In Europe, a vision document for nanoelectronics published by the European Commission in June 2004 (European Commission: Vision 2002) estimates that an annual overall R&D effort of 6 billion euro is required in Europe to develop nanoelectronic technologies over the next five-year period (2004–2008). This is a doubling of financial resources from the previous level of 3 billion euro per year. The document certifies that new nanotechnology materials are being investigated for a range of applications that include smaller, flexible displays and more powerful storage devices. These and other recent advances in nano-scale technologies can be exploited not only to lead to new mass markets for electronics but also to provide the high-technology experience and low-cost manufacturing required to develop other nanotechnology industries. The report refers to USA and Asian countries which 'are investing huge amounts of public funds in research and manufacturing', meaning that 'Europe must increase its efforts to stay in the race in terms of research, design, applications and manufacturing needs'.

Limited achievements but long term speculations

Although many nanomaterials are currently at the laboratory stage of manufacture, a few of them are being commercialised. Products with some of the unique properties of nanoscale materials are already available, for example certain components in computers, and products with strong fibres such as tennis rackets. Another area of application is that of mobile phones where materials are being developed for use in advanced batteries, electronic packaging and displays. Within a few years we may get composites that use the properties of *carbon nanotubes*, rolls of carbon a few nanometres in diameter and up to a few centimetres in length, which are extremely strong and flexible and can conduct electricity. By and large, however, nanotechnology is still in the research phase and will not be the source of dramatic changes in our world for some time.

In the long term, the potential is there for revolutionary improvements in almost all areas such as computers, medicine, the environment and military technology. For example, nanotechnology will have a huge impact on the medical industry including diagnostic techniques as well as drug

development and delivery. It can help automate complex medical tests thus lowering the costs of analysis and increasing the availability of testing, which will in turn increase the possibility of early disease detection, real-time assessment, tailored therapy for each patient and also preventive measures (see e.g. Pilarski *et al.*, 2004, pp. 40–5). Perhaps patients will drink fluids containing nanorobots programmed to attack and reconstruct the molecular structure of cancer and viruses to make them harmless. In theory at least the possibilities are endless. Among even more speculative ideas you find *nanosurgeons* – nanorobots that can be programmed to perform delicate operations, including cosmetic surgery, with much greater precision and without leaving the scars that conventional surgery does. Non-medical nanotechnology applications are found in cosmetics where a number of products already exist on the market.

In the computer industry, the possibilities to decrease the size of components will soon reach the limits of existing technology. Here, nanotechnology will be needed to create a new generation of computer components and it is believed that nanotechnology will facilitate the production of ever-smaller computers that store vastly greater amounts of information and process data much more quickly than those available today.

Nanotechnology also has the potential for positive effects on the environment. It seems reasonable to predict that manufacturing materials with nanotechnology will create less pollution than conventional manufacturing processes. Also in this field there are speculations in long term achievements such as airborne nanorobots that can rebuild a thin ozone layer, remove contaminants from water sources, and clean up oil spills.

Four years after the launch of the NNI initiative in the United States there was great optimism in the programme. Mihail C Roco, Chair, of the US National Science and Technology Council (NSTC)'s Subcommittee on Nanoscale Science, Engineering and Technology (NSET) said in 2004 (Roco, 2004, p. 6):

> Nanotechnology has the potential to change our comprehension of nature and life, develop unprecedented manufacturing tools and medical procedures, and even influence societal and international relations.

And further on (ibid., p. 7):

> Converging technologies from the nanoscale will establish a mainstream pattern for applying and integrating nanotechnology with biology, electronics, medicine, learning and other fields.

The enthusiasm in the US about the prospects of nanotechnology is in contrast to the somewhat more restricted views of leading UK scientists. For example, concerning the treatment of cancer Roco says (ibid., p. 7):

> Suffering from chronic illnesses is being sharply reduced. It is conceivable that by 2015, our ability to detect and treat tumors in their first

> year of occurrence might totally eliminate suffering and death from cancer.

The Royal Society & The Royal Academy of Engineering (2004, p. 23), however makes a different judgement:

> We have, however, seen no evidence to support the notion that nanotechnologies will eliminate cancer in the short- to medium term, and feel that such a claim demonstrates an over-simplistic view of the detection and treatment of cancer.

What about risks?

Like other new technologies, nanotechnology is the subject of great hopes and fears. On the one hand it could revolutionise healthcare, consumer goods and construction industries. On the other, prophets of doom have described nightmare scenarios of self-replicating nano-scale robots turning the Earth into a 'gray goo'. It is inevitable that some people, often proponents of a new technology or simply enthusiasts, exaggerate potential benefits whereas others exaggerate the risks. Overstated claims about either benefits or risks both do a disservice to the emerging field. In this case, experts 'selling' nanotechnology with exaggerated potentials have a higher burden of responsibility than, for example, environmental organisations that exaggerate risks. It is easy to understand that arguments using science-fiction-like benefits, e.g. in health care and medicine, create concerns of equal magnitude about ethical aspects.

Going back to our discussion earlier about genetic testing, microsystems will make it even faster and more accurate, thus they have the potential to intensify many of the concerns that exist. There are also concerns from scientists that nanotechnology will bring new risks to human health. What will happen when nanoparticles are inhaled, ingested or injected, or simply when the skin is exposed to them?

In medical applications, there may be risky side-effects for patients. For example, it may be the case that nanodevices designed for drug delivery have negative effects because of their capacity to pass through biological systems (for instance, crossing the blood-brain barrier and penetrating into the brain). Concerns have also been raised about the potential health risks for individuals other than patients due to the spread of free nanoparticles in the environment. There are also ethical dilemmas. Nanomedicine can reinforce personal freedom by improved precision in diagnosis combined with an increasing number of treatment options. But this may also create anxiety by increasing individual responsibility for the choices made. And should third parties such as insurance companies and employers have access to information obtained by refined nanomedical diagnostic methods? If so, under what conditions?

The report by The Royal Society & The Royal Academy of Engineering (2004) says that currently, the main risk of human exposure to manufactured nanoparticles and nanotubes is inhalation at workplaces. Carbon and other nanotubes may have toxic properties similar to those of asbestos fibres, although preliminary studies suggest that they may not readily escape into the air as individual fibres. Until further toxicological studies have been undertaken, human exposure to airborne nanotubes in laboratories and workplaces should be restricted, says the UK report. The report also recommends that nanoparticulates should be treated as new chemical substances in UK and European chemical regulation, thus requiring additional testing.

The UK Government's response to the joint Society and Academy report was published on 25 February 2005 (UK Government, February 2005). In its response, the government recognized the need for regulating the release of manufactured nanoparticles to the environment until more knowledge is available. It is essential to develop an understanding of the risks to people at work, to members of the public and to the environment, the government says. Professor Ann Dowling, chair of the working group that produced the academies' report, however, was disappointed that there was no new money promised for the research that will be needed to underpin appropriate regulations (Royal Society News Stories, 25 February 2005).

The Royal Society and the Royal Academy of Engineering expect that developments in nanoscience and nanotechnologies will raise significant social and ethical concerns. Even if a future convergence of nanotechnologies with biotechnology, information and cognitive sciences that could be used for radical human enhancement is more in the realm of science fiction, they see a need to monitor future developments of nanotechnologies to determine whether they will lead to social and ethical effects not yet anticipated.

Many non-governmental organisations have already taken the firm standpoint that the risks associated with nanotechnologies are potentially severe. The influential Canadian based ETC Group, with Pat Mooney as a very energetic leader with good contacts in politics and academia, says that nanotechnology will make possible the fusing of the biological world and the mechanical and that there is a critical need to evaluate the social implications. In the meantime, the ETC Group believes that 'a moratorium should be placed on research involving molecular self-assembly and self-replication'.[3]

Concerns about human health exist not just among researchers, NGOs and concerned citizens but also among insurance companies. According to *Cordis Focus* (No. 247, 2004, p. 6), Swiss Re, one of the leading global reinsurance firms, an insurance company for insurance companies, with its core business segments in risk transfer, risk finance and asset management, has expressed concerns that risks related to nanotechnology cannot be evaluated and calculated. A problem for insurance companies could be that illness claims linked to nanoparticles may come decades after introduction and a situation similar to what happened with asbestos could emerge. In this case,

claims for exposure in the 1970s have cost insurance companies billions of euro.

Social aspects, public involvement and politics

Having now seen the official views on nanotechnology in the United States, the European Union and the United Kingdom, we are left with great uncertainty about benefits, risks and the timescales within which they will materialise. In theory the possibilities are almost without limits even if the actual commercial scale applications are still quite few. The optimism with regard to future applications is greater in the US than in Britain for example. Risk assessments cover a broad range of issues from very large social and ethical impacts in the long term in response to the most advanced judgements about technical possibilities to more concrete risks for employees in the short term. There is less emphasis on potential risks in the US than in Europe.

It is easy to draw parallels between the early development of nanotechnology and the early phase of genetically modified organisms, such as technological enthusiasm, narrow technical framing of impacts and little risk awareness. However, it is worth noting that nanotechnology cannot be seen as just another new area of science and technology, since both its positive and negative consequences will come when used in combination with existing technologies. Combined with information technology it has the potential to improve security systems which may further increase concerns and about privacy. Combined with genomics it may contribute to better healthcare but also increase the existing challenges to personal integrity in genetic testing, and so on. The fact that a wide range of very diverse activities in many fields are together called 'nanotechnology' and yet only have the nano-scale as their common characteristic prompted the Royal Society and the Royal Academy of Engineering to talk about 'nanotechnologies' as plural in their report.

At least in the UK, lessons have been learnt from earlier failures in risk communication in one sense. The Royal Society and the Royal Academy of Engineering now discuss the social aspects of the new technology and the need for more public involvement in the decision processes.[4] They believe that a constructive and proactive debate about the future of nanotechnologies should be undertaken now – at a stage when it can inform key decisions about their development and before deeply entrenched or polarised positions appear. In the conclusions they say (The Royal Society and the Royal Academy of Engineering, 2004, p. 80):

> Nanotechnologies are likely to pose a wide range of issues, so it would be inappropriate to identify a single method of public dialogue. Instead, the precise means of dialogue would need to be designed around specific objectives and should be agreed by an independent steering board comprising a range of relevant stakeholders and experts in public engagement.

> Finally, dialogue must be properly evaluated, so that good practice in public dialogue can be built on.

This is encouraging since it is a recognition that technical expertise is not enough in determining future applications of nanotechnologies and the relevance of their various consequences. The British organisations see a need for mechanisms to incorporate public values early in the development. However, such policy statements are of little value if they don't reflect a political will to actually make them work. There must also be a knowledge of *how to make it work*, and this is where we are doomed to fail without a much better understanding of the role of different means for public dialogue than we have today. The design of 'precise means of dialogue' requires that we have a structured knowledge base to work with but the UK report reflects an awareness that such understanding does not exist. In summary there is a feeling of uneasiness that the further development of nanotechnologies will meet severe public opposition and a similar uneasiness that we don't know how to meet the challenge.

The UK government is committed to a public dialogue on nanotechnologies and Lord Sainsbury of Turville, Minister for Science and Innovation, said he now 'looks to civil society groups, industry, the research community, and the general public in the United Kingdom to continue to engage with one another and government in a spirit of constructive dialogue' (UK Government, February 2005, Foreword). The academies welcomed the Government's commitment to a public dialogue on nanotechnologies, but stressed the need for the Government to consult with relevant stakeholders, including industry and non-governmental organisations, in developing a strategic public dialogue programme.

The report of the two societies did not only ask for public dialogue but also raised the concern that it may be difficult to design. This problem is not reflected in the government response. Instead there are general statements like (ibid., Foreword):

> The Government's agenda sets out our ambition to work actively in partnership with industry, civil society groups, the research community and the public so that we can move forward together, bringing forward our particular perspectives to ensure that we reap the benefits and avoid the pitfalls.

These are very general words that say little about the real form or content of the envisaged dialogue, and it is difficult to see what commitment has actually been made by the UK Government.

In the European Union political arena, nanotechnology is still more or less a non-issue, without much in the way of regulatory activities. However, there are clearly political issues at stake such as the protection of

human dignity, integrity and autonomy, protection of privacy and of the confidentiality of personal data, as well as protection of the right not to know and of property rights. The European Group on Ethics in Science and New Technologies to the European Commission (2007) has expressed this as follows:

> Nanomedicine is part of a process that can already be observed in other areas of research and technological development, demanding new models of governance, or structures to fashion the relations between society, the economy and research institutions. Depending on what policies on funding and, for example, patenting are chosen in this area, research and development in nanomedicine will take different paths. How can societies remain at least partly autonomous in their decisions, when the development of nanomedicine is closely connected to the economic prosperity of a given society and plays a part in international competition on the global market?

Like the Royal Society and the Royal Academy of Engineering in the UK, the European Group calls for initiatives to be taken to organise academic and public debates on problems and possibilities of present and near-future nanomedicine. The critical question is, however, how such debates should be organised to be effective in creating political and public awareness. One root cause for the uneasiness with the situation is that there is little understanding about the roles of different means of dialogue within existing democratic structures. We shall deal with this problem in forthcoming chapters.

In June 2007, DuPont Chemical Company and Environmental Defense (ED), a US environmental group advocating market-oriented solutions to environmental problems, jointly published a voluntary risk assessment framework for nanotechnology. The framework shall 'facilitate public acceptance, and support the development of a practical model for reasonable government policy on nanotechnology safety' (Environmental Defense and DuPont, 2007, p. 7). The primary audiences for the framework are companies and research institutions involved in nanotechnology but it 'can also be useful to other stakeholders, such as government officials, academia, financial institutions, and nongovernmental public-interest organisations (NGOs)' (ibid., p. 12).

In preparing the framework, a wide range of stakeholders had been engaged to provide input. However, in April 2007 a number of NGOs, including the ETC Group, Friends of the Earth and Greenpeace, rejected the proposed framework in an open letter 'as fundamentally flawed' (Civil Society–Labor Coalition, 2007).[5] The rejection was motivated with concerns that their participation would be used to legitimise the proposed framework as 'a starting point or ending point for discussing nanotechnology policy,

oversight and risk analysis'. The NGOs said that the duPont–ED proposal at best was a public relations campaign, but that it also could lead to the abdication of policy decisions to industry by those entrusted to take that responsibility.

The NGO refusal to participate in the industry organised process is understandable since such a process would meet serious problems with respect to legitimacy and authenticity. In fact, the DuPont–ED proposal as well as the NGO rejection illustrates very well the problems with these kinds of initiatives; stakeholders may be included to legitimise the process, and may therefore feel like hostages in the process; regulators participating may be led to premature standpoints; the political process can lose its legitimacy; if expert-driven the process would probably be narrowly framed (for example, a search for the words 'ethics' and 'ethical' in the DuPont–ED framework was without results), etc. By this I don't mean that industry should not search for stakeholder advice or investigate pubic opinion. However, stakeholders, NGOs and politicians should be careful no to be involved in activities that legitimise hidden agendas, cause them to take premature viewpoints or, even worse, make biased and/or non-autonomous decisions. Instead, we as a society should look for participatory processes where all stakeholders can take part on an equal basis and which don't pre-empt decisions by our elected representatives.

What is a human being?

The concept of 'convergent technologies' refers to the combination of four major scientific and technological fields: (1) nanotechnology, (2) biotechnology, including genetic engineering, (3) information technology, and (4) cognitive science, including cognitive neuroscience. Together they form the acronym NBIC (nano-bio-info-cogno). Each one of these areas is developing rapidly, but when they combine progress, but also potential threats, can become even more dramatic.

Already today, genetic testing raises concerns about privacy and personal integrity that should be subjected to political decision-making, such as the use of genetic testing for job applications or insurance purposes. There are also concerns about genetic discrimination. For example, the boundaries for variation of human characteristics that today are thought of as normal may change and society may pathologise them. It is possible to check adults and fetuses for many known genetic disorders and thus to determine whether a particular person is predisposed to hereditary illness. When these possibilities become more available, there will also be great demand for them. Results of genetic testing may be stored in data banks where they can be combined with other data, for example for the purpose of security or for commercial interest. These and other concerns will only increase with the combined catalysis that can take place within convergent technologies. As the European Group

on Ethics in Science and New Technologies to the European Commission (January 2007) puts it:

> The overarching anthropological questions have to do with our view of ourselves and, in this context, the extent to which this view will be affected by the applications of nanotechnologies in medicine. Nano-scale implants and devices may have an impact on autonomy, integrity, self identity and freedom. In particular, what are the implications of the man/machine distinction, and in the perception of it, on a social level? How do our concepts of human beings change? What is the role of the media, literature and films (e.g. science fiction)?

The ethical group concludes that such questions can be answered by social, cultural and ethical research in dialogue with biomedicine. The danger is, however, that the discussion stays at this meta-expert level without reaching out to the general public and the politicians, who after all are responsible for setting regulations in place based of societal values.

The development will not stop with converging the NBIC sciences. At the horizon we have synthetic biology which will allow researchers to design and build standardised, integrated biological systems to accomplish specified tasks – 'to build life from scratch'. Of course there are many promising potential applications of synthetic biology such as cheap, environmentally responsible production of medicine from microbes, conversion of plentiful, renewable resources into energy and bioremediation as a natural solution to environmental contamination.[6] The ETC Group, a well respected international civil society organisation based in Canada, however, sees great problems if synthetic biology develops purely by the researchers themselves. This can according to the organisation lead to catastrophic societal risks either by deliberate misuse or as a result of unintended consequences.

Now, the rapid development in nanotechnology, converging technologies and synthetic biology goes on practically without any societal or political debate which could result in value-laden positions that people could vote for or against and that could result in principles for regulatory oversight.

7
Global Warming

The fourth report of the United Nations' Intergovernmental Panel on Climate Change (IPCC, 2007), published in 2007, tells us that:

- Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
- Most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in man-made greenhouse gas concentrations.
- It is *very likely* that hot extremes, heat waves and heavy precipitation events will continue to become more frequent.
- Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* be larger than those observed during the 20th century.
- Sea ice is projected to shrink in both the Arctic and the Antarctic under all emission scenarios. In some projections, arctic late-summer sea ice disappears almost entirely by the latter part of the 21st century.

Today, by far the most dominant environmental issue is global warming. Often 'environmental protection' now means the same as reducing carbon dioxide (CO_2) emissions. We are being strongly encouraged by government subsidies and social pressure to buy cars which emit less CO_2, proposals have been made to label food for its CO_2 cost and we are all as private people given advice on how to reduce our CO_2 budget, etc. Governments, international bodies, scientists, environmental groups and large parts of industry all agree – it looks like a perfect case of good risk communication where activities such as the Al Gore movie have played an important role.

However, as we do for many other complex issues in this book, we should take a critical attitude and even in this case challenge what seems to be the

established truth. The questions then arise what is the real scientific status, what are the uncertainties and is there any disagreement among researchers. Whether there is scientific consensus or not about global warming and its causes is the subject of heated debate. In December 2004, Dr Naomi Oreskes at the University of California published an article in Science (Oreskes, 2004) which claimed that there is in fact complete agreement among climate experts, not only that global warming is a genuine phenomenon, but also that man-made releases are the cause. The author had analysed almost 1 000 papers on the subject published in refereed scientific journals between 1993 and 2003, and concluded that 75 per cent of them either explicitly or implicitly backed the consensus view, while none disagreed with the consensus position.

However, surfing the Internet, you find numerous articles by scientists in climatology, atmospheric science, geography, etc. saying that warming during the 20th century was due to changing solar activities, that climate changes being observed today are small compared to earlier periods, that historically warmer periods have *preceded* increasing atmospheric CO_2 levels, etc. One example is Dr Madhav L. Khandekar, retired Environment Canada scientist who was an expert IPCC reviewer in 2007, who said in August 2007 (Khandekar, 2007) that an increasing number of scientists are now questioning the hypothesis of greenhouse gas induced warming of the earth's surface and suggesting a stronger impact of solar variability and large-scale atmospheric circulation patterns on the observed temperature increase than previously believed.

The American Association of State Climatologists (AASC, 2002), the professional organisation of State Climatologists of the United States, said in a policy statement in 2002:

> Climate prediction is complex with many uncertainties – The AASC recognizes climate prediction is an extremely difficult undertaking. For time scales of a decade or more, understanding the empirical accuracy of such predictions – called "verification" – is simply impossible, since we have to wait a decade or longer to assess the accuracy of the forecasts.

And further on:

> Policy responses to climate variability and change should be flexible and sensible – The difficulty of prediction and the impossibility of verification of predictions decades into the future are important factors that allow for competing views of the long-term climate future.

David Henderson, former head of the Organisation for Economic Co-operation and Development's (OECD) economics and statistics, says that governments, and in particular the governments of the OECD member

countries, are mishandling climate change issues and that both the basis and the content of official policies are open to serious question (Henderson, 2007). Too much reliance is placed on the IPCC process of review and inquiry and IPCC is biased towards alarm in the mistaken belief that 'the science is settled'. Governments should take prompt steps to ensure that they and their citizens are more fully and more objectively informed and advised says Hederson and continues: 'This implies both improving the IPCC process and going beyond it.' 'Even if the IPCC process were indisputably consistent and rigorous, objective and professionally watertight,' Henderson says, 'it is imprudent for governments to place virtually exclusive reliance, in matters of extraordinary complexity where huge uncertainties prevail, on a single source of advice and a single process of inquiry.'

Considering the on-going debate it would probably be more correct for the world-wide community to take a precautionary approach to global warming rather than to act as if knowledge is complete so that that we almost accurately can derive the amount of temperature increases from the amount of CO_2 releases. One could object that a precautionary standpoint would make efforts to reduce CO_2 more difficult to communicate, make them less important in the public eye and decrease the political determination. On the other hand, one could argue that such an approach would be more robust in the long term. Considering the shortsightedness of newsworthiness, sooner or later, the skeptical scientists will get more attention in media, and perhaps even dominate the public arena, even if the scientific basis remains the same or if the case for a greenhouse effect increases in scientific strength. A position based on scientific consensus will then be more difficult to defend than a precautionary platform and the international efforts to reduce CO_2 emissions would be more vulnerable. A precautionary approach would be quite robust being able to take much of scientific debate since it says that lack of full scientific certainty must not be a reason for postponing cost-effective measures to prevent possible serious environmental damage. The old saying 'honesty is the best policy', which in this case would mean recognizing scientific uncertainty, seems relevant.

Furthermore, a clear precautionary approach would relieve politicians and others from bounded and prestigious positions and serve as a platform for open and transparent inquires in the public domain. Policies could be flexible while not being sensitive to any abrupt changes in public perceptions that might arise. The current situation, which shows disturbing signs of an international knowledge monopoly of strong groups with similar interests, could be challenged.

A solution to the global warming problem?

According to the energy projections made in 2006 by the Paris-based International Energy Agency (2006), the global primary energy demand in its

reference scenario is projected to increase by just over one-half between now and 2030 – an average annual rate of 1.6 per cent. Over 70 per cent of the increase in demand over the projection period comes from developing countries, with China alone accounting for 30 per cent. In the same scenario global energy-related CO_2 emissions are set to increase by 55 per cent between 2004 and 2030, or 1.7 per cent per year. Emissions are thus projected to grow slightly faster than primary energy demand – reversing the trend of the last two-and-a-half decades – because the average carbon content of primary energy consumption is expected to increase.

The Agency also provides an alternative policy scenario in which it is assumed that the policies and measures that governments are currently considering for enhancing energy security and mitigating CO_2 emissions are implemented. In this scenario, global energy demand will grow by 37 per cent or by 1.2 per cent annually. Energy-related CO_2 emissions have been cut by 16 per cent by 2030 relative to the reference scenario but will still be 37 per cent above present levels. Emissions in the OECD countries and transition economies are expected to stabilise and then decline before 2030 while emissions in developing regions carry on growing, but the rate of increase slows appreciably over the period compared with the reference scenario.

With this perspective it is hard to see how we can avoid substantially increasing CO_2 emissions thereby making global warming unavoidable if there is actually a greenhouse effect. Now, however, CO_2 from fossil fuel combustion can be captured and stored away from the atmosphere in natural reservoirs, such as depleted oil or gas fields, deep saline reservoirs or the deep ocean. These natural reservoirs could store captured CO_2 whilst the injection of CO_2 may also enhance production of oil, helping to offset the cost of capture.

Capture and storage of CO_2, if implemented on a large scale, would enable significant reductions in emissions with limited impact on the global energy infrastructure and economy. The technology of CO_2 capture and storage is already available but the main barriers to wider use are the cost of capture and the proof of reliability and environmental impacts of storage. This indicates areas of immediate priority for research, development, and demonstration. Indeed, major research programmes are underway or planned in a number of countries.

Having seen the potentials of CO_2 capture and storage, we should also have a look at the obstacles. It is not difficult to find arguments that environmental groups and other skeptics will use against the technology. The first argument is that this is a technology which the fossil fuel industry wants to launch in order to continue with business as usual. It will just increase the problem since even more fossil fuels will be used. Capture and storage is best suited to large point sources of CO_2, such as power stations and cannot help with the emissions from public, industrial and private transportation. When used in the oil fields it is also a technique for enhancing the production

of oil, which is another motivation for the industry to lobby for the technique. There are uncertainties surrounding the long term storage capabilities, which may result in an increased burden on future generations. Furthermore, we have little knowledge about other possible detrimental effects. Many of these arguments are similar to the arguments against the siting of nuclear waste repositories, and most probably we will see public uncertainty, demonstrations and protests from the greens and political controversy.

Is CO_2 capture and storage a technique that can solve the global warming problem on a large scale or is it just a lobbying project from the oil and coal industry? Is the opposition obstructing a technical solution with irrational and emotional arguments or is it based on sound skepticism and valid moral arguments? I am not taking a standpoint in this but we can observe that the global society does not seem to have a mechanism for sorting the arguments and making them transparent to the world public. What is the best scientific evaluation? What are the commercial and environmental arguments? And who can we trust among the industrial and environmental organisations and lobby groups?

If there was a process available for making these issues transparent and for increasing awareness of the arguments, who would host it? Hosting a process for transparency, which must include public participation, is quite simply a function that the international community lacks. Further on in the book we shall see in more depth what such a process will require. According to a UK study (Shackley *et al*., 2004), the public is poorly informed and rather skeptical about CO_2 capture and storage, but public support will be essential for large scale implementation. Communicating the issue is a challenge because of its relatively technical and remote nature and because there are hardly any comparable experiences in the public domain to act as a reference. The UK study, however, highlighted the importance of a decision-making process which is transparent and in which a range of stakeholders and the public could have faith. As usual, the industrial and research communities are in danger of presenting CO_2 capture and storage as a 'technical fix' but, as the UK study emphasises, ownership by the public is crucial.

8
Examples from Other Areas

In this chapter we deal with three areas that will further support the four themes formulated in Chapter 3. For two of the example areas, contaminated sites and mobile phones, the text is based on my experiences from consultant projects, whereas the discussion about acrylamide in food simply reflects my observations as a normal citizen when the events unfolded.

Food safety

Food safety is a difficult and sensitive area of risk communication. This is so since we all need good food, the food we eat is factually and emotionally integral to our health and sometimes the food we like the most is not the healthiest. We listen carefully to expert advice but get confused when experts disagree or when they change opinions.

Risks associated with certain kinds of food often get enormous public attention and failures in risk communication have important consequences. One example is the UK Food Standards Agency (FSA) which was created following numerous public health crises and epidemics in the UK, including salmonella, listeria, botulism, and especially BSE ('mad cow disease'). In creating the new agency in 2000 the Government believed it would 'put an end to the climate of confusion and suspicion which has resulted from the way food safety and standards issues have been handled in the past' (Minister of Agriculture, January 1998). The intention was that all future Government activity relating to food would be subject to public scrutiny, and that the public's voice will be fully heard in the decision-taking process.

On the EU level, the European Food Safety Authority (EFSA), now situated in Parma, Italy, was legally established by the European Parliament and the European Council in January, 2002. Also in this case the new body was established following a series of food scares, including BSE, in the 1990s which undermined consumer confidence in the safety of the food chain. The EFSA, which has risk assessment and risk communication as its two major tasks, shall provide 'objective scientific advice on all matters with a direct or indirect

impact on food and feed safety'. The EFSA 'is committed to ensuring that all interested parties and the public at large receive timely, reliable, objective and meaningful information based on the risk assessments and scientific expertise of its Scientific Committee and Expert Panels'.[1]

Relating to the GM food issue we discussed in Chapter 6, there is a problem with regard to the decision-making processes of the EFSA, a problem which also affects the FSA and other similar national bodies. Citizen concerns about genetic modification are more about aspects other than food safety. There is thus a risk that the EFSA and its national counterparts will continue to contribute to the narrow framing and instrumental rationality which have been counterproductive in the past.

Having touched upon institutional aspects of food safety, we now take a look at the case of acrylamide as an interesting example of the lost innocence of scientists. This substance is found in certain baked and fried starchy foods such as potato chips, breads and cookies. On 24 April 2002, the Swedish National Food Administration Agency called to a press conference where the news were released that researchers at the Stockholm university funded by the agency had discovered that there were measurable quantities of acrylamide in these foods. The call for the press conference had some startling wordings, the event was live broadcasted in Swedish television and the news attracted much attention also internationally. The discovery was presented as a dramatic event that was supposed to have an extensive impact on our eating habits.

Shortly afterwards there were intense discussions as to what the correct and relevant risk assessment should be. Clearly, in quantitative terms the risk is negligible compared to most other risks to be considered, and some experts made efforts to put the risk of acrylamide in foods into a greater risk assessment context.

A few days after the press conference, there was an editorial article in Dagens Nyheter, the biggest daily paper in Sweden, written by Stig Hadenius, professor in journalism. He argued that the main motivation for the release of this discovery in such a dramatic fashion, was that the agency had budget problems. By showing themselves to be doing research that was crucial to public health they would influence the Swedish Government to increase the budget, it was argued.[2] Whether or not this is true is not the point here. It is the fact that this argument could be put forward officially with some relevance by a university professor which is significant.

Public opinion was affected by the news, of course and sales of potato chips fell dramatically during the weeks immediately following the press conference, but returned to ordinary levels some months later and no changes were in fact made to official nutritional advice from the Swedish authorities or the World Health Organisation. However, the new results have initiated much research globally and the acrylamide amounts in food have been reduced.

The acrylamide event as such is just one of many similar risk-related warnings that have gradually reduced the authority and credibility of expert risk assessment and even academic research, which is more and more seen as part of the market competition for research funds.

Cleaning-up and restoration of contaminated sites

The existence of chemically contaminated sites is by and large a legacy of earlier phases of industrialization when there was little understanding of the environmental consequences of releasing heavy metals, oil, dioxins, etc. into soil and water. Now, we have hundreds of thousands of contaminated areas to take care of and even in a small country like Sweden over 80 000 sites have been identified. There is a need for methods of risk assessment and risk management which make it possible to set decision-making standards for when cleaning up is needed, and how measures should be paid for. There should be standards for the levels of contamination that require action, means to prioritise between different restoration projects, appropriate decision processes at local and national levels, and finally methods available to carry out the actual cleaning-up and restoration.

As for all risk related issues, decision-making bodies should be well aware of alternative courses of action and why one particular alternative is better than another. In a study in which I participated (Andersson, Grundfelt and Wene, 2006), fundamental problems in Swedish decision-making processes were found in this respect at both national and local levels.

At the national level, the ambitions of the cleaning-up and restoration programme had been set in agreement between the Swedish Social-Democratic Party, when in minority government, and the Green Party of Sweden whose support the government needed in order to survive. This programme is, perhaps surprisingly for many, of about the same magnitude as the Swedish nuclear waste management programme with an annual budget of about 55 million euros and is predicted to continue for several decades. There are different types of contaminated areas; a typical example is soil contamination from an old factory situated close to a lake or a river into which contaminants slowly leak, another example is that of contaminated sediments in harbour basins. In Sweden the sites are given three different risk levels depending on the hazardous nature of the substances, the amount of contaminant, its extension and potential further dissemination (Swedish Environmental Protection Agency, 2003). Included in the risk assessment is also the potential harm for human beings (which for example depends on whether the area is used for settlement, industry or recreational activities), and the environmental protection value of the site in question (which depends for example on the uniqueness of the ecosystem or presence of endangered species).

In Sweden, the strongest actors possessing knowledge and expertise in the area are the county administrative boards and consultant companies. The

county administrative boards have the task of identifying contaminated sites that need to be restored and to prioritise between them at the regional level. They also play an active role in preparing the material needed for funding decisions and by negotiating between different interests. Consultant companies do the actual site investigations at successive stages of a restoration project, they deliver alternative courses of action, and sometimes they suggest which one of them should be realised. Finally, the actual cleaning up and restoration work is typically done by a larger consultant company. Since a restoration project goes through different phases, and since each phase is subject to competitive bidding by a number of companies, there is a functioning market without the dominance of a particular company or group of companies.

All this seems good, but there are fundamental weaknesses in the system. Paradoxically, both the funding agency and the local stakeholders, who after all are the ones affected both by the contamination us such and the restoration activities, are the weakest parties.

On the national level, the Swedish Environmental Protection Agency takes the actual funding decisions thus prioritising between a large number of potential restoration projects. This is in the hands of an agency group comprised of less than a handful of people who also have the task of reporting to the government and applying for continued funding. At the local level, involvement is low during the early study phases when alternatives are investigated and solutions are proposed and, furthermore, municipal officials are seldom involved in handling this kind of issue. However, it is the municipality that in the end must decide on the restoration project and be responsible for its conduct.

One particular aspect of this environmental sector is that there are hardly any stakeholders available who can challenge either the level of funding for the national programme or the individual restoration projects. The county administration and the consultants involved have a shared interest in proceeding, the Swedish Environmental Protection Agency has too little manpower to challenge their recommendations, environmental organisations are naturally pro, the municipalities involved don't have the competence to make their own qualified assessments, and when they do have additional arguments it is often a matter of how the remediation activities will impact municipality image.

In summary, the Swedish programme for cleaning-up and restoration can be described as follows:

- The entire cleaning-up and restoration programme is built on a political decision made during negotiations that were conducted between political parties now no longer in government and which could now be jeopardised by the new political majority currently in power.

- These political decisions are made without any overall risk management deliberation, since there is no general risk target established in the Swedish system.
- The programme is to a large extent controlled by consultant companies and county administrative boards. Together they have a shared interest in a high level of government funding and there is no actor in place to challenge their knowledge monopoly.
- Even if value-laden and social aspects are included in the risk management framework by the Swedish Environmental Protection Agency, they are downplayed in the expert driven process (Andersson-Sköld, Norrman and Kockum, 2006, pp. 136–43).
- The primary interest group of cleaning-up and restoration, the municipalities and their citizens, lack the means to challenge statements made by consultants and county level experts. Therefore, there is a risk that they will make decisions with a low level of awareness about the consequences.

The Swedish programme for cleaning-up and restoration of contaminated sites is thus yet another example which validates our four themes from Chapter 3: the programme is narrowly framed by expert groups with shared interests, decisions on projects are made with instrumental rationality at the cost of value rationality, the area is highly commercialised (which in this case has the positive consequence of minimizing cost) and there are organisational factors that create a cartel-like situation. Even if these conclusions are based on the Swedish case with its special organisational characteristics, it seems reasonable to assume that several of them, such as narrow framing and instrumental rationality will be valid for many other countries due to a lack of stakeholder challenges and poor local preparedness.

The possible risks with mobile telephones

During the last 15–20 years the use of mobile telephones has increased dramatically all over the world. In the beginning they were prestigious business tools being too expensive for most private persons. Now there are more mobiles than people in some European countries and they are also frequently used by children. In 2006, the worldwide sales of mobile phones rose by some 20 per cent and the total sale approached a billion units. The most dynamic region was Asia-Pacific, with a more than 50 per cent increase in sales and in some developing countries the mobile phone has led to the introduction of telephony, thereby skipping the use of fixed line phones altogether. It is not only the increasing world-wide market penetration that makes the mobile phone industry so successful – new generations of network systems have increased the transmitting capacity dramatically which means that the

phones have to be replaced to take advantage of new services such as Internet surfing and television viewing.

The value of mobile communications for work and pleasure is beyond dispute. So is their importance for business and even for national economies, especially in countries like Finland and Sweden where the companies Nokia and Ericsson are major drivers of the economy. However, there may also be risks for human health involved since mobile communication technologies transmit and receive radio frequency electromagnetic fields (RF–EMF). Concerns have been raised about the possible effects of using mobile phones or of being close to base stations and masts that provide the networks. There is controversy about the regulations that limit the levels of radio frequency fields that mobile devices and their supporting infrastructure should transmit.

Many countries base their regulations on guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)[3] which is a body of independent scientific experts consisting of a main commission of 14 members, five scientific standing committees covering epidemiology, biology, dosimetry and optical radiation as well as a number of consulting experts. The ICNIRP is 'formally recognised' by the World Health Organisation of the United Nations which has concluded that 'EMF exposures below the limits recommended in the guidelines by ICNIRP do not appear to have any known consequence on health' (Repacholi, 2003). The ICNIRP guidelines are constantly reviewed and according to the committee, research has not established any health risks from exposure to RF–EMF fields below recommended limits. Industry representatives often refer to the great number of scientific articles on which recommendations are based (see e.g. Milligan and Rowley, 2006).

There are two mainstreams of research that deal with the possible health effects of RF–EMF. One is epidemiological studies that aim to find out if there are any measurable links between exposure to RF–EMF and health problems, most notably cancer. The second research method is experiments designed to find possible mechanisms of RF–EMF in the human body. This is done either *in vitro* (on tissues in a controlled environment outside the body) or *in vivo* (in living organisms).

The large majority of epidemiological studies show no connection between cancer and RF–EMF exposure. However there are many experimental results that show effects on human tissue and animal organs, such as potentially pathological effects on the blood-brain barrier (Salford *et al*., 2003). The REFLEX study (2004), which was funded by the European Union and involved twelve European research institutes, had the aim of investigating the molecular level effects on single cells *in vitro* of electromagnetic fields below the energy density reflected by the present safety levels set by ICNIRP and national bodies. Professor Franz Adlkofer at the Verum Foundation in Munich and person in charge of the REFLEX project, said in June 2006 that although the REFLEX results don't prove a causal link between RF–EMF exposure and

any adverse health effects they may speak more in favour of than against such an assumption (Adlkofer, 2006). He also said that 'it should be made clear to politicians, to health officials in governmental administrations and also to the leaders of industrial companies that a potential risk to the health of people through electromagnetic field exposure can in no way with any certainty be excluded at present'. Professor Adlkofer argued that that the acceptance of the precautionary principle is justified in this area, especially for children.

At the core of the scientific controversy is whether possible health effects are limited to thermal effects (temperature raise in body tissue) or if other mechanisms are equally or perhaps even more important. Some scientists claim that there is evidence of hazardous effects of exposures which are too low to cause heating. This evidence has been reviewed by ICNIRP, which stated that '... it is impossible to use this body of information as a basis for setting limits on human exposure to these fields' (International Commission on Non-Ionizing Radiation Protection, 1998). Accordingly, the ICNIRP guidelines take only thermal effects into account which means that they would not be fully relevant if non-thermal biological effects give negative health consequences.

This is not the place for a comprehensive discussion about the risk assessment of mobile phone systems. However, with regard to the roles of expertise and risk communication we can highlight three aspects of risk assessment we have already brought up in this book: (1) problems in applying the precautionary principle, (2) the limited value of international expert groups for risk management, and (3) the expert attitude to ordinary people. As our starting point we can consider five possible degrees of evidence relating to the two major types of research results involved: epidemiological and experimental studies:

1. Disputed indications from some experiments on mechanisms with potential harmful effects on human health.
2. Scientific consensus on effects on, e.g. the blood-brain barrier in rats (which is the animal often used in experiments), but no consensus on evidence from epidemiological studies.
3. Results from some epidemiological studies showing a connection between exposure and cancer, but disputes about methods used in these studies. Otherwise as degree 2.
4. Convincing epidemiological evidence but no confirmed mechanism that can explain the epidemiological results.
5. Both epidemiological evidence and confirmed mechanisms that can explain the results.

The precautionary principle

Before deciding on whether the precautionary principle is applicable or not one should know what the status of knowledge is in the field, but already

here we meet controversy among scientists involved, with the exception that degree 5 can be excluded.[4] Different scientists can argue for degrees 1–4 and this is why there needs to be a process for evaluation of the scientific status in the field.

Having reached a conclusion about the scientific status, the decision whether or not to use the precautionary principle still remains. There needs to be *some knowledge* to trigger the principle, with *too much knowledge* on the other hand the principle is not needed. However, as already discussed in Chapter 5, deciding whether any of the degrees of knowledge indicated above is enough to set the principle in motion is not a purely scientific task but a matter of value judgements. The authorities most often making this kind of decisions must therefore make transparent the scientific and value based grounds for either applying the principle or not. In a democratic society citizens should have insight into who makes the decisions, whether the decision makers are authentic, what the scientific evidence is and how the judgments are made. Today, mechanisms for such insight are lacking.

The limited value of international expert groups

In a field like this where there is a great deal of uncertainty and where different scientific disciplines are involved there is a need to gather the entire body of knowledge and review it. Some sort of conclusion must be reached about the level of knowledge and where the most important knowledge gaps requiring more research are located. This is a role that the ICNIRP plays on the intentional stage. Based on the valuations, the ICNIRP publishes guidelines and statements. The ICNIRP also publishes a number of scientific publications in collaboration with the World Wealth Organisation and details of the ICNIRP publications are provided on the Commission web site where they can be downloaded free of charge.

The ICNIRP guidelines are important when decisions affecting RF–EMF field regulations are made in individual countries and in many cases the ICNIRP recommendations are simply adopted in national regulations even if certain countries use a more precautionary approach. However, the controversy about possible health effects makes it necessary to include the insights of stakeholder groups such as people who are electro-sensitive, politicians in communities that must make decisions on the siting of base stations, journalists and government officials, etc. There are a number of relevant questions that need answers such as: Do members of the ICNIRP have vested interests in their results? How is the evaluation of the body of knowledge really performed? Are certain research methods (e.g. non-epidemiological) treated as giving irrelevant information per se? Is there a closed and therefore unhealthy loop of information and judgement between certain research groups, national authorities, the ICNIRP and the WHO? Should the same individuals play important roles in all these groups, even if they are very

competent, something which is actually the case? I don't have the answers to these questions, but there is no way for stakeholders or 'lay people' to get the insight necessary to have them answered. It is easier for national authorities to avoid public scrutiny by referring to an international organisation like the ICNIRP which is more or less inaccessible for most people and which, due to its closeness to the United Nations, enjoys a high status. Citizens and concerned groups still have the right to see their regulators being challenged for their decisions.

The expert attitude to ordinary people

The controversies involved and the complexity of the issues make insight and high quality risk communication necessary. How to organise the processes for such insight and communication is an important and sensitive issue. As explained in Chapter 2, the core problem here is to avoid the pitfalls caused by an elitist expert attitude to other people. One problem is how to deal with a situation, which often occurs, where there are relatively small groups of scientists and experts holding positions which diverge from the majority.

The WHO published in 2002 a Handbook on dialogue on risks from electromagnetic fields. The Handbook has many of the characteristics of a good approach to risk communication, however concerning the problem of different opinions it seems to fall into the elitist trap when it is says (World Health Organisation, 2002, pp. 37–8):

> It is important to verify the knowledge and integrity of so-called "experts", who may look and sound extremely convincing but hold unorthodox views that the media feel justified in airing "in the interests of balance". In fact giving weight to these unorthodox views can disproportionately influence public opinion. For the public, often the best sources of information are from panels of independent experts who periodically provide summaries of the current state of knowledge.

Of course it can be the case that self-appointed experts get unjustified attention in public debate. However, this cannot be avoided by excluding them from public meetings, etc. A person claiming to have scientific arguments should be challenged, however this should not only be the case for 'outliers' but also for mainstream experts. The method of replacing open debate on scientifically controversial issues with 'panels of independent experts', something the WHO seems to suggest here, opens new issues in the debate. Are the expert panels really independent and furthermore independent from whom? How do they make their judgments? How do they treat scientists who diverge from the mainstream? In order to answer such questions, the panels and their conclusions should be challenged in public. Only then can the process gain public confidence and be part of a democratic society.

Comment

It could be argued that my selection of example areas in this and previous chapters is not scientifically carried out to objectively represent the expert role or the way decisions are made, and that the observations and conclusions therefore could be biased. Even if I can agree that this may be a valid argument, I would say that having investigated such important areas as radioactive waste management, biotechnology, nanotechnology, mobile phones and the restoration of contaminated sites, and having thereby found similar patterns of narrow framing, instrumental rationality, commercialisation of science and knowledge monopolies, there is a strong case for improved societal structures in decision-making.

9
Lessons Learned

Many will think that by focusing on the problems of scientific conduct manifested in our four themes this book gives too negative a picture of the role of expertise and science in policy-making. It is thus important to recognise that there are situations where bad decisions are made and good decisions are not made, despite scientists' efforts to gain access to decision-makers in order to increase their awareness. The need for awareness-creating arenas, which we will discuss later in this book along with proposed solutions, is also relevant for such situations. With this in mind, we are now ready to link the themes elaborated in Chapters 2–3 and summarised at the end of Chapter 3 with our findings from the practical case studies explored in Chapters 4–8.

First theme – narrow framing

A common type of narrow framing is that new technologies are presented at an early stage with their benefits, or rather potential benefits (which may or may not be realised later on), while their possible risks are not exposed to public scrutiny or are simply not addressed. The risk studies appear later when the technologies have already been introduced and they are done with an expert driven, narrow framing, not uncommonly controlled by knowledge monopolies. Hardly any social impact assessments are carried out until social scientists start to study the effects of the technology. We have seen this process take place so many times (for electromagnetic fields, genetically modified crops, nuclear technology, etc.) that it would appear to be the normal procedure.

Nuclear waste management is a perfect example of narrow technical framing which has led to a great deal of frustration in most countries with nuclear power. For a long time, the agenda was set by experts in technology and various disciplines of natural sciences. It was believed that the entire issue of taking care of the waste, including the siting of final repositories, was a matter to be dealt with purely by the experts. By and large, we see that a technocratic approach with little public influence leads to a framing of issues which later

proves to be irrelevant for political decisions. We need not repeat the conclusions from Chapter 4, but only remember that the siting of waste repositories has been stopped, or delayed by decades, for this very reason. This is obvious in the failure of Sellafield in the UK, in Canada where it was officially recognised that social concerns had been neglected, in France where a technocratic approach has been used with the exception of a few years, etc. Sweden, the first country where the key actors understood the necessity of broadening frames to include citizen concerns and to bring them into the process, seems to be on the right track, but is now entering a sensitive licensing phase.

The debate and the policy-making process in Europe about genetically modified organisms (GMO) for food production provide another good example of early expert narrow framing. The early agenda was that GMO could be cultivated when the experts had assessed possible risks to the environment, such as the potential harm to biodiversity, and that the use of GMO in food production could be allowed when risks to human health had been assessed. In other words the framing was that scientifically based risk assessment was enough to provide a basis for making a decision in favour of GMO and for addressing public concerns. However, the general public had a broader framing from the very beginning, which included social issues like the relationship between global industrial giants and farmers and the position of the industrialised nations towards developing parts of the world. The general public also seems to have the rational view that higher risks are more acceptable for technologies that bring obvious benefits to society than for technologies for which they cannot see real benefits (for GMO the public had problems seeing any benefits beyond profits for big business). When we add to this the lack of trust citizens and other stakeholders had in that the industry and the experts actually did their scientific assessments properly and informed about the uncertainties involved, it is easy to understand the public outcry that resulted from the introduction of GMO in Europe and the de facto moratorium that followed.

Framing often takes place at an early stage in technology development, risk assessment and decision-making processes. Fragmentation is a variation on agenda setting which can be activated at various points in time. It results when one particular aspect of a complex issue is put in focus. A stakeholder can do this by strategically selecting both the time and subject for action to suit his own purposes. The more media attention gained, the better the chances of influencing public opinion and winning the attention of politicians. Fragmentation can impact people's views on what is important and imprint the decision-making environment, especially if it takes place when the issue approaches critical decision-making points. This is certainly not beneficial for high quality decisions since the comprehensive picture is lost. We should thus do our best to vaccinate the system against such fragmentation. The aim should be to make all the stakeholders, including politicians and the general public, as aware as possible of the issue in its entirety,

including both factual and value-laden parts. The overall decision-making process must therefore have this as a major objective and various mechanisms for public participation, tailored for specific points in the process, should be employed.

Second theme – instrumental rationality

It is now widely recognised that public values should be taken into account in risk assessment and risk management. However, in Chapter 5 we learnt how the expertise keeps the risk management process under control in this new societal setting as well. This is done in two ways: either you openly downplay the importance of factors other than the 'objective' calculable figures, or you include the value-laden aspects in a seemingly wider framework but use technical tools while doing so to minimise non-expert influence.

One way to downplay the importance of stakeholder and public concerns is to say they can be explained by ignorance and emotions. Ignorance can be overcome by information which makes the public more knowledgeable, and when knowledge increases, so too will the acceptance of expert opinions. The information approach takes it for granted that experts are always right in factual issues and that they represent citizen values, which is, of course, a highly dubious point of departure. It refers to emotions as a factor in citizen concerns and is founded on the idea that non-technical arguments have no role in rational policy-making (*instrumental rationality*). This, however, implies that all views which are not based on science are irrational. The argument confuses fully legitimate value-laden (and rational) arguments with arbitrary emotions. The idea that ordinary peoples' risk perception rests on ignorance and emotion in contrast to the objectivity and rationality of the experts, supported by the psychometric paradigm, has served as a rationale for excluding lay people's influence on risk management affairs.

The second, more sophisticated, approach to resisting stakeholder involvement is to include social and value-laden attributes in risk assessment as a basis for selecting between risk management options, but to do it in a way which maintains expert control. Methodologies like strategic risk assessment, multi-attribute decision analysis, cost benefit analysis and cost effectiveness analysis can perfectly well be used in such a way. The use of such instruments sets up the process on expert terms, making it alien to lay people. Sometimes the experts even reserve the right for themselves to invalidate concerns raised by other stakeholders. In the case of the precautionary principle, which has been decided on by politicians, the administrative and technical community also takes control when it comes to applications in specific policy areas e.g. mobile telephone systems and genetically modified organisms.

Having met all the resistance described in Chapter 4, nuclear waste management organisations around the globe turned to the social sciences for

advice on how to proceed in order to get the desired acceptance. However, there was an unrealistic expectation that the social sciences could provide a toolbox for reaching consensus or at least general acceptance. The expert community has also demonstrated resistance to too much citizen involvement and by large nuclear waste management programmes are still controlled by an expert community not willing to change more than is absolutely necessary.

Experts often avoid breaking mental barriers and engaging in active dialogue, but citizens frequently want access to the real experts as opposed to information departments. The willingness of experts to give up some of their control over the process and to include stakeholders' concerns in their assessments is the key to success both in achieving a dialogue and in building a comprehensive and relevant basis for decisions.

Third theme – commercialization of science

In Chapter 2, I described and documented the on-going commercialization of science as a more or less irresistible force that irreversibly changes the scientific ethos. I shall not repeat those arguments here, but only list some clear signs of the trend. Governments are promoting a more commercial approach within academia; industry is funding research groups in universities and sometimes entire research centres; various public–private partnerships have been established; we see industry representatives on academic research councils, etc. Universities are patenting their results and many have their own offices for stimulating the commercialization of research results. There are academic courses in commercialization, scientists are establishing their own companies in more or less direct connection with their academic institutes and university scientists describe themselves as consultants rather than free scientists.

As also described in Chapter 2, biotechnology has been the leading sector of commercialization with its rapid advancements attracting industry investment. This sector is, however, by no means unique in being a commercialised part of university research. As very well illustrated by the Swedish radio investigation discussed in Chapter 2, universities have become more and more dependent on industry funding for their very existence and so too have individual scientists.

Other areas we have studied in this volume have different characteristics to biotechnology. The driving force behind research in nuclear waste management for example, is not the prospect of new products for a large market that can attract venture capital. Instead it is the need on the part of the nuclear industry and national governments to find solutions to the waste problem in order to make nuclear power more legitimate in the minds of the public, or more simply the need to find safe solutions to a problem which is the

subject of a great deal of public concern. Still, the very fact that either the nuclear industry (like in Sweden or Finland) or government bodies (like in the US) are responsible for finding a solution to the waste problem means the research is driven by industrial or political interests and thus takes place under non-academic conditions. Without these driving forces there would hardly be any research on topics like corrosion of copper in groundwater, the long-term stability of bentonite clay or groundwater movement at the interface between saline and brackish waters. This leaves the research results open to the criticism that they have not been subject to normal academic review. In this area, regulatory bodies have a critical function in the review process and in order to be competent they must at least have their own research programmes in key topics.

The cleaning-up and remediation of chemically contaminated sites is quite a competitive business with many large and medium sized consultant companies competing for remediation projects – there is a functioning market. The question, however, is whether the commercial interests on the market have an unhealthy impact on the development of guidelines for when remediation measures should be taken and how costly they should be. What makes this area special is that there are no counter-forces against industrial interest. Normally, proposed clean-up and remediation projects are met with positive attitudes among stakeholders – including political decision-makers, local industries, environmental organisations, etc. Here, various interests that otherwise often have divergent views on environmental issues come together, interests such as economical development, environmental concern and municipality image. After all, who doesn't want a cleaner environment? Consultant businesses and government bodies share an interest in the area's continued prioritisation as an environmental programme. Furthermore, academic research is quite small by comparison with the development of remediation technologies and risk assessments methods being carried out by consultant companies. On the national level, this looks like a research cartel situation with a knowledge monopoly on risk assessment providing a rationale for sustained government funding. The lack of checks and balances, however, makes these programmes vulnerable to political whims that could drastically reduce the budget.

Fourth theme – research cartels and knowledge monopolies

One way for powerful groups of organisations to suppress scepticism and minority views on technical issues from the public arena is to take control of the agendas of high profile and highly trusted international bodies, or to form an international committee for the issue in question. If these organisations are staffed with people holding similar ideas to and enjoying good connections with industry and government organisations, a very powerful network

will have been founded with the means available to establish a knowledge monopoly. News from such organisations, whether it is the World Health Organisation (WHO), the International Commission on Non-Ionising Radiation Protection (ICNIRP) or the Intergovernmental Panel on Climate Change (IPCC), give the impression of scientific consensus, are positively perceived because as information sources they are closely related to the United Nations, and have high status simply because of their international context. Even if there are many researchers who don't support the mainstream agenda of such organisations, they have great problems getting media and public attention. When they succeed, it is often in an adversarial context where they are easily seen as outliers and not as serious scientists. A more serious effect might be that they get less funding for research simply because their research doesn't support the interests of the groups in power, and thus a 'scientific consensus' is constructed.

International organisations often play the role of reviewers of entire research fields, thus forming a kind of consensus opinion of the state of knowledge – an opinion which becomes widely recognised as truth. We can see this process taking place with global warming and the health effects of electromagnetic fields. The international bodies also often recommend safety standards which national authorities can follow, making their regulations difficult to challenge.

Groups of meta-experts tasked with making judgments about the state of knowledge in huge research fields like the effects of electromagnetic fields on health play a key role in policy-making. This role is, however, far too little criticised as are the conclusions and recommendations that these groups produce. There are a number of issues associated with them that deserve attention. First, the appointment of members to the meta-expert groups is very seldom discussed in the public domain; secondly their work is not subject to scientific peer review unlike the research results they are supposed to judge.

Thirdly – and most importantly – society has no means of challenging the claims of truth and authenticity made by the meta-expert groups (in Chapter 11 the concept of 'stretching' is used for this). Public meetings and hearings with scientists who have different opinions about, for example, the possible health effects of cellular phones are not uncommon and they can be improved to increase clarity. However, scientists holding views that diverge from the mainstream research (as defined by the meta-groups) automatically become underdogs on such occasions because of the status given to the meta-scientists. Furthermore, there are no organised attempts to question and criticise conclusions drawn by the meta-scientists which have been based on the total body of international research. Indeed, politicians and citizens should have the means of challenging claims made by meta-scientist groups, for example, those suggesting there is no evidence in scientific studies that should trigger precautionary measures.

The core question here is how research results that diverge from the mainstream should be included in societal discourse. As we learnt in Chapter 8, the World Health Organisation is concerned that the media give 'unorthodox views' too much attention. Instead the public should get the information from 'panels of independent experts who periodically provide summaries of the current state of knowledge' (World Health Organisation, 2002, pp. 37–8). The intention with this approach seems to be that citizens will never hear the arguments of scientists who don't follow the mainstream (which is an unsustainable situation in the long run). On the other hand, it could be argued, at public meetings where minority and opposing views are given equal space as the dominant part of the established scientific community, the public may get an erroneous impression of the state of knowledge. However, if we accept the possibility that research cartels can establish knowledge monopolies, the minority group may in fact be in minority just because it has been downplayed by the resources of the cartel. Again we are back to the need for active measures to challenge the 'established' conclusions made by the groups of scientists acting at meta levels.

Another phenomenon is international reviews of national programmes. Nuclear waste management is an area where this takes place regularly. For example, in Sweden a number of risk assessment projects, including parts of the site selection programme, have been subject to international reviews set up either directly by the regulatory agencies or by international organisations, like the OECD Nuclear Energy Agency, at the request of these agencies. There is value in such reviews, of course, but they should not be over estimated. One problem is that even on the international level there are only a limited number of experts available with enough insight into the issues to be invited to take part in such reviews and that these experts often have connections with the waste programmes in their own home countries. It is thus possible that review groups share an interest with the programme in the country that is subject for review, i.e. that the overall approaches and methods being used are the best, even when there are still issues that need more research. The results of these reviews are often used to legitimise projects that should be exposed to greater scrutiny.

I am not opposing international cooperation of course, or the value of internationally agreed courses of action. I am only highlighting some of the problems that can result. One problem is the risk of research cartels forming between certain fields of research and financial or political interests. There are strong indications that this has taken place in research on the possible health risks of electromagnetic fields. We can see signs of this also in climate research where researchers and politicians have come together to the extent that the public gets access more or less to only one type of results. We have also seen that nuclear waste management is an ideal candidate area for research cartels and knowledge monopolies and that the regulatory bodies have a critical role in preventing such developments from taking place. Other areas

of research in which cartels could easily emerge include nanotechnology and converging technologies where commercial, national and research interests join in partnerships for competition between continents.

Converging trends

The trends of narrow framing and instrumental rationality used by expert groups, the commercialization of science as well as the formation of research cartels and knowledge monopolies separately mean serious problems for democracy. When these trends merge, as is the case when narrow framing and instrumental rationality are used by scientists and experts on behalf of commercial interests or other powerful formations, they become even more dangerous and also more difficult to challenge.

In the first chapter we described a situation in post-modern society characterised by information overflow within which we are exposed to, and defenceless against, framing and fragmentation by interest groups, industry, researchers and experts. There are also cases where scientists try in vain to rouse passive policy-makers and attract societal attention to problems and risks which have not yet been addressed properly. Those who can organise the strongest framing and fragmentation channels that reach politicians and the public win the battle over policy-making. The public has no insight into this process, cannot evaluate the consequences of the resulting decisions, is not aware of possible alternative policies and is thus unable to hold decision-makers accountable for their decisions. In order to find a means of tackling this weakening of our democracies we need to become more acquainted with democratic theory.

10
Insights into Democratic Theory – and the Awareness Principle

In the first chapters we explored the 'objective world' with factual issues, the social world with norms and values, and emotions which also have an impact on how we think societal issues should be handled. We then went through a number of case study areas relating to challenging issues that are subject to political decisions. In each we found how expert agenda setting can lead to a situation where the decision-making basis becomes illegitimate in the eyes of the public. Innocent experts following the old-fashioned paradigm try to convince decision-makers and the public with 'neutral information', believing that it will lead to 'objective' decisions. Moreover, experts, stakeholder groups and lobbyists act to fragment the scientific evidence and often keep the value-laden aspects hidden.

A new enlightenment should mean that those who have the power to set agendas and fragment issues should be illuminated and that the political decision-makers should act on our behalf and represent our values in the decisions they make. Moreover, it must be possible to hold our political representatives accountable for their actions and decisions. Since this is at the heart of the very meaning of democracy we need to found our further discussions of possible improvements to decision-making processes on our democratic tradition and contemporary democratic thought.

In the mid-19th century John Stuart Mill set the course of liberal democratic thought, which since then has dominated democratic theory. In contrast to the earlier meaning of democracy with its roots in ancient Greece, as mainly consisting of the gathering of citizens in public meetings and assemblies, Mill argued that this was no longer realistic in larger scale societies where people can only participate in very small parts of public business. Instead a representative democratic system was needed in which citizens exercise their controlling power through periodically elected deputies (Mill, 1972, originally 1861 in 'Considerations of Representative Government').

In this democratic model the ordinary citizen has a limited role in the actual setting and conducting of policies. This is left to the elected representatives. Thus the power of the citizen is a *controlling power*, exercised in

elections, in which the elected representatives are *held accountable* for their behavior in office. However, for society to function it also needs an efficient administration and experts in government offices. According to Mill, parliament should appoint individuals to executive positions. It should be up to the executive offices to prepare details of legislation and to administrate their practice. Parliament should as a national forum of citizens give directives to the administration and make the final decisions. As expressed by David Held, 'representative democracy, thus understood, can combine accountability with professionalism and expertise'.[1] He also remarks that this is justified with the assumption that 'participation in political life is necessary not only for the protection of individual interests, but also for the creation of an informed, committed and developing citizenry'. Following Held we call this form of representative democracy *developmental democracy* (Held, 2002, p. 110).[2]

It took a long time for liberal representative democracy to advance from its position as a leading intellectual model to universal acceptance and implementation, first in the USA, then in Western Europe, later in Asian countries and now also in the former communist states of Eastern Europe. For a long time, a serious obstacle was the inequalities existing between citizens, for example the restrictions on who would be considered a legitimate citizen. Indeed, Johan Stuart Mill himself had no intention of letting the educated and more skilled be outvoted by the general mass. He proposed instead that the allocation of votes could be adjusted to occupational status (Held, 2002, p. 109). It was up to the liberal political movement, the working class and feminist activists of the late 19th and early 20th centuries to fight for the one-person-one-vote principle. In the United States, many African-Americans were, in practice, denied equal rights as citizens until the civil rights movement in the 1950s and the 1960s. The latest victories of liberal democracy have only recently been celebrated in many states in Eastern Europe after the fall of the Soviet system. As David Held has expressed it (ibid., p. 109).

> The consolidation of representative democracy has been a twentieth-century phenomenon; perhaps one should even say a late twentieth-century phenomenon. For it is only in the closing decades of this century that liberal representative democracy has been securely established in the West and widely adopted in principle as a suitable model of government beyond the West.

Interestingly enough, it is during the same period, essentially during the second half of the 20th century, that complexity in society and the size of the expertise has grown to the extent that John Stuart Mill's combination of political accountability with professionalism and expertise has been challenged.

Accountability in liberal democratic thought requires a sense of citizen participation in political life, meaning that the elected assemblies represent not only the citizens as individuals but also their values. Democracy, however, as expressed by Schumpeter (1987), can also be understood simply as a method which involves citizens only in a formal process of designating those who make decisions. Schumpeter saw democracy as a competitively produced leadership, meaning that political parties in election campaigns compete for votes and the people are thus reduced to being 'producers of governments'.

In such a system the elected members of parliament do not really represent societal value systems, or the 'popular will'. Instead the political parties use psychological techniques and advertising to influence voters' preferences, which makes the popular will more of a social construct than a genuine expression of citizens' interests and values. Held contends that this model of democracy, which he calls '*competitive elitist democracy*', is technocratic and close to anti-liberal and anti-democratic (Held, 2002, p. 193). He also questions the realism of Schumpeter's idea of the manufacturing of the popular will by advertising techniques such as repetition and playing on the subconscious to shape people's preferences. Held believes this to be an exaggeration of the manipulative power of the governing elite and says that 'there is little evidence to support the view that people's political attitudes are overwhelmingly shaped by the messages that they receive from above' (Held, 2002, p. 194). If Held is right, in a competitive elitist democracy citizens are convinced to vote for their leaders by more or less undemocratic means, but when in power the same leaders fail to convince their voters about major directions of policy-making. In the long run, this must be an unsustainable situation. There are recent examples in Europe that support Held's view that there is indeed a limit to the manipulative power of the elite. The first came in the form of the Swedish referendum on joining the European Monetary Union in 2003. In spite of an intense campaign for a yes vote by a massive majority of the political and business elite, the Swedish people gave an overwhelming no-vote (56 per cent against 42). Then, of course, there are the even more overwhelming results of the 2005 referenda in France and Netherlands, which took place as part of the ratification process of the newly proposed European Constitution. In France 55 per cent and in Netherlands 62 per cent voted against the constitution thereby blocking it for the foreseeable future. Here the citizens of two of the founding countries of the European Union within four days of each other completely changed the scene of European politics. Once again, this happened despite a massive yes campaign by the established elites. One reason why Schumpeter's argument about the popular will is exaggerated is probably that he makes no distinction between values (against a 'super state' in the EU examples) and emotions that we discussed in Chapter 3. Emotions are easier to affect with advertising methods while personal values are more stable over a longer period of time. Since values are

more relevant for political decisions than emotions, Schumpeter's argument has limited relevance.

Yet another democratic theory which became successively more dominant during the last decades of the 20th century is *pluralism,* for which Robert Dahl is the most prominent exponent (see e.g. Dahl, 1956, 1989). Although there are many versions of pluralism as described e.g. by Held, its point of departure seems to be a realistic view of how power is in fact distributed in today's complex society. Societal decision-making takes place by bargaining and mediation between numerous groups representing business, labour, ethnic groups, environmental groups, local, regional and national interests, expert elites and academia, etc. As compared to developmental democracy (Mill) and competitive elitist democracy (Schumpeter), there is no one exclusive power centre in a pluralist society (Dahl). Instead the traditional societal structures weaken, as we have already described in Chapter 2 in the case of science, and we get a large number of competing policy-making centres. Even the political parties themselves are reduced to being actors on the market among others although, they still compete to become representatives of the public in national and other assemblies, and representative democracy has a role to play (Dahl, 1956, p. 131).

Having now been acquainted, at least to some extent, with three major models of democracy, it is time to ask the question: Which one of them would we like to practise in dealing with complex issues like the ones described in the previous chapters? To be somewhat provocative; do we want decisions about ownership of our genetic legacy to be made on the market (pluralism), by a political elite without public insight (competitive elitist democracy) or by assemblies representing citizen values (developmental democracy)? Should the siting of radioactive waste repositories (or other waste facilities) be decided solely by an expert elite (competitive elitist democracy); by negotiations between the power industry, communities and possibly other stakeholder groups (pluralism) or by representative national and municipal assemblies (developmental democracy)? Should the approval of genetically modified crops be made solely on the basis of whether they are safe to eat or not (competitive elitist democracy), by market competition between the United States and Europe (pluralism), or by careful consideration of all of the factors involved including food safety, environmental protection and farmers in developing countries (developmental democracy on the national and international levels)?

If we put the question this way the answer seems easy. Clearly it would be inconsistent with our democratic ideals to leave these decisions to market forces or to elites with their vested interests. Instead there should be public influence which realistically takes place through the representative political system. On the other hand, both pluralism and competitive elitist democracy seem closer to reality in today's society, while the developmental democratic model seems idealistic and unrealistic. The main reasons for

this are societal complexity, information overflow and our limited attention span as individuals. We lack the ability to gain sufficient insight into the issues and therefore we cannot check if our representatives are operating in accordance with our values. So developmental representative democracy looks good in theory – but does it work in practice? The counterargument is obvious; an elitist or market oriented way of making decisions may be feasible in a pragmatic sense – but there is no guarantee that the decisions will be good for us as citizens and individuals, and thus for society. Furthermore, if we have accountability as a criterion for a working democracy, we have great problems with these models. In the pluralist model no one is accountable other than the impersonal 'market'. If something goes wrong with the competitive elitist democracy, it would be clear who is accountable but there is no one to hold him accountable, since the public does not have insight.

One problem with the representative system seems to be that politicians do not have enough insight into the issues, and they are subject to market forces and lobbying by a large variety of interest groups. Another problem is that citizens do not have insight either, which is necessary for them if they are to hold representatives accountable for their decisions. As a means to improve the situation I propose an *Awareness Principle* to be introduced into the developmental representative system:

> Society should be organized in such a way that decisions on its future development are based on the will of the people being, to the greatest possible extent, aware of all the factual and value-laden elements of alternative directions. In a representative democracy this implies that elected representatives and the arms of government have the resources to create the necessary awareness, and that citizens have the insight to gain the same level of awareness, thereby being able to hold the elected representatives accountable for their decisions.

If the developmental representative democratic system was armed with institutional structures securing the awareness principle, it would be possible for the citizens to evaluate the performance of elected officials to hold them accountable. There would then be no ground for an elitist system. Awareness in such a system is solely a matter for the governing elite and thus awareness in the sense we mean, which includes citizens, does not apply. In a pluralist society, centres of awareness-creation can be set up on market conditions, however, they would then be just one force of many involved in the societal decision-making process. If they could be created they would have a role in improving the quality of decision-making, though probably a much weaker role than in developmental democracy.[3]

In order to make the awareness principle operational, we need to give the concept of awareness itself both structure and content. This is what we shall

do in the following two chapters. When this has been done, we will return to democratic theory and discuss the two main streams of contemporary democratic thought which have emerged from the three classical ones described here. It will then be possible to see how institutional structures can be created that can make the awareness principle operational.

In the following I use the term 'new enlightenment' more or less in parallel with the 'awareness principle'. The idea is that that the latter is a more formal concept, whereas the first is the philosophy behind.

11
Awareness and Transparency

The premise for the rest of the book is that the more awareness there is in society of all aspects of policy-making, the better it is. In a democratic society it should be possible for the public and concerned citizens to have insight and awareness about the basis for decision-making. From what we have seen so far it is evident that the awareness of important problems is decreasing rather than increasing, and that this is a crucial problem for our democracies.

The three building blocks for awareness

I suggest a framework for the enhancement of conscious decision-making consisting of three major elements: transparency, public participation and arenas for public discourse. In what follows we, first, give a brief description of their meaning and then a more in-depth investigation of all three; transparency in this chapter, public participation in Chapter 12 and public discourse in Chapter 14.

The first element is transparency. This is a nice word, which in everyday language is more or less synonymously used with openness. In the European Union there is a move towards more openness in government institutions. There seems to be an influence from the Nordic countries, where access to documents is guaranteed by law, on other parts of Europe where secrecy often has been an overriding principle. Of course the openness in question is not total even in Sweden where documents in process can be kept from the public. However, the openness principle is important. It is possible for interested citizens and the press to scrutinise all official documents (not protected for security reasons) including details such as how officials use their credit cards, what they spend on representation, etc.

What is interesting, though, is that the practical importance of openness decreases with the ever increasing information flow, and perhaps also with the increasing time pressure on journalists. When you go to the public archives you need to know what you are looking for, otherwise time is wasted. Openness is good but certainly not enough! We need new mechanisms for

public insight and it is here we introduce the transparency concept. Transparency is a popular word in policy-making but few have a clear idea what it should mean more than openness. In this chapter we give the concept structure and a deeper meaning by the RISCOM model, which has clarity in factual and value-laden issues, testing of stakeholders' authenticity and stretching of arguments as key elements. Transparency then serves two purposes: to increase the awareness of decision-makers and to give the public insight and influence. The increasing complexity of today's society, the complexity of decision processes and the complexity of the underlying factual basis are all factors that work against transparency and participation. Therefore special measures are needed to make it work.

The second element of awareness is public participation. If you accept the RISCOM model of transparency, public participation has to follow. It is needed for the clarification of facts and values, as well as for testing stakeholders' authenticity and stretching their arguments. If we want to unmask the hidden values in expert investigations, and if we want to include them in the decision-making process, the issues must be viewed from new angles. This can only be done with the fresh perspective of laymen who possess not only values that are the ground for societal development but also important knowledge that is often neglected in decision-making.

The need for more insight and influence by citizens has caused many participative processes to be developed. Their aim is usually to capture values through the creation of small public spaces where issues are discussed. Consensus conferences, science shops, lay people's panel, team syntegrity and the Oskarshamn model are only a few of a large number of participative and deliberative processes. There are also broad frameworks such as Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA) and Participatory Technology Assessment (PTA). There is thus no lack of ideas or initiatives aimed at increasing participation. However, we don't yet have a systematic framework for evaluating them and for understanding how different participatory processes fit into a larger context. We will deal with this in Chapter 12.

Participation can take place with only a few members of the public and/or politicians. Certainly it is valuable in itself that complex issues are made transparent to limited groups. Individuals in these groups may communicate the experience to other groups or individuals. Some may be influential policy-makers or stakeholders that find fragmentation more difficult when issues have been made more transparent to themselves and others. There may also be feedback from citizens to experts and politicians that broaden the basis for decision.

However, from a democratic point of view participation and transparency that only leads to awareness among limited groups is of limited value. In the end the general public will hold decision-makers responsible for their

actions, which means that awareness of the issues should be created as much as possible in the public sphere with arenas for public discourse. This is why as a third element in our awareness creation agenda we have to include the public sphere provided by the media and the new information technology.

The third element in providing awareness is thus arenas for public discourse. Transparency for a wider audience cannot be achieved without access to the mass media which is a difficult challenge. I believe that this will require new and innovative ways of interchange between scientists and journalists. After all, both groups have in common the ideal of seeking truth and uncovering values and hidden interests. But they also both have integrity and independence as strong aspects of their identity, which means that close cooperation with others is regarded with hesitation. We deal with these issues in Chapter 14.

Transparency

In the old view, the experts-agenda paradigm, transparency meant explaining technical solutions to the stakeholders and the public – it was a matter of packaging technical information. However, major decisions on complex issues involve both factual and value-laden elements. Facts can be evaluated in terms of relatively objective procedures, but in policy conclusions facts are not easily separable from considerations that also include factors peculiar to the specific situation such as the nature of the case; the plausibility of assumptions; the selection of the evidence and the choice of methodology for evaluating the evidence. The decisions that must be made in such a complex environment will improve in quality if it is made clear to the public and the decision-makers how these elements interact.

The RISCOM model for transparency was originally developed from problems in risk assessment and nuclear waste. Is was developed by Clas-Otto Wene, Raul Espejo and myself with support from the Swedish Nuclear Power Inspectorate (see Andersson, Espejo and Wene, 1998, or Wene and Espejo, 1999). Later, the model has been tested and further developed within an EU research project (Andersson and Westerlind *et al.*, 2004). The model goes back to Habermas theory of communicative action (Habermas, 1981). Habermas distinguishes between strategic action oriented to success and communicative action oriented to understanding. In order for an action to be communicative Habermas has three criteria: statements have to be true, right and truthful. The truth requirement relates to the objective world, and a statement of truth is based on criticisable claims of validity. The requirement of rightness means that the social and normative context of the statement is recognised as legitimate. The truthfulness requirement means that an actor must be honest – there must be consistency between words and actions and no hidden agenda. If an action or statement is not honestly produced it is strategic instead of communicative. Göran Sundqvist has in his

book about the nuclear waste problems effectively summarised the theory of commutative action (Sundqvist, 2002, p. 182):

> The ideal situation is that agreements and disagreements are based on statements clearly motivated and recognized as criticisable, that the social situation is recognized as legitimate and that the intentions behind the actions are honestly and not manipulatively formulated.

The RISCOM model,[1] building on this, includes three basic elements: technical/scientific issues, normative issues and authenticity. *Technical/scientific issues* can be clarified with scientific methods. They relate to questions like 'Is this true?' or 'Are we doing things right?'. *Normative issues* reflect what is considered fair and acceptable in society, what is legitimate. As we have seen in a number of cases, in an expert dominated area value-laden issues are not often openly explored. Instead they are often hidden in expert investigation. *Authenticity* builds trust; it has to do with consistency between the actions of a person (or an organisation) and who the person (or organisation) is, or his role in the decision-making context. If a stakeholder considers an organisation to be authentic, he is more likely to trust its views and decisions, thus reducing his demands for technical details.

To achieve transparency there must be appropriate procedures ('*transparency arenas*'[2]) in which decision-makers and the public can validate claims of truth, legitimacy and authenticity. The procedures should allow *stretching*, which means that the environment of, for example, the implementer of a proposed project, the authorities and key stakeholders is demanding and that challenging questions are raised from different perspectives. It is by stretching the value-laden elements held by stakeholders become visible to all. Espejo end Wene have formulated a definition of transparency (in Andersson and Westerlind *et al.*, 2004, p. 11):

> In a given policy area, transparency is the outcome of ongoing learning processes that increase all stakeholders' appreciation of related issues, and provide them with channels to stretch their operators, implementers and representatives to meet their requirements for technical explanations, proof of authenticity, and legitimacy of actions. Transparency requires a regulator to act as guardian of process integrity.[3]

As Sundqvist points out, in a real communicative situation, the project proposer must show that he takes the views of other partners into account, thus his control is a great deal deprived (Sundqvist, 2002, p. 182). However, we must look out for manipulation by the proposer, which would be the case if he sets up a process which is presented as a framework for communicative action but which he intends to use to reach strategic aims.[4] This is why the very last sentence in Espejo's and Wene's definition is so important. Someone

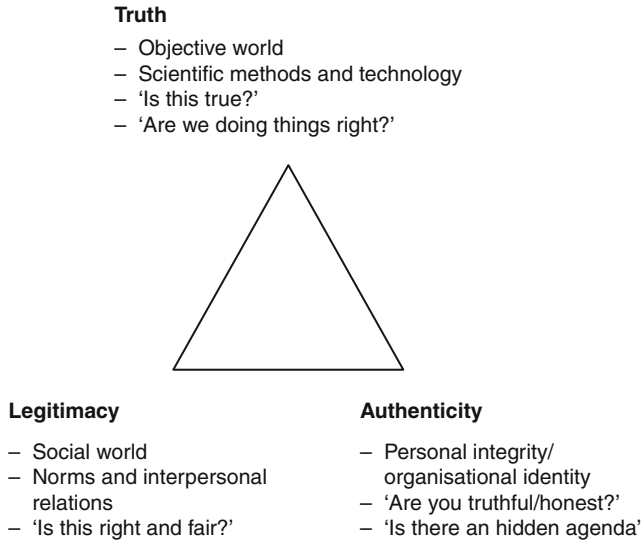

Figure 11.1 The RISCOM triangle[5]

having authenticity and societal trust must be there to guard a transparency process.

Besides the three corners of the triangle in Figure 11.1, decision processes must deal with the fact that a policy issue includes different levels of discussion and decision.[6] The three components of transparency will have different meanings at separate levels. This structuring of the dialogue makes it possible to focus at one level at a time while issues on other levels can be transferred to other parts of the process. Thus, the RISCOM model does not only illuminate the three corners of the 'RISCOM triangle', but it also helps us to structure the debate.

The RISCOM model, having a theoretical foundation in the work of Habermas, may look academic. The basis is however fundamental in the sense that any statement I make includes the three validity claims; I tell the truth, what I am saying is relevant (legitimate) for my audience, and I have no hidden agenda behind it. In order to evaluate these claims the audience needs some organised way of challenging them – this is what I call a transparency arena. The RISCOM model may also look idealistic. We cannot expect that the ideal situation of commutative action will ever be achieved since all stakeholders have strategic agendas. However, we can design decision processes using certain rules, measures and tools in order to strengthen the prerequisites for transparency. The RISCOM model provides support for doing this. It has

already been used with considerable success to design events in the Swedish site selection process for a nuclear waste repository and also in other areas.

The RISCOM model in practice

The most valuable validation of the RISCOM model is to see whether it is workable, if it can give real support in the setting up of a decision-making process. From this point of view, the use of the RISCOM model for the design and evaluation of hearings held in Sweden has been very valuable (Andersson, Wene, Drottz Sjöberg and Westerlind, 2003). Hearings were held in 2001 at three locations covering six municipalities. The municipalities had taken part in feasibility studies for the siting of a high level nuclear waste repository, conducted by the Swedish Nuclear Fuel and Waste Management Co (SKB), in the previous years. The hearings were organised by the Swedish regulatory authorities, i.e. the Swedish Nuclear Power Inspectorate (SKI) and the Swedish Radiation Protection Authority (SSI), and aimed at complementing the authorities' reviews of SKB's work and plans. Central themes of the hearings were SKB's choice of municipalities for the next phase of the programme that of building a high level nuclear waste repository, and their choice of method for this work.

The hearings had a total of about 200 participants (not counting representatives from SKI, SSI and SKB), and were considered quite successful. About 170 questions were formulated in work groups and were followed by a number of questions from the moderators and the audience. All written questions were answered either at the hearings or in writing afterwards, i.e. answers were published on the SKI web site.

It was found that the RISCOM model is a practical tool for developing a structured hearing format. Although, as the evaluation showed, the fit between the RISCOM principles and the real conduct of the hearings was not perfect, the model had a positive impact on the hearing format in the direction of transparency. The hearing format was successful in several respects[7] such as a high level of involvement, the mental separation of levels of discussion and stretching. Furthermore, the involvement of the actors themselves in the hearing design contributed to the fairness of the entire process. Representatives of the municipalities participated in the planning of the hearings.

In autumn 2006, the Swedish National Council for Nuclear Waste, KASAM, launched a transparency programme on the national level which is based on the RISCOM principles and for which I had the pleasure of conducting a pre-study (Andersson, 2007). The idea of the transparency programme is that it should increase the transparency, and thereby the quality, of the decision-making process. It should also increase the quality of the documentary basis for upcoming decisions concerning SKB licence applications for a final high level nuclear waste repository and an encapsulation plant for spent nuclear

fuel, expected to be submitted to the government at the end of 2009. During the pre-study a number of stakeholders were approached to give their views about the format and contents of the transparency programme. The consultations showed great expectations for the programme and a large number of issues were raised that could be included in transparency-creating activities. A typical activity will be relatively resource intensive, especially with respect to the time available for key stakeholders. Therefore, issues to be addressed must be carefully prioritised. The pre-study report contains nine issues proposed for special efforts by KASAM. A first event in this suggested series of activities within the transparency programme took place in March 2007, when KASAM arranged a hearing about deep bore holes as a possible alternative method for final disposal. Technical feasibility, long term safety and safety philosophy were among the topics addressed.

Although having its origin in the area of nuclear waste, the RISCOM model is generally applicable. So far, RISCOM has been applied to three other areas:

- mobile telephone systems
- cleaning-up and remediation of contaminated sites
- technologies for electricity production

The introduction of the third generation (3G) of cellular phones has caused much discussion in Sweden. The timetable and the level of ambition in terms of countrywide access to the system were set early on at the highest political level. The development of 3G has, however, caused opposition and controversy in a number of municipalities. There are concerns over radiation risks from the masts, which are built with much higher density than for the previous GSM system, although the authorities assure that there are no such risks. Resistance groups have emerged, and there are municipalities wanting to establish mast-free zones. In 2005 representatives of the industry, the authorities, the municipalities and critical groups agreed to form a joint Transparency Forum using the RISCOM model through an initiative taken by the Swedish Radiation Protection Authority (Hedberg, 2006). In this forum the stakeholders were able to agree on the structuring of the problem in dialogue and on the format and content of a series of three seminars that followed the agreed structure.

The aim of the effort related to contaminated sites was to explore methods for participation and transparency-creation in remediation projects (Andersson, Grundfelt and Wene, 2006). It was shown how the RISCOM model can help to increase decision-making quality. In particular it was found that the municipalities involved should be given resources within the national programme for competence development and stretching since they, in the end, must take responsibility for remediation projects and choose between the various possible alternatives for carrying them out. In the area of electricity production three energy projects were analysed as case studies, and

a number of observations were made in relation to the RISCOM principles (Andersson, Johansson and Wene, 2006). Also this area would benefit from using the RISCOM model given that an appropriate organisational solution can be found.

I will refer to the RISCOM model later in this book as it provides key principles for how awareness can be achieved. If you take the RISCOM principles seriously, it should also prove an important tool in the evaluation of different public participation processes, an issue to which we return in the next chapter.

12
Public Involvement

During the 1960s–1970s, decision-makers in industry and government met increasing concerns among the public about environmental impact and sustainability. Large industrial facilities and infrastructure programmes met strong opposition. There was a lack of understanding of the new social environment that resulted in a distrust of industry and government. Failures of scientific assessment and arguments to persuade stakeholders resulted in a range of outcomes from public protest and the expensive deferment, reversal and review of projects, to the longer-term erosion of trust and confidence in both industry and regulators. The traditional 'DAD' (Decide, Announce and Defend) approach to decision-making had become obsolete.

Social science research described this change early but it took quite some time before legislators and industry took it seriously. Initially, more and better information was seen as the solution. This strategy also failed because the approach was still a matter of 'we and them' and involved no sharing of values or participation by concerned people in the decision-making process.

Which are the rationales for public involvement in decision-making? It is just too easy to state that more democracy, public involvement and committed citizens are for the common good without explaining why. It could be argued that in a society that builds on representative democracy, the decision-makers by definition represent the values of their voters.

However, the values involved in complex policy issues do not automatically become apparent – for this to happen transparency must be secured by procedures that involve members of the general public and different stakeholders. Transparency and public participation are thus strongly linked: transparency needs public involvement – and meaningful public involvement cannot take place without transparency in procedures. Thus if we want decisions to be made with the best possible political and societal awareness, it follows that we also need citizen participation.

On a more common ground, we can identify three rationales for the desirability of public involvement. The first rationale is *ethical* and means that the

public should be involved because they are the ultimate source of values in society, and these values should be expressed in decision-making. In other words, we should respect our citizens' right to self-determination and autonomy. The second rationale is *political*. This means that public involvement strengthens the legitimacy of decisions and provides a broader responsibility for them, which also increases their stability over time.

The third rationale concerns *knowledge*. The public should be involved because citizens have knowledge, which is different from the knowledge of experts and politicians. This lay-knowledge is often of essential importance for the issue considered, at the very least it means that the knowledge base becomes broader. When considering local projects, or local effects of regional, national or global issues, it is usually the case that local residents have important knowledge that is neglected by decision-makers (see, e.g. Irvin, 1995 or Irwin and Wynne, 1996).

These three rationales for public involvement, which all look very reasonable at first sight, raise a number of questions from the perspective of the democratic models we discussed in Chapter 10. We shall go deeper into this in Chapter 13, where we also introduce the model of *participative democracy,* which in fact to a great extent has its theoretical foundation in the first two rationales, especially the ethical one. In this chapter we take a less theoretical and more pragmatic perspective. We will describe a number of processes for public involvement, first at the scale of events taking place within a limited timeframe and involving a smaller number of people, then on a larger scale, processes designed to be major parts of the decision processes over a longer period of time, involving a wider range of participants. We will also have a look at efforts made to systematise all these processes so that they can be derived and evaluated in a structured format. When doing that, we will include their capacities to create transparency and awareness as we defined these concepts in the previous chapter. The role of international agreements set up to stimulate public participation will also be discussed.

Public participation processes

The need for more influence by citizens and for better understanding about public attitudes in controversial issues has caused a number of participative and deliberative processes to emerge. As pointed out by the British Economic and Social Research Council (1999) their aim is usually to capture values through the creation of small public spaces where citizens can discuss the issues with each other, scientists and decision-makers. Some of these processes result in recommendations to political decision-makers. Let us only very briefly have a look at some of them.

Consensus conferences

The Danish Board of Technology is an independent body established by the Danish Parliament (the Folketing) in 1986.[1] At that time the US Office of Technology Assessment was an important model for the new institution (Klüver, 1995). The task of the Board is to monitor and assess technological development, and advise the national parliament and the government. An additional important task is to promote the debate of technology in society as well as public enlightenment regarding the consequences of technology.[2] The objective is not to assess the functionality, effectiveness or commercial potential of a technology but 'to clarify dilemmas and conflicts' in relation to the technology.

The Board lists six criteria which have to be fulfilled before a technology (or a topic) is of relevance to the Board: (1) there must be a technological content; (2) there must be a problem, a conflict or a need to make decisions; (3) it must be of relevance and importance to many people, or crucial for a segment in society; (4) it must be topical and given political attention; (5) there must be a target group, a set of well-defined recipients who needs to have the topic dealt with, and (6) the Board must have a role to play, e.g. by having lay people taking part in the assessment.

The Board, which uses many different methods for the assessment of technology,[3] is best known for its work with lay people and internationally the consensus conference is its most well known activity. Here ordinary people – lay people – are given the opportunity to assess a given technological development and make up their minds about its possibilities and consequences.

Participants are found by sending out invitations to randomly selected citizens. About fifteen citizens of different age, gender, education, profession and residence are selected from among those who wish to participate in the conference. The citizens are prepared for a meeting with the experts by reading material on the topic and participating in two weekend courses.

On the first day of the consensus conference the experts give presentations where they address questions posed in advance by the lay panel. The panel spends the second day asking individual experts for elaboration and clarification of their presentations. On the third day the citizens' panel discusses and formulates the final document and this goes on until consensus has been reached. On the fourth and last day of the conference, the lay panel presents the final document to the experts and the audience – among them the press. The lay panel's final document together with the written contributions of the experts, are set out in a report to the members of parliament.

Between 1997 and 2002, 22 consensus conferences were organised by the Board on a large variety of topics such as gene therapy, electronic surveillance and the future of private automobiles. Typically, the lay people involved do not change their basic values during the process although they become more

informed and increased knowledge often modifies their earlier attitudes. The conferences often get high levels of media attention which means that they may have an impact on public opinion and political decisions. The symbolic value of the conferences is also of importance: they demonstrate that lay people are committed and 'able to cope with complicated issues' (Klüver 1995).

Science shops

The idea of science shops started in Holland in the 1970s as part of the Dutch radical science movement (Dickson, 1984, p. 329). It emerged out of the student movement, and included university staff who were critical of the status quo and wished to democratise the universities. Their aim was to increase the influence of civil society on the universities, to make contact between citizen groups and scientists and to make use of the knowledge available at the universities.

A science shop provides independent, participatory research support on scientific issues in response to concerns experienced by civil society. It responds to requests from individuals or representatives from community groups, public-interest organisations, trade unions and local governments. The staff at the shop scrutinises the requests and decides if the university is able to respond to them, i.e. if it is possible to develop the request and answer it in a scientific way. When requests are accepted they are handed over to researchers and students. Usually additional criteria are used for deciding whether to accept requests from the public. The requesting party should not have the means to pay for the research. It should be possible to utilise the results for action; however, the utilisation should not be commercial (see Dickson 1984, p. 329, Sclove 1995, p. 226, Sclove, 1996). Some shops have established 'project centres' which are focusing on specific themes such as environmental problems.

The function of the science shops is to mediate between social needs and university research. The science shops are an example of a mechanism which more directly connects research and social needs without passing commercially based channels where needs are usually expressed.[4] Much of the research produced by science shops is in direct response to the expressed needs of community organisations. Such research therefore reflects the concerns of civil society rather than the interests of researchers, academic institutions or private companies. There is a commitment to participatory methods.

In a study financed by the European Commission, Andrea Gnaiger and Eileen Martin concluded that science shops are a cost effective way to provide research and information to a wide range of civil society organisations and the demand for their services continues to grow (Gnaiger and Martin, 2001). Through the science shop movement, civil society organisations can obtain

and contribute to research, which they can then use to make changes in their own social situations.

Like consensus conferences, the science shop concept has been seen as a very successful initiative and the idea has spread widely across Europe, also reaching non-European countries. In a first wave in the 1980s a number of science shops were created in Australia, Belgium, Denmark, Northern Ireland, France, Germany and Austria. In the 1990s science shops were established in England, Israel, South Korea, Malaysia, New Zealand, and Canada. Furthermore, in the mid 1990s, some Dutch science shops began to actively export the science shop concept to Czechoslovakia and Romania. In the history of science shops, there are many examples of students and faculty members who in their studies and research have been inspired by the requests from the public. They have adapted their research to contribute more to the solution of practical problems.

Simulation

Here the concept of 'simulation' is used in the specific sense of a structured process providing a framework for communicative action and interaction between the participants. By simulating a future 'real' decision process the focus is more on understanding issues, decision processes and arguments than building strategic positions. A generic simulation format consists of four phases:

1. The participants discuss the issues determining the future development in the field of interest (such as ethical, procedural, technical and social issues).
2. The participants agree on a step-wise decision process for simulated testing. The involvement of key stakeholders including local authorities, regulatory bodies and environmental groups is defined.
3. A decision process is simulated, expressing possible positions of all participating stakeholders in each step.
4. The results of the simulated decision process are analysed by the participants. The parties agree on recommendations for procedures to be followed in the future. It could be a question of informal procedures using degrees of freedom within the existing legal format, or possibly suggestions for new legislation.

This simulation format was used in the early 1990s by the Swedish 'Dialogue project' (J.Andersson, K. Andersson and Wene, 1993) that dealt with nuclear waste issues and involved major stakeholders such as licensing authorities, municipalities and environmental groups. It was accomplished in two phases: first, seminars were held on critical issues in order to build a common knowledge base between participants. Secondly, a hearing was

arranged for a simulated licence application, which led to insights into how arguments would be used in a real application, and into how the existing legal procedures worked. Then the participating organisations in agreement wrote a letter to the Swedish Government with recommendations about how procedures should be changed. Although this happened more than 15 years ago, the project made a lasting impression on the participants and it is still referred to as a proactive initiative.

Team syntegrity

This special meeting format, called 'team syntegrity' (TS), was originally developed by Stafford Beer, the founder of management cybernetics.[5] The format supports the self-construction of the meeting agenda, the reverberation of ideas in a non-hierarchical set up and the contribution of all participants to the best of their abilities.

A team syntegrity meeting is not a normal round table discussion or seminar. The self-organisation of the meeting is a strong positive feature of the format. Instead of having a project leader setting the agenda, the participants formulate their own topics of relevance starting from an *opening question*. The format encourages all participants to actively participate. The process also produces an unusual degree of commitment and enthusiasm. Clearly it is not possible to participate only partially – you need to be an active participant all the way through! TS requires an organisation 'on-site' with TS management specialists, facilitators, and a secretariat. In addition to real-time recording and sharing of the many group discussions during the event, rapporteurs use the facilitators' notes to document the meeting including all the discussions leading to the final statements.

The TS meeting format was used on a European scale in the RISCOM projects on nuclear waste management (Andersson, ed., 1998). The general feeling among participants was that the meeting format was well suited to exploring different views on the issue in question. The participants represented a large variety of stakeholder perspectives on a complex issue, and the cultural and legal differences between the countries involved guaranteed that the topic was discussed from different angles.

However, team syntegrity is a tool that cannot be used on a regular basis for discussions on similar matters. It is relatively costly to run and requires educated facilitators and administrative resources at the meeting to get good results. Furthermore, it is not a process that is transparent to people outside the group of participants. Therefore, it should be seen as a tool that can be used in specific situations within a broader context of transparency and participation. Other communication methods are also needed.

Focus groups

A focus group is an informal technique that can help you assess people's opinions and feelings in a certain area.[6] In a focus group, you bring together

a limited number of people, usually between six and ten, to discuss a selected issue. The group session typically lasts about two hours and is run by a moderator who maintains the group's focus. During the group session, the moderator has the job of keeping the discussion on track without inhibiting the flow of ideas. The moderator must also ensure that all group members contribute to the discussion and must avoid letting a few participant's opinions dominate.

Focus groups are an increasingly popular way to learn about opinions and attitudes and the technique is widely used, for example, by marketing firms wanting to determine how customers respond to new products and also by politicians who want to know how citizens will react to certain yet to be decided policies. For participants, the focus-group session should appear to be free-flowing and relatively unstructured, but in reality, the moderator must follow a pre-planned script of specific issues and set goals for the type of information to be gathered. Typically, there should be more than one focus group on the same topic, because the outcome of any single session may not be representative and discussions can get sidetracked.

Focus groups are often used in combination with opinion surveys. Compared to surveys, focus groups provide in-depth qualitative insights coming from a relatively small number of people. Surveys provide quantitative data that can be generalised to larger populations. Focus groups do not produce statistical data. They collect a breadth of information so that a 'story' can be told. An interesting example is the focus group meetings organised in Sweden by the Radiation Protection Authority and conduced by Britt-Marie Drottz-Sjöberg, professor in social psychology at the Norwegian University of Science and Technology. This experience shows that lay people can provide material contributions even to a complex matter such as guidance on radiation protection and focus groups were a suitable method to make that happen.[7]

UK planning inquiry

In the United Kingdom a Planning Inquiry takes place in cases when a developer appeals against the Local Planning Authority's refusal of his planning application for a large or complicated project. In England, appeals are made to The Planning Inspectorate. In inquires, expert evidence is presented, and witnesses are questioned in a formal process. An inquiry may last for several days, or even weeks. It is not a court of law, but the proceedings are quite similar and both the appellant and the Local Planning Authority usually have legal representatives. Inquiries are open to members of the public, and although you do not have a legal right to speak, the Inspector who leads the inquiry will normally allow you to do so. Local people are encouraged to take part in the inquiry process since local knowledge and opinions can often be a valuable addition to the more formal evidence given by the two opposing sides.

A well known Planning Inquiry took place when Nirex, the organisation responsible for the UK programme leading to the disposal of intermediate level nuclear waste at the time, sought planning permission for a Rock Characterization Facility near Sellafield. From the Sellafield inquiry, which we have already described in Chapter 4, we learn that this kind of public inquiry, with cross-examination of experts, proponents and opponents, is good for testing the authenticity of stakeholders and their experts and all arguments are tested. However, we also learn that too adversarial an approach could be counterproductive to communication between stakeholders. Furthermore, the inquiry format is not automatically effective in clarifying what are the factual and what are the normative issues. In a court-like procedure you try to find 'the truth' in a certain issue which means that the value-laden parts of the issue are not dealt with as material.

Another example of face to face public involvement in environmental issues is the public hearings that the Environmental Protection Agency in the Unites States convenes several hundred times per year. In a report by Resources for the Future (Beierle, 1999) it was concluded that these hearings do not meet a number of basic requirements for good public involvement. For example they seem to encourage participants to take extreme positions and therefore they do not reduce conflict, they involve organised interests rather than members of the concerned public, and they are sometimes used to defend agency decisions rather than to involve the public.

Science court

Where there is scientific uncertainty and opposing views of a disputed issue among scientists, the public has a right to insight into what the scientific status of the issue actually is. The idea of a 'science court' was proposed by the engineer Arthur Kantrowitz in 1967 in order to meet this demand. In his proposal, the court was viewed as a mechanism of transparency which could bring openness and clarity to the consideration of expert knowledge. The idea of the science court is to separate facts from values and to prevent 'the extension of authority beyond competence' (quote from Jasanoff, 1995, p. 65).Even if the science court has never been institutionalised, and even if lay person participation is limited to insight, the idea has such significance as a matter of principle that I have included it in this overview.

The science court procedure tries to separate facts from values when dealing with conflicting views of knowledge. Furthermore it tries to sort out irrelevant parts from fundamental ones in order to identify a hard core of knowledge on which scientists agree. The important thing with science courts, compared to traditional expert committees, is that the procedure of sorting facts from values, and relevant knowledge from less relevant, is done in a systematic and clearly visible way which is documented, so that everyone can view and assess the procedure.

In a science court, the important decisions of sorting arguments are in the hands of a judge, a third party, a panel etc, who has to play the role of neutral expert. This role is obviously critical, since total neutrality does not exist and the statements of the judge may reflect hidden values (Brante and Norman 1995, p. 175). On the other hand, if the procedure takes place openly in public there should be some opportunity to reveal hidden values and vested interest. The focus of a science court is on factual controversies, which could conceal more important disagreements about the social or moral desirability of the phenomenon at stake, for example a specific technology (Jasanoff, 1995, p. 66). In the overall policy-making system there must thus be functions that can incorporate the results from a science court and make the other aspects of the issue equally visible.

What is a good process?

Each one of the processes we have described here has it own characteristics and its own niche of application. They also have their own limitations in terms of involvement and transparency. Even if the consensus conference has had great success, questions can be asked about the role of expertise versus the role of citizens. Are the citizens free enough from expert influence? Obviously, the Board has a critical role in agenda setting and the selection of experts. There seems to be little room for stretching, but it is clear that the process often creates new insight into what citizens really think. The science shop is a unique idea for laypeople to set agendas, but the impact on public awareness is probably low. It is likely to increase trust in science, but scientists' own value systems remain unexplored. A simulation gives pre-understanding about issues that later will appear on the official agenda and creates more awareness among stakeholders, but with little impact in the public sphere. Team syntegrity treats all participants equally and has a high potential to increase awareness, but with little insight from the outside world. Focus groups give in-depth information about what people think, which can be used for strategic purposes, but insight and influence is limited to a small group of participants. The UK planning inquiry challenges stakeholders in the public arena, but the court-like process makes them reluctant to engage in dialogue and the value-laden aspects are not really exposed.

These are only some observations that can be made about only a few of the many processes for public participation that are being used in different countries and in different areas of application. Is there a systematic way to compare and evaluate all these process and others?

The role of, and the need for, risk communication and public participation in environmental and public policy decision-making has been increasingly acknowledged over the last twenty years and much research and development has been devoted to the field of public participation. However, governments, industry and other participants still struggle with what makes 'good' public

participation (Santos and Chess, 2003, pp. 269–79). A number of authors have recognised that although there is a large body of practical insights from case studies of public participation, there is still a need for more conceptual and theoretical understanding in order to help match method with context and purpose (see e.g. Webler and Tuler, 2002).

Approaches to evaluation

A variety of schemes for evaluation have been proposed but no one group can claim to have solved the problem. In Europe, the UK has been the leading country in the area of research-driven public participation, in particular, on the issues in food safety and biotechnology. Gene Rowe and Lynn Frewer at the Institute of Food Research present nine criteria for the evaluation of processes: representativeness (participants should comprise a representative sample of the population), independence, early involvement, influence, transparency,[8] resource accessibility (participants should have adequate resources for their participation), task definition (a clearly defined process), structured decision-making and cost effectiveness (Rowe and Frewer, 2000).

In a study for Resources for the Future, Thomas C. Beierle and Jerry Cayford have made an extensive review of public participation processes in the Unites States (Beierle and Cayford, 2002). They used five 'social goals' in their review:

- incorporating public values into decisions
- improving the substantive quality of decisions
- resolving conflict among competing interests
- building trust in institutions
- educating and informing the public.

Beierle and Cayford gathered a large number of reports on public participation processes, and evaluated 239 cases spanning over 30 years. The various mechanisms for participation were grouped into four main types: (1) public meetings and hearings, (2) advisory committees not seeking consensus, (3) advisory committees seeking consensus, (4) negotiations and mediations. Among the five social goals 'educating and informing the public' was the easiest one to comply with whereas, not surprisingly, 'building trust' scored lowest.

This report concludes that processes with more intensive mechanisms than for example traditional hearings, and processes where agencies are responsive to stakeholders, are more likely to be successful than others. It also concludes that more research is needed to understand how the context of decision-making, such as the nature of the issue and the institutional settings, affects the success of participation.

Rowe and Frewer have not only developed their own criteria but also reviewed the entire field of public participation exercises (Rowe and Frewer,

2004). They have collected no less than 34 studies world-wide on public participation evaluation. The evaluation criteria vary broadly between research groups, but some of the most common ones are representativeness, deliberation, fairness, competence, impact and influence, effectiveness (for example, in decreased time to develop regulations), early input, responsiveness to results and consensus. Rowe and Frewer conclude that research in this area has been disorganised and sporadic and they suggest a more systematic research agenda.

The transparency dimension

There is no simple answer to the question what makes good public participation. Obviously there is no one superior process, and no one best set of criteria to evaluate the processes. It all depends on the context and the purpose. In certain circumstances transparency will have top priority and in other cases it may be of more limited importance. The further development of criteria and frameworks for comparing processes thus needs to take not just the characteristics of the processes themselves into account, but also the context in which they are supposed to work. It is clear that consensus conferences, simulation and team syntegrity have very different characteristics but they will all be 'good' processes when used in an appropriate context. The problem is that we don't have the means to determine which process is the best one for use in a certain situation.

In order for us to understand how the processes described above and other processes can contribute to more informed decision-making they need to be mapped and evaluated. Clearly, with the philosophy developed in this book, one evaluation criterion should be how the processes meet our requirements for transparency (the RISCOM model), an aspect which has not been addressed by existing evaluation frameworks.

Figures 12.1–12.4 summarise an attempt to characterise processes by using the RISCOM model.[9] In these figures I have included the *expert committee* as a baseline for comparison. The traditional way of using expert knowledge in decision-making is to set up a committee of experts (expert panel, advisory group etc). Such a group summarises the knowledge needed and advises decision-makers how to use this knowledge. This strategy implies a clear separation of knowledge questions from policy issues – something that I have already made clear is not functional in post-modern society.

Figure 12.1 shows the context within which the various public participation processes operate, whether they are actually a part of the decision-making process, have an advisory function or are purely informative without a close link to decision-making. A science shop, for example, has no other role than to increase the public's knowledge, whereas consensus conferences actually have an advisory role to the policy makers. The only process on our list having a formal role in decision-making is the UK Inquiry which is a mandatory procedure resulting in a government decision. The horizontal

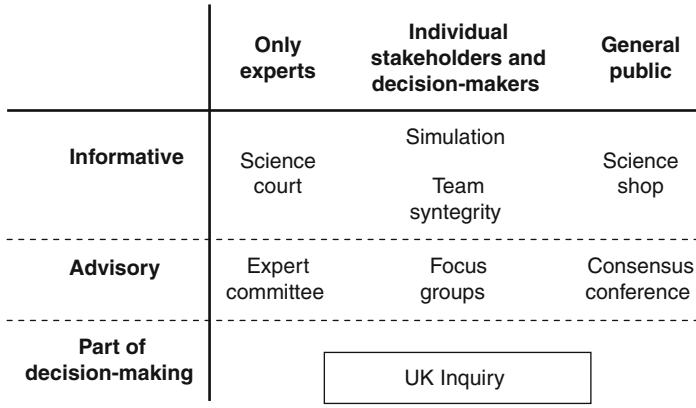

Figure 12.1 Context of public participation processes

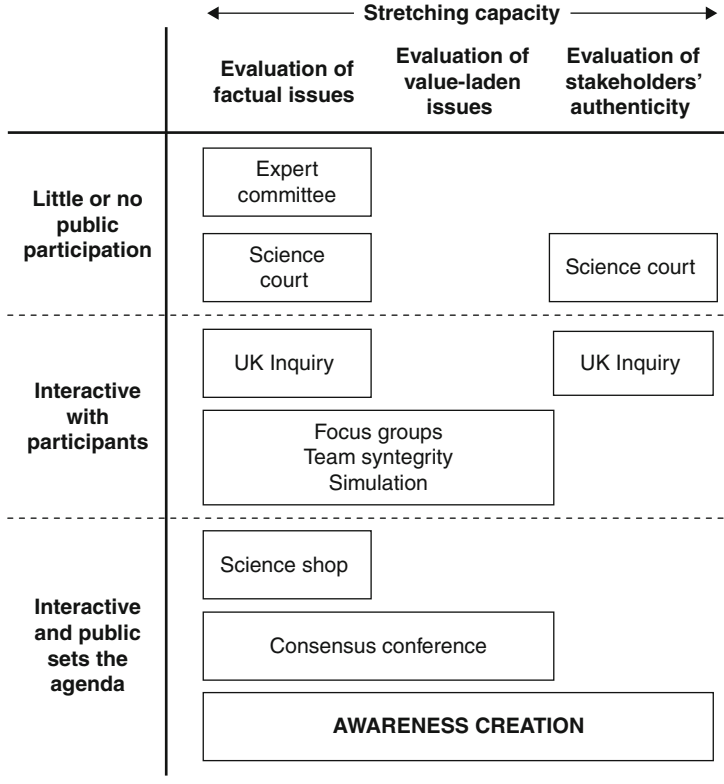

Figure 12.2 Capacity of processes with respect to elements of stretching and how the public is involved

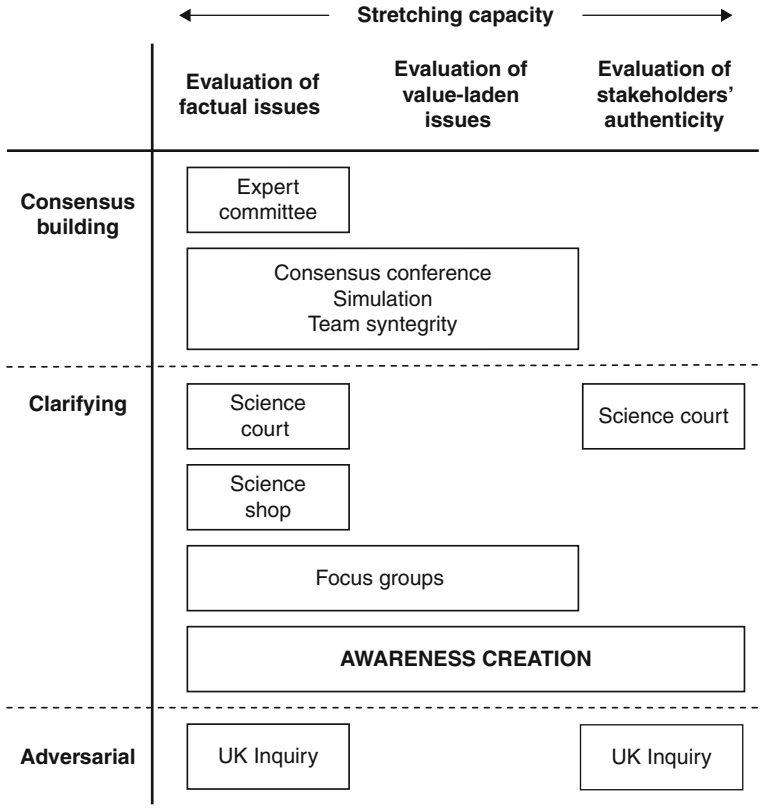

Figure 12.3 Capacity of processes with respect to elements of stretching and degree of consensus building versus being adversarial

axis in the figure shows how 'the public' is represented, either with individual stakeholders or open to all.

Figures 12.2–12.4 together illustrate four dimensions into which public participation processes can be mapped:

1. Capacity for stretching: to evaluate facts, values and authenticity of stakeholders. With our framework for awareness building and transparency, this must be our first dimension for evaluation. Here it is included in Figures 12.2 and 12.3.
2. Extent of public involvement: whether the procedures are interactive with the public and whether they allow the public to set the agenda. This dimension is found in Figure 12.2.
3. Consensus building – clarifying or adversarial in character. This is shown in Figures 12.3 and 12.4.

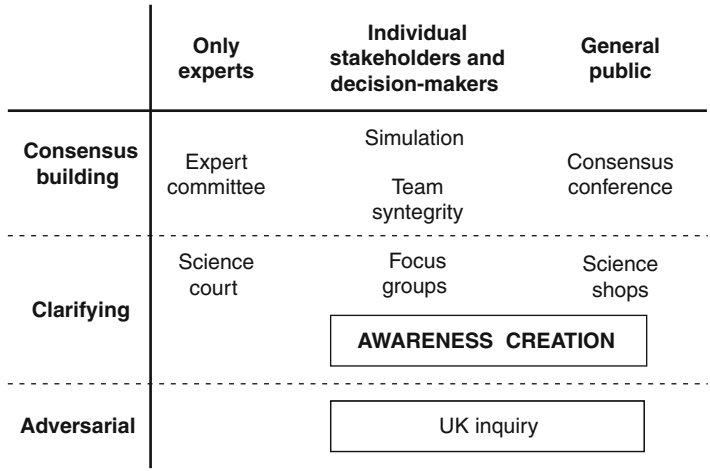

Figure 12.4 Mode of public involvement and amount of consensus building versus adversarial character of studied procedures

4. Mode of representation (with individual stakeholders or open to all), a dimension included in Figure 12.4.

In the figures I have included what would be an ideal process of participation for the purpose of awareness creation as defined in Chapter 11. Such a process would have full stretching capacity evaluating facts, values and authenticity. Citizens including lay people and non-official stakeholders should have an agenda setting power equal to that of the experts and the political establishment. The ideal process should not strive for consensus at the expense of clarification – on the other hand, over polarisation and too much adversarial procedures will cause stakeholders to act strategically and fragment issues in order to 'win the case'.

I admit that the characterization of processes given in these figures may appear both premature and based on subjective judgement. They are not the result of any in-depth scientific evaluation. The aim is only to contribute to the discussion of how participative processes could be described and evaluated in a consistent manner. A more comprehensive effort towards a 'science of public participation processes' could start with the development of both the context description (Figure 12.1) and the mapping of processes (Figures 12.2–12.4) by exploring what would be the relevant dimensions. A second aim of this mapping of processes is to emphasise that the principles of the RISCOM model need to be included in the topology as a dimension of awareness creation.

In spite of the obvious limitations of our highly preliminary mapping of processes, we can make some observations:

1. All of the processes aim to clarify factual issues, but only a few clearly address the values involved.
2. Some of them, especially consensus conferences and focus groups, have the potential to bring up the values of stakeholders and lay people. However, if this is not explicitly emphasised by the organisers, the participants may easily fall into the trap of expert narrow framing.
3. When it comes to the capacity to evaluate the authenticity of experts and stakeholders, only the UK inquiry system and science courts seem adequate, however, in the latter case only with regard to the experts. In the UK case the capacity to evaluate authenticity is built into the formal process.
4. It follows from observations 1 and 2 that none of the processes addressed here is ideal for achieving transparency. The combination of a process which incorporates values with the hard testing of authenticity, including vested interest seems to be especially difficult to achieve. For example the UK inquiry, being a system 'looking for the truth', is not designed for the explicit discussion of value-laden issues. Consensus conferences, on the other hand, which are conducted more in a dialogue format, can hardly challenge the experts in depth due to limited resources and time.
5. With the proper procedures it is possible to get committed involvement from 'ordinary' citizens. In consensus conferences lay people can set the agenda, define the problem and also choose the experts to be questioned. Focus groups can bring citizens, who otherwise may have few opportunities to participate, into policy debates.
6. Examples also show that public participation can have a clear impact on the outcome. Also, the symbolic value of consensus conferences is important: they demonstrate that lay people are committed and able to cope with complicated issues.

Transparency or consensus?

In general, our comparison with the 'ideal process' leading to awareness indicates that something crucial is missing since none of these processes can really meet our requirements for awareness and transparency. Consensus in itself does not lead to awareness unless all of the issues, including underlying values, are first shown openly. Transparency first – consensus later! Would it be possible to take the positive features of the UK system (authenticity testing) and modify them to a hearing format with an approach that involves more consensus building? Or could it be combined with other processes that would compensate for the features it lacks, perhaps under some of the umbrella processes we will discuss in the next section? Or do we need to construct a new framework for participation which leads to the level of transparency

and awareness we want? And how do our processes of public participation fit into the models of democracy? We will come back to these fundamental questions later in the book.

Research to understand the pros and cons of different participative processes in different situations and using different criteria should be of particular importance for the further development of tools for enhancing democratic goals. One critical aspect here is how the participative processes are appreciated by the citizens themselves. If the processes are not set up in a careful way they may be seen as nothing more than a new, more sophisticated tool for those in power to reach their goals. Following the terminology of Habermas of communicative versus strategic action, participative processes can be one form of latent strategic action, namely manipulation (Habermas, 1979, pp. 1–68). To avoid this, fairness in design and a trustworthy guardian of the process to be used are essential components.

Developing a systematic framework for the description of public participation processes is not a straightforward task. There are a number of unresolved research issues involved. The relationship between transparency and consensus building is a matter of concern, to name but one such issue. In certain circumstances, transparency may lead to increasing consensus, but in other situations to decreasing consensus. This is an issue that can be debated from two perspectives. One is the research issue as such, that is under what circumstances we can get one or the other type of result. The second perspective is whether decreasing consensus, in other words an increasing variety of views, is good or bad *per se*. From a democratic point of view, transparency leads to a higher level of awareness of all aspects of the issue, which should benefit the quality of decision-making. If transparency in a certain phase increases the amount of opposing views, there needs to be a well grounded democratic decision-making process that can incorporate them and different value systems in a trustworthy way.

Here we have seen that the RISCOM Model can support the development of criteria for public participation processes. If, as we have claimed, transparency is a requirement for a high quality decision-making process, the RISCOM Model should be part of the picture when describing participative process and evaluating them.

Umbrella processes of public participation

The type of processes for public participation we have discussed so far are run for a relatively short period of time and are events that can be scheduled at optimal points to give the best possible input to the overall decision-making process. There are also processes for participation that can be run over a longer period of time. They are typically based on certain core principles and they have to varying degrees been formalised in legal systems. They can be seen as overarching processes that could be umbrellas to host a number of innovative

activities, such as the processes we have already discussed. Here we deal with three such 'umbrella processes': Environmental Impact Assessment, Strategic Environmental Assessment and Participatory Technology Assessment.

Environmental Impact Assessment and Strategic Environmental Assessment

There are many conceptions of what is meant by Environmental Impact Assessment (EIA); it can be a planning instrument, a legal framework or simply a set of principles for good practice in making environmentally related decisions. To me, the 'EIA story' started as a source of inspiration for how to set up a process leading to high quality decisions with the participation of key stakeholders and the general public. While using the EIA concept in that way in the Swedish municipality of Oskarshamn we observed two different and contradictory lines of development. On the one hand, the EIA idea became increasingly widely disseminated across the world. It was introduced in legislation in many countries and the European Union and the area of application was broadened to include not only projects but also plans and programmes. On the other hand, the original enthusiasm over a new and almost revolutionary idea was replaced by pragmatism and the fresh ideas from the 1980s were lost in administrative procedures. A pessimistic observer would regard this as a typical example of winning battles but in the end losing the war. An optimist on the other hand might point out that EIA has made environmental assessment a little better, and that it still has great potential if we just stick to the key principles. Here we shall give a brief history of EIA in order to put the concept into our context of awareness creation and participation.

It all started in the United States with the National Environmental Policy Act of 1969 (NEPA, 1969) which introduced the concept of an environmental impact statement (EIS). The primary purpose of EIS was for it to serve as a device to ensure that US environmental policies and goals were incorporated into the ongoing programmes and actions of the federal government. The importance of the ideas introduced in NEPA was recognised at a time when there was an unprecedented interest in the environment, an international manifestation of which was the UN conference held in Stockholm in 1972. The problems which NEPA was intended to address were those of industrial development, with pollution and destruction of the natural environment, and were perceived as universal.

The Act made clear that the environmental impact of proposed agency actions must be assessed *before decisions were made* rather than afterwards. Secondly, agency decisions must not be made without first having evaluated alternatives to the proposed action. The regulations of the Council on Environmental Quality, which provides agencies with guidance on how to implement NEPA, thus states: 'The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major

points of view on the environmental impacts of the alternatives including the proposed action' (Code of Federal Regulations, 40 CFR 1500).

The structure for a rigorous project evaluation of environmental consequences which the NEPA process introduced was seen as a model for many other jurisdictions, initially on a state level in the US where California was first and then also in the international arena. There is some confusion in terminology, however, since EIA has internationally become the term used for what is named EIS in the United States. On the following pages we use the term Environmental Impact Assessment (EIA).[10]

As already said, the EIA idea has become widely spread both as a formal legislative process and as a set of principles that are used in more informal frameworks. The two core principles in NEPA, that of early start of the EIA and the requirement of assessing alternatives to the suggested action, have been retained in all areas of application. They are also included in the operating principles of environmental impact assessment best practice published by the International Association for Impact Assessment (IAIA).[11] The NEPA also emphasised that environmental impacts should be discussed in proportion to their significance. In cases where no significant impact is found, there should only be enough discussion to show why more study is not warranted. The phase of EIA which aims to identify the issues and effects likely to be important, and thus to determine the topics covered in the EIA, has been called *scoping* by the international EIA community. Obviously this is a critical, perhaps the most critical, phase of an EIA study. If the scoping is too broad it will take resources from the most important issues. If it is too narrow, it will later be found that it has to be repeated with a broader scope.

The main reason, however, for giving EIA so much space here is that public participation became an important part of the EIA identity at an early stage. This is also one of the IAIA principles of best practice: 'The process should provide appropriate opportunities to inform and involve the interested and affected publics, and their inputs and concerns should be addressed explicitly in the documentation and decision-making.' Public involvement can take place in various phases of the EIA process, but it is usually recommended that involvement begins early in the process.

There is an EU Directive on EIA[12] as well as national legislation in EU countries. The Directive requires public participation to occur as part of the EIA process for certain projects, including disposal facilities and facilities for long-term storage of radioactive waste. This participation must take place before a decision is made on whether to grant development consent. In practice, however, the request for participation is quite weak. It only gives 'the public concerned the opportunity to express an opinion before the development consent is granted', and it leaves it to the individual countries to determine the manner in which the public is to be consulted, 'for example, by written submissions, by public enquiry'. The European Commission now seems to be dissatisfied with the current practice of public participation across the EU.

The extent of public involvement varies considerably between EU countries and the interpretation of 'the public concerned' varies from quite narrow to wide. There is a need, in the Commission's view expressed in a report to the European Parliament, for better formal and informal arrangements for consultation (European Commission COM (2003) 334).

The Oskarshamn model

The case of Oskarshamn shows clearly that the basic EIA principles can be very powerful for structuring the decision-making process in a complex area such as nuclear waste management. In the research and development programme of 1992, the Swedish Nuclear Fuel and Waste Management Company (SKB) proposed siting the planned encapsulation plant of spent nuclear fuel in the Oskarshamn municipality. In response to this, a number of activities were initiated by the municipality – among them the setting up of an EIA Forum, which had its first meeting in 1994. The participants in the forum are SKB, the Swedish authorities for nuclear safety and radiation protection, the Kalmar County Council and the Oskarshamn municipality. Further on, in 1995 SKB sent a letter to the municipality of Oskarshamn asking for acceptance for a feasibility study for the final disposal of spent nuclear fuel within the municipality. The municipality decided to accept on certain conditions and the study started in 1997. The EIA Forum was then adjusted to deal also with the siting programme for a final repository.[13] The Forum celebrated its 50th meeting in March 2005.

The municipality selected the EIA process as a tool to get open access to all relevant information and to exercise influence over the programme. Table 12.1 shows a well-structured EIA process in three phases. The first phase involves scoping to identify important issues to be covered in the EIA. This is a task on which all key stakeholders in the Forum can collaborate without endangering their integrity and independence in relation to upcoming decisions on the acceptability of the proposed installations. One can agree on what must be covered in the basis for decision-making while still having different opinions about which solution is the best. In the next phase it is up to the implementer (in this case SKB) to conduct the investigations and to prepare the EIA document. In parallel, other stakeholders, including the municipality, can continue their EIA process in order to further increase their knowledge and understanding of key issues and to prepare themselves to take care of the SKB application. It should be emphasised that key stakeholders can participate in the process while maintaining their integrity on upcoming decisions. Once SKB has done its investigation and submitted an application, the formal licensing process takes over.

At the local level, the municipality has formed a special project called LKO (Local Competence Building, see e.g. Carlsson *et al.*, 2001). The organisation includes a number of working groups, for example on geology and safety, socioeconomic issues and issues of special interest for people living close to

Table 12.1 The structure of the EIA process in Kalmar county

Phases in EIA process	*Actors*	*Activities*	*Product*
Phase 1			
EIA scoping	All stakeholders*	Meeting with EIA Forum. Meetings, hearings, etc. on the local level	Advice on EIA document
Phase 2			
Implementer investigation	Implementer	Project work	Licence application with EIA statement
Continued EIA process	All stakeholders	Hearings, seminars, etc.	Understanding
Phase 3			
Final phase of EIA = first phase of licensing	Regulator interacting with community	Review and decision hearings	Improved licence application Final decision

Note: *Stakeholders include implementer, regulator, county, municipality and the public.

the potential repository site. The *Oskarshamn model* has been summarised in seven basic principles:

- openness and participation
- the EIA framework provides the overall structure
- the municipality council is the local client
- citizen involvement
- environmental groups are seen as a resource
- the regulatory authorities are seen as municipality experts
- SKB and the regulators are stretched to clear answers.

The EIA framework was introduced at the very beginning as the overall methodology for organised participation which included the EIA Forum starting in 1994. This was well ahead of the 1999 Swedish regulation which introduced EIA as part the Environmental Code. The Oskarshamn example thus demonstrates the power of the basic EIA principles even when implemented without formal legislation. It also shows that that one can be innovative and build new processes within an existing legal framework and within the normal working format of representative democracy. The municipal council is the formal client of the EIA process. Thereby local politicians get involved, their knowledge increases and they prepare themselves for upcoming decisions. The municipality thus uses the established form for

representative democracy in this critical issue. Ultimately the project leads to a general vitalisation of the local political decision-making process.

Oskarshamn has applied our principles for transparency with the three corners in the 'RISCOM triangle' and 'stretching' in practice. Even if different aspects have not always been treated as clearly as would be expected in an ideal process, many of the activities in Oskarshamn have served the purpose of clarifying facts and value aspects in issues such as the 'zero solution' (which in this case means no new disposal facilities), reprocessing and transmutation, and the impact of ice ages on a repository. The municipality council, the working groups and, to a certain extent, the interested public have now developed such competence that they should have the capacity to stretch the nuclear industry to a considerable degree.

The municipality involvement has been successful in several respects. It has been possible to influence the programme to a large extent, to meet certain municipality conditions and to ensure that the local perspective is retained. The local competence has increased to a considerable degree. The activities generated by the working groups have created a large number of contacts with various organisations, schools, mass media, members of the general public and interest groups. Over the years, an impressive number of activities have been organised as part of the process. Even if one can now see a decreasing momentum in the Oskarshamn involvement due to several reasons (such as the formal take-over by SKB of the EIA process and the long time scale of the programme in relation to other political processes), the early initiative serves as an example of how EIA good practices can be implemented.

Strategic Environmental Assessment

One interesting and potentially important line of development is Strategic Environmental Assessment (SEA), which basically means using the EIA principles for projects on the higher levels of policy and planning. The idea of implementing EIA for plans, programmes and policies was promoted early on and the SEA concept was subsequently used in connection with impact assessment at the strategic level of planning and decision-making. As for EIA, initial expectations were high and much research and administrative efforts have been used to develop guidelines.

The European Union now also has an SEA Directive in force (European Union, Directive 2001/42/EC). The directive concerns plans and programmes which are subject to preparation and/or adoption by authorities at national, regional or local levels. Its purpose is to provide a high level of protection for the environment and to integrate environmental considerations into plans and programmes for future development consent of projects. Authorities must provide an outline of the reasons for selecting the preferred alternatives. The directive stipulates that the public shall be given an early and effective opportunity to express opinions of draft plans and programmes. The detailed arrangements for the information and consultation shall be determined by

the member states. In the European Union, the original intention was to incorporate also environmental policies in the new directive, however, the final directive only deals with plans and programmes.

Due to the large variety of administrative, cultural, and legal circumstances, the implementation of the SEA Directive into national legislation across Europe certainly offers a number of challenges, something which is already well documented for the relatively homogeneous Nordic region of Europe (Hilding-Rydevik, 2003). One main challenge lies in developing public participation. As Mikael Hildén and Pauliina Jalonen at the Finnish Environment Institute have already pointed out there are fundamental problems concerning issues of representative democracy, e.g. which groups can act as spokespeople for the public (Hildén and Jalonen, 2003): 'These issues are related to the problem of raising interest in abstract plans and programmes, especially those with strong political elements.' We have set the scene for a more in-depth discussion about the relationships between public participation and representative democracy in Chapter 10 and we shall come back to this in the next chapter.

Reflections on EIA and SEA

From the perspective of public participation and transparency, the development of EIA and SEA must be seen as a positive step. The requirement that the implementer must show the consequences of not realizing the proposed project (the zero alternative) broadens the basis for decision and the requirement for public consultation increases the concerned citizen's opportunities for insight and influence. In a broader sense, 'best practice EIA' rests on principles that can guide the entire decision-making process. These include public participation, the need to analyse the 'zero alternative' and the need to start the EIA process early, i.e. before the real decisions have been made – something which often takes place long before formal decisions are made.

However, compared to the initial potential of EIA, we see limitations and drawbacks in the present situation. Cleary one can follow the EIA and SEA legal requirements in an administrative way without any real public participation and without any progress in terms of transparency. The requirement for early public participation is quite flexible. So much so that in the case of one of the most important 20th century projects in the Nordic countries – the Öresund Bridge connecting Copenhagen in Denmark and Malmö in Sweden – the EIA was done *after* government decisions in Denmark and Sweden had been made (Falkemark, 1999).

Another problem is that the EIA principles are being diluted in the very large variety of projects that are subject to EIA legislation. In some countries the same rules, including the analysis of the zero alternative and public consultation, apply for almost any type of project. In principle, the siting of a nuclear installation follows the same rules as trivial projects. One result is that the minimal procedures followed (correctly) for a large number of small

projects can also be applied to the small number of large projects with very significant effects. The revolutionary EIA principles can thus be reduced to a list of administrative procedures to be ticked off in the margin. There should be some kind of screening system to decide which projects would be subject to EIA. The EIA and SEA processes should be saved for the significant projects, plans and programmes as the Swedish EIA expert Peggy Lerman suggests (Lerman, 2003).

In the Unites States, the practical implementation of EIA varies between different environmental fields. But in some important projects the EIA principles certainly have very limited impact. The decision by the US Congress that the Yucca Mountain site would be the only one site to be investigated for final disposal of high level nuclear waste was made without any reference to the EIA principles. It is a tragedy that the country where EIA was born ignores its core principles when it comes to one of the major environmental issues in our history.

In spite of its limitations when being formalised in legal settings, and in spite of the fact that governments often ignore the original spirit of EIA (even when formalised in legal procedures), the EIA framework can be a powerful instrument for citizen involvement and for providing a broad decision-making basis. In the RISCOM Pilot study (Andersson, Espejo and Wene, 1998), the EIA was seen as a possible umbrella under which many different innovative activities could be arranged. Perhaps, for EIA and SEA the best way forward in setting formal requirements is not to be too detailed in procedures, but to be strict in following up the basic principles and leave the field open for innovative initiatives adapted to particular situations arising in specific projects.

From a broad perspective, with the EIA addressing private or public projects and SEA addressing public plans and programmes, a wide gap is left open for commercial plans and programmes which can, of course, also cause significant environmental effects. For this category we have to wait to apply the principles of EIA and SEA until concrete projects are realised that will be a subject for licensing processes. Of course, I don't mean that the public should have access to commercial plans for new products or services. There are certain areas, however, especially in biotechnology and information technology, where research and development goes on gradually but with a high speed, which may have very important consequences for human health and dignity as well as for the environment. For such areas, the application of EIA/SEA principles could be quite effective in increasing social awareness. Different alternative avenues of development could be investigated and compared with the 'zero alternative'. Scoping could be done at an early stage and stakeholders and the general public could be consulted.

Furthermore, scoping could be done through cooperation between stakeholders and agreements could be reached about which aspects are important for detailed investigation without taking the decision-making power away

from the political system. The ultimate aim would be to bring the crucial issues to the table at an early stage, so that politicians get a real opportunity to set conditions on the application of these technologies. The situation would be different to the EIA and SEA areas of application in one important respect. For EIA and SEA it is normally the responsibility of the project, plan or programme owner to start the process and to produce the assessment, and normally it is also easy to identify who that is (a company, a national, a regional or a local planner). In the case of technological development, this must be up to the official bodies; parliament, the government or an institution having this as its specific responsibility. This reasoning leads us to a closer look at the concept of Participatory Technology Assessment.

Participatory technology assessment

Participatory technology assessment (PTA) is a broader concept than the individual participatory processes we first discussed in this chapter and the formalised procedures of EIA and SEA. In fact it covers all these approaches with the common aim of 'finding solutions together' or 'generating dialogue'. One of the most comprehensive reviews of PTA has been done by the EUROPTA project (European Participatory Technology Assessment) which had as one of its objectives to advance the understanding of the role of PTA (Klüver *et al.*, 2000).

In building an overall framework for PTA, the EUROPTA report divided PTA arrangements into *active* ones where the main initiative comes from the citizens ('grass-root PTA'), and *passive* ones where citizens are used as a source of information or of support or rejection rather than being agents themselves. A PTA arrangement can be either formal or informal. A *formal* PTA has procedural rules dictated by law whereas an *informal* PTA would be practised without a legal basis. In these terms, the EIA and SEA are formal PTA processes (required for example by EU Directives) which can be invoked in courts, for example if the citizens have not been consulted properly. The participative processes we dealt with in the first part of this chapter (consensus conferences, focus groups etc), which don't rest on a legal basis, are examples of informal PTA.

The EUROPTA report describes the idea of participation in technology assessment as being to a great extent based on democratic arguments. This justification of PTA views participation as a requirement of democratic politics, making technology assessment 'an intermediary between the public and politics respectively, supposed to raise the democratic basis of decision-making'. And further on (Klüver *et al.*, 2000, pp. 23–4): 'Participation in technology assessment should ensure that alternatives in technology and social policy are generated. Secondly, the democratic involvement of those previously excluded from decision-making should be enhanced.'

The report confirms our general observations on participative processes: 'European participatory technology assessment has over the last ten years

or so evolved into a rich, diverse activity, ranging from numerous stakeholder round tables, scenario workshops to lay consensus conferences, and from biotechnology studies, technology foresight to urban transport reviews' (ibid., p. 169). Not only is there a very broad diversity of activities, but also a variety of roles for PTA, such as evaluating public attitudes towards new technologies, identifying and characterizing problems, resolving conflicts, drafting policy options for R&D and/or for technology implementation, creating visions of future policies, creating social networks around technologies, and carrying out strategic planning (ibid., p. 170).

The picture that emerges from the EUROPTA report is that PTA is a philosophical framework that unites a large number of activities with a variety of objectives, with the common democratic ideal that participation makes a difference. Another overview of PTA is given by Simon Joss in a special issue of the Bulletin of Science and Technology (Joss, 2002). He describes how technology assessment, in spite of having been borne as a result of public involvement in science and technology, was developed as an expert tool for policy analysis (ibid., p. 222):

> At best the link to the wider public was seen as unidirectional, in the sense that the knowledge and information emerging from technology assessment were to be conveyed to the public for its better appreciation of science and technology. Attempts by citizens' groups and special interest groups to gain access to the process of technology assessment were by and large rejected.

Joss, however, concludes that 'the institutionalised technology assessment has been more reflexive and conceptually and methodologically adaptable than some critics expected'(ibid., p. 226). This conclusion is supported by the Danish and Dutch cases, which indeed have served as models for a number of other countries. In these two countries, developments in technology assessment have been relatively inclusive, with the Danish Board of Technology being set up by parliament in 1986 and with the Rathenau Institute also being set up in 1986 as the Dutch national technology assessment organization. The democratic perspective of science and technology has been emphasised and technology assessment has essentially been seen as social assessment with the active involvement of affected social actor groups (ibid., p. 224). The Rathenau Institute runs the Platform on Science and Ethics established in the early 1990s as a consequence of the need for debate about ethical aspects of science and technology which had been identified by the Dutch parliament. The fundamental purpose of the Rathenau Institute is to observe and stimulate the social and political debate on science and technology, and to put the related social issues on the public and political agenda.

It can thus be said that the more informal view on public participation in technology assessment, as practiced in Denmark and The Netherlands, has been more viable than the formalised version as stipulated in environmental

impact assessment requirements. However, it should also be noted that this line of technology assessment has not been followed in other countries such as Sweden or Finland, and certainly not yet by the European Union at large.

The EUROPTA report evaluates an argument often used against PTA: that it can disturb the proper functioning of representative democracy (Klüver *et al.*, 2000, p. 171). The reason for this would be the competing claims for representation between elected politicians and appointed professionals on the one hand, and those involved in PTA on the other. The EUROPTA report dismisses this argument against participation. Instead, the report states that it is the representative democratic system itself which, in response to public controversy and pressure, wishes to open up new participatory discourse processes of science and technology policies. We shall come back to this critical issue. However, we can already say that whether the opposing argument is relevant or irrelevant depends on the particular form and contents of PTA, as the concept of PTA itself is a very broad one and includes many possible frameworks.

International conventions

In addition to practical methods, legal requirements on impact assessment and more philosophical approaches to public participation there are international conventions where countries have committed themselves to certain levels of citizen involvement in technical and environmental assessment. Such conventions exist for specific areas, such as the Cartagena Protocol on biosafety, but here we shall deal with two of the most prominent ones that are not limited to a certain technological area but are more generic – the Espoo Convention on environmental impact assessment in a transboundary context, and the Aarhus Convention on information, participation and justice in environmental matters.

The Espoo Convention

The Espoo Convention was formulated by the United Nation's Economic Commission for Europe in 1991 and entered into force in 1997. The general objective is to prevent or reduce the adverse transboundary impacts of proposed activities. The convention lists projects where an Environmental Impact Assessment is to be carried out in areas likely to have considerable cross boundary effects. Examples of such activities are oil refineries, nuclear power reactors, radioactive waste management facilities, major infrastructure projects (e.g. construction of motorways, lines for long-distance railway traffic and airports), large oil and gas pipelines, dams and reservoirs, pulp and paper manufacturing and storage facilities for petroleum, petrochemical and chemical products.

The convention requires environmental impact assessment procedures that permit public participation – not just for the public in the country of origin[14]

but also for the public in areas likely to be affected. This means that members of the public in a neighbouring country should be given the same rights of participation as the public in the country where the activity will take place. The convention thus requires extensive levels of cooperation between the countries involved. As the result of an amendment adopted in 2004, the public in all affected countries is also allowed to participate in 'a procedure for the purpose of determining the content of the environmental impact assessment' whenever the country of origin intends to carry out such a procedure. This is what is generally called the scoping phase of environmental impact assessment.

After completion of the documentation for the environmental impact assessment, the country of origin must, without undue delay, enter into consultations with all affected countries. The purpose of these consultations is to map the potential transboundary impact of the proposed activity and agree on measures to reduce or eliminate this impact. These consultations may relate to possible alternatives to the proposed activity, including the no-action alternative.

The procedures stipulated in the Espoo Convention have been followed in many types of activities, for example bridges between countries (Bulgaria and Romania), pipelines between countries (Italy and Croatia), and nuclear waste disposal sites situated on the coast (Finland). However, in general the actual amount of public participation seems to have been low and only a few comments were received in these cases.

The Aarhus Convention

The Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (United Nations Economic Commission For Europe, 1998), came into force on 30 October 2001. It has been described by UN Secretary-General Kofi Annan as 'the most ambitious venture into environmental democracy undertaken under the auspices of the United Nations'.[15] Although the convention is a European regional product, it is open to accession by any country. The convention has been signed by 40 countries and in July 2007 more than 35 countries had ratified or approved it – many of which are Eastern European and Central Asian[16] countries. The Aarhus Convention consists of three pillars:

1. access to information
2. public participation in certain decisions relating to the environment
3. access to justice in matters pertaining to the environment.

The first pillar governs access to environmental information. The public has a right to request and receive information about the state of the

environment, factors and activities that influence the environment and the state of human health and safety if affected by the state of the environment. Within the framework of national legislation, the way in which public authorities make environmental information available to the public must be transparent and environmental information must be effectively accessible.

The second pillar governs public participation in decision-making procedures for activities, plans, programme, policies and regulations which are likely to affect the environment. For activities, at an early stage the public concerned shall be informed of the proposed activity, the application on which a decision will be taken and the procedure for participation. Procedures for public participation shall allow the public to submit, in writing or, as appropriate, at a public hearing or inquiry with the applicant, any comments, information, analyses or opinions that it considers relevant to the proposed activity. An annex to the convention lists the activities which are unconditionally subject to public participation. These include many energy, mineral and chemical industries as well as specified infrastructure projects such as railways, highways and airports. The Aarhus Convention not only obliges the signing Parties to let the public submit its views, it also ensures that the decision-maker takes due account of the outcome of public participation. This requires the relevant authority to consider seriously the substance of all comments received, regardless of their source, and to include the substance of the comments in the motivation of the final decision (United Nations Economic Commission for Europe, 2000, p. 109). The convention requires that the public shall have the right to participate in the decision-making process not only for specific activities but also for plans, programmes and policies and in the preparation of regulations.

The third pillar stipulates that a person has the ability to go to court or another independent and impartial review body to ask for review of potential violations of the convention, for example if his or her request for information has been ignored, wrongfully refused or inadequately answered.

In December 2004, the Environment Council for the European Union gave approval to ratify the Aarhus Convention. In a press release, Stavros Dimas, Commissioner for the Environment, said (European Commission, Press release, 20 December 2004):

> Today's agreements mark a milestone for greater citizen involvement in environmental matters. They demonstrate that the EU stands firm in its commitment to apply the principles and rules of the Aarhus Convention in its own environmental decision-making. I am particularly happy about the improved public access to information about environmental matters – an area of concern to all of us.

As we have observed already, the European Commission has not been completely happy with the way member states are following the EIA Directive.

In its report to the European Parliament (European Commission COM (2003) 334, p. 5) the Commission concludes that the transposition of the Aarhus Convention into EIA legislation may provide an opportunity for improvements in public participation in EIA.

Even if the Aarhus convention includes a broad range of activities in the public participation requirement, this was not the case for genetically modified organisms until May 2005. Then, after four years of intense discussion, an agreement was reached between the convention Parties that extends the public's legal right to participate in decision-making on the release and placing on the market of genetically modified organisms (GMOs). The public will have the right to submit comments and the public authorities will be expected to take these into account in the decision-making process. Once made, the ruling should be publicly available together with the reasoning and considerations upon which it is based.

This amendment was welcomed by Ecoforum, Friends of the Earth, and the European Environmental Bureau as a significant step 'in the right direction'. Apparently the discussion had been polarised with resistance from the biotech industry and many EU countries. Pressure form the EECCA countries (Eastern Europe, Caucasus and Central Asia) and Norway seems to have boosted the amendment.

It is interesting to note that the Aarhus convention goes further in its requirements on participation in environmental matters than EU Directives on EIA and SEA. The Directives include only projects, which has about the same meaning as 'specific actives' in the Aarhus convention, plans and programmes whereas the convention also includes policies and regulations.

The impact of international conventions

The international conventions on citizen participation have an important but limited role in raising public awareness in controversial and complicated matters. The Aarhus convention is especially far reaching in its demands for participation in environmental matters. When international conventions exist, critical groups, non-governmental organisations and others can use them as arguments to pressure governments into organising means for information and influence that would not otherwise be made available. Being accused of not following a convention is embarrassing for governments.

On the other hand, the importance of the conventions should not be overestimated. They give little practical advice about what kinds of participation processes should be used, how they should be set up, how the results should be followed and how the processes should be evaluated. In practice, as is the nature of international agreements, much of this will be up to the parties to define within their own countries. Then there is a huge gap between minimal and more demanding applications. Normally, we can expect governments to do enough to make it arguable that the conventions have been followed, but not much more. Here NGOs can play an important role in making the public

aware of the existence of conventions such as the Aarhus Convention and to put pressure on their own governments to follow them with more ambition.

Communication or manipulation?

In this chapter we have explored a wide range of approaches to public participation. The concept of participatory technology assessment can be seen as the common idea that brings together all the other approaches. The Aarhus convention is the most powerful convention agreed on internationally that sets standards for participation. EU directives and national legislation on environmental impact assessment and strategic environmental assessment give legal frameworks for insight and participation in environmental matters and they can be powerful instruments for citizen involvement and for broadening the decision-making basis. With the Espoo Convention the right to participation crosses the boarders to countries being impacted by activities taking place in another country. Then we have a broad set of methods, such as consensus conferences and focus groups, that can be used within the more general and legal frameworks. Progress made in some cases, such as with consensus conferences and participation in matters relating to nuclear waste, demonstrates that lay people can be involved and are able to cope with complicated issues.

All this has broad political and public support, as we see from statements made by the UN Secretary General, EU Commissioners and non-governmental organisations such as Friends the Earth. All in all, the picture is overwhelmingly comprehensive and impressive. What state of affairs could be better? In order to answer this question, we need to look at the practical implementation of regulations and conventions. After all, in spite of all the achievements made in public participation, we still have an increasing lack of trust in the established institutions of society including the expert community and the political system. And we need to critically evaluate if participation, as we have seen it in this chapter, really helps to build the awareness and transparency needed for a democratic way of dealing with complex technologic and environmental issues.

A word of caution

Governments increasingly recognise their reliance upon the active contribution of citizens in making better decisions and for achieving policy objectives. Within the OECD, a programme of work was undertaken under the auspices of the PUMA (Public Management Project) Working Group on Strengthening Government-Citizen Connections during 1999–2000 (OECD/PUMA, 2001). Comparative surveys were conducted among 23 OECD member countries and the European Union, eight in-depth country cases were performed and the results were discussed in five meetings before being published. Among the most important findings in PUMA is an imbalance between the amount of

time, money and energy which OECD member countries invest in strengthening government-citizen connections and their far less strenuous efforts to evaluate the effectiveness of these measures or their impact on public policy-making. Thus more effective ways of evaluation are recommended. Considering the immature state of 'the science of public participation' and the lack of a systematic methodology to describe and evaluate the processes we have already noted, this seems to be a completely logical conclusion.

As we have already emphasised, we must not create expectations among citizens that in the end go unfulfilled. Christian Vergez, Principal Administrator of the OECD Directorate for Public Governance and Territorial Development, has expressed concerns (Vergez, 2003):

> While the benefits of engaging citizens in policy-making may be considerable, governments should not underestimate the risks associated with poorly designed and inadequate measures for information, consultation and active participation. They may seek to inform, consult and encourage active participation by citizens in order to enhance the quality, credibility and legitimacy of their policy decisions. However the opposite effect may be achieved if citizens discover that their efforts to be informed, provide feedback and actively participate are ignored or have no impact at all on the decisions reached.

These are striking words coming from a high OECD official, that participation may in fact be harmful, if organised so that it doesn't keep its promises to the citizens it activates.

Participation requires influence in order be meaningful in the long run. If there is too little impact, participation is close to being a therapeutic, or even manipulative, activity.

Participation as therapy

Already in 1969 Sherry Arnstein, writing about citizen involvement in planning processes in the United States, described the 'ladder of participation' (Arnstein, 1969). She then used the words *manipulation* and *therapy* for the two lowest forms of participation, which in fact are non-participative. Their aim is to cure or educate the participants. The proposed plan is the best one and the job of participation is to achieve public support by means of public relations. In spite of the official support, theoretical achievements and practical case studies over the past 35 years, there are still good reasons for taking Arnstein's words seriously.

In theory, technology assessment has been developed to include social goals and public participation. Sometimes current processes of societal and regulatory decision-making contain elements of public participation, such as public hearings and consensus conferences. However, typically, the traditional established expert community invades these new initiatives for citizen

involvement and transforms them back into 'businesses as usual'. This is what in many cases has happened with environmental impact assessment processes. Often citizen comments are few, the level of involvement is low, or NGO groups have taken over as 'representatives of the public'.

Citizens are brought in and can participate in seminars, focus groups, reviews etc, but there is little expectation that these activities will have any real influence. Interesting events can be arranged and new social groups are created. All this may be good for the participating individuals, but without a real chance of influencing the procedures, assessments and decisions, it can best be described as therapy rather than participation.

Participation as manipulation

At least in a therapeutic situation there is a sense of common understanding that the activity itself is valuable for the 'patient'. New social groups can be created and there can be stimulating discussions. Another situation is when the participating citizens really believe that their work is important for the project or society as a whole and that they can have the power to change, while in fact this is not the case. In the worst case, citizen participation can be arranged so that it looks like citizens will have real influence, but instead the outcome is decided in advance by the controlling body. It is a matter of engineering citizen support. Instead of genuine citizen participation, it is a sophisticated public relations vehicle driven by power holders. Using the words of Habermas, this is a sort of concealed strategic action, which can well be called manipulation. As Arnstein argued in 1969, 'there is a critical difference between going through an empty ritual of participation and having the real power needed to affect the outcome of the process'.

Participation as consensus building or awareness raising?

The distinction between therapy and manipulation might be vague, since in both cases the outcome of the process is determined and controlled by the establishment and participation, in the real sense of word, is only virtual. In spite of this, there are often expectations that 'negotiations with the public' will solve problems and lead to acceptance. Such expectations, whether they are expressed openly or remain unsaid, are simply too hazy and most of all lack any realistic idea of what the place of participation or deliberation should be in our democratic system.

Taking the *principle of awareness* as the point of departure, we should certainly not use public participation for any sort of therapy or manipulation with the aim of getting acceptance for certain projects or technologies. Perhaps it is of some consolation to know that the opposite effect will most probably be achieved by anyone who tries this. Neither should the aim be that of consensus building even if there are often unrealistic expectations that public participation will result in consensus on controversial issues. In fact, the relationship between awareness and transparency on the one hand and

consensus building on the other needs to be carefully analysed. Transparency can contribute to increasing consensus but it may also, under other circumstances, decrease the level of consensus. Transparency means that different value systems are exposed and therefore it clarifies the reasons for opposing views. This, however, should not be seen as a problem in a democratic society, since there should be functioning structures that incorporate the different value systems in the overall political process. Transparency thus gives awareness about the political grounds for decisions, which must be healthy in a democratic society. In that respect, transparency is more important, and should be given priority over consensus building. The approach advocated in this book is that awareness building and transparency must come first.

In theory it has been increasingly recognised that public participation must take place up front as new technologies occur in order to gain public confidence (see e.g. Pilarski *et al.*, 2004, pp. 43–4). However, since the goal of the various approaches to participation we have explored in this chapter is so often consensus building or merely participation for its own sake, there is no guarantee that they will actually contribute to more awareness. Often participation processes are controlled by groups having the attitude that lay people and opposing groups are only 'barriers to acceptance' not competent to judge 'sound science'. Then of course the real value of dialogue or participation is precluded from the beginning. One scenario is that participation following legal requirements means certain administrative procedures with open meetings that simply can be held (and easily controlled) and formally written off in the margin. 'The public', can also be given the opportunity to hand in written comments on environmental impact statements. Even more ambitious activities can be well organised without there being any intention of allowing them to affect the predetermined outcome. It is thus important that the Aarhus Convention obliges the signing countries to take the outcome of the public participation into account.

Participation processes often give a participative role to non-governmental organisations, and normally they rise to the occasion. Since they typically come to the procedures with different perspectives to those of the industry, government bodies and other official stakeholders, they add new substance and therefore they are a resource in the decision-making process. However, there are two problems with their participation that must be kept in mind. Just as any other stakeholder, an NGO is also an actor in the process with its own values and its own interests. NGOs can also play the game of narrow framing and fragmentation. When this happens there is no one there to reveal their hidden values and vested interests. In the worst cases, NGO participation increases confusion and frustration. The second problem with NGO participation is that they often see themselves, and are also regarded by the media, as representing the public, which in fact they cannot do. Instead they also become part of the established system of professional stakeholders guarding their own interests, fragmenting the issues, etc.

In summary, the general recognition of the need for participation gives no insight into what forms of public participation should take place or what should be expected from them. We have not yet understood how a systematic framework for public participation processes should be developed. We must, however, recognise that the idea of participation and deliberation is not new. It has its roots in the late 1960s and the early 1970s when many of the original thinkers published their ideas. These were quite radical times with opposition to established society. Since then the political climate has changed enormously and societal affairs are solved 'on the market'. There is thus a completely new environment in which participation must take place. It can be used as an instrument for market forces, or it can be restricted to administrative procedures.

We need to set public participation into the context of the overall political decision-making system in society. In general, its role in a representative democracy is a huge field of research which relates to different models of democracy and contemporary developments in society. In the next chapter we shall take a look at the more theoretical developments of democracy that have taken place over the last decades in parallel with the practical and legal development of public participation.

13
The Democratic Paradox

In Chapter 10 we were acquainted with developmental democracy, competitive elitist democracy and pluralism as three major lines of democratic thought. While the first one is still often held as the ideal state of politics, the elitist system and the pluralistic model seem more realistic in post-modern society. However, in the late 20th century two additional models of democracy emerged, partly as a result of increasing uncertainty about the role of the state and the welfare institutions in an increasingly pluralistic and competitive society. As in Chapter 10, we follow here the conceptualisation of democratic thought made by David Held. He describes the two new democratic models that emerged, which he calls legal democracy (or 'the new right') and participatory democracy (or 'the new left').

Legal democracy – the new right

The idea of *legal democracy* is the minimisation of the role of the state and the granting of the fullest possible scope to market forces. Individual freedom and free choice have the highest priority and this can best be achieved by the market. The dynamic market is the perfect mechanism for determining not just individual but also collective choice. As a consequence, the role of the state is limited to providing a legal system to protect the individual from violent force and to secure his properties. Compared to a pluralist system as described in Chapter 10, the role of representative assemblies and government is further diminished and market forces dominate societal affairs even more. The only special role remaining to the state is the provision of security. Political parties, parliaments and governments are reduced to being market actors among others. For people like me with their roots in 1950s Sweden when there was a clear political party system and when parliament with its elected representatives unquestionably had the ultimate power in society, this idea seems alien. However, from personal experience I know that this is exactly the way that the current state of affairs is seen by many in, for example, biotech academic research.

David Held criticises these ideas mainly from the point of view that the market works in a society with large inequalities and asymmetries between individuals, groups and nations which makes it incapable of providing a 'common good'. Irrespective of this criticism it is clear that the legal democratic system cannot comply with the awareness principle, which says the common good is created by a system where decisions are made with consciousness about the possible consequences of alternative directions.

Furthermore, there is no accountability in the democratic meaning of the word. For example, if the insurance market develops to a stage where a few companies take control over our lives by information technology and genetic data banks, there is no one to hold accountable. Such a situation does not arise overnight, it would do so via the tyranny of small steps in which each step is seemingly innocent. One could argue, of course, that such a situation would be possible also in a system where the awareness principle is in force. For each small step there would be awareness that the consequences would be relatively small and thus we could have the same development in a direction leading to an unacceptable end state. However, in contrast to the legal democratic system, there would also be awareness about the possible unacceptable consequences in the long term, and thus the chances of society setting up barriers against it would be higher.

The legal democratic system cannot offer awareness and accountability in societal decision-making. Let us instead see if the competing new left has the solution to the problems we have discussed in this book. At first glance it looks quite attractive.

Participatory democracy – the new left

In Chapter 12 we explored processes for public participation and we found that there is as yet no systemic way of describing them. They appear as individual processes, each one with its own characteristics, and we don't know how to combine them. One could hope there was a theoretical foundation that could bring order into the realm of participative processes. However, that does not seem to be the case.

There are currently a number of theoretical concepts such as participative, deliberative and discursive democracy. Here we use 'participative democracy' as a cover term for a rich and diverse set of approaches in recent, contemporary thinking on democracy. Some authors set up quite abstract visions of ideal deliberative procedures on which real procedures might be modelled, some just collect processes of the type we discussed in Chapter 12 and others emphasise the importance of deliberation in existing structures and democratic institutions. Whatever type of participation and deliberation they advocate, however, the common assumption is that democratic legitimacy is a product of the extent and nature of the process that precedes formal collective decision.

For example, the idea of deliberative democracy is related to participative democracy, although there is no sharp definition that distinguishes the two. A UK group from Lancaster University and Galson Sciences has defined *deliberation* as (Hunt, *et al*., 2001, p. 4):

> A form of discourse, theoretically and ideologically requiring ideal conditions of equality of access and justification of arguments. Deliberation involves reasoned debate between relevant actors. It draws on a notion of procedural legitimacy, that is, if the conditions for deliberation are fulfilled, then the outcomes are the best possible.

The concept of deliberation is seen as a more formalised process than the more loosely defined concept of participation. Although the word 'participation' is used loosely to indicate taking part in a process, and although participation can take place solely through taking account of a wider range of views, Hunt emphasises that participation in a strong sense implies *making* decisions, not merely consultation on those decisions.

The new left, as described by David Held, has its roots in the political upheavals in the late 1960s and a dissatisfaction with the heritage of liberal and Marxist political theory (Held, 2002, p. 264). In his description of the new left or '*participatory democracy*' Held refers to Carole Pateman and C.B. Macpherson.[1] The Canadian political theorist Macpherson saw problems with inequalities of power and resources when reassessing the liberal democratic tradition and advocated participatory democracy as a key to the future of democracy. The other leading political theorist referred to by Held, Carole Pateman, questions whether formal rights for different social classes, men and women etc., are actually realised in our societies and whether the traditional separation between 'the civil society' and the state is meaningful. Both question the idea that individuals are free and equal in contemporary liberal democracies. Instead they contend that equal right to liberty and self-development can only be realised in a participatory society where citizens are themselves involved in the regulation of society. Participatory democracy means that citizens participate directly in the processes that form their life, at work and in their communities. Reorganisation of the political parties in the direction of a more direct democracy would be an important element in participatory democracy.

Joshua Cohen, an American political theorist and a prominent figure in democratic theory, particularly in the theory of deliberative democracy, has described an 'ideal deliberative procedure' (Cohen, 2002, pp. 146–7). The key idea is that societal choices should be made in a deliberative way, and not only be political decisions that fit the preference of citizens. In such a deliberative procedure, everyone participating is equal and the focus is on the 'common good'. In that respect, Cohen is much inspired by the theory of justice of the Harvard political philosopher John Rawls (Rawls, 1971). In a just society,

political opportunities must be independent of economic or social position, and the political agenda must not be controlled by the interests of economically and socially dominant groups. In a deliberative democracy, everyone can set issues on the agenda, propose solutions and offer arguments in support of or in criticism of proposals. Deliberation aims to reach a rationally motivated consensus, however, if this cannot be achieved the deliberation ends with voting, according to Cohen.

Cohen argues that societal institutions should be reflective enough to make deliberation possible; 'Arenas have to be formed in which citizens can propose issues for the political agenda and participate in debate about those issues. The problem is to figure out how arenas might be organised to encourage deliberation' (Cohen, 2002, p. 152). Cohen recognises that such arenas will bring together only a narrow range of interests on certain issues and that the more comprehensive conception of the common good may be left out. This leads Cohen to the conclusion that the political parties should take a leading role in making deliberative democracy possible. After all they address a comprehensive range of issues not restricting the agenda to sectional interests. Cohen' s opinion is that the political parties, supported by public funds, should provide open-ended arenas for deliberation.

Another prominent author criticizing today's political institutions and proposing a new approach is John Dryzek (Dryzek, 2000). He criticises the dominance of instrumental rationality and objectivism in political institutions, public policy, and in the practice of political science. He argues that the reliance on instrumental rationality has led to the excessive bureaucratization of government and to technocracies of expert cultures that are ill-equipped for dealing with complex social problems. Indeed, this is precisely what we have been able to illustrate by quite a number of example areas in this book. Dryzek outlines a form of participatory democracy, which he terms *discursive democracy* that stresses the importance of active citizenship and public discourse.

As Held points out, these proposals for participation and deliberation as a complement to, or sometimes almost as a replacement for, representative democracy, are usually associated with left-wing politics since there the point of departure is the conflict of interest between the dominant and the weaker groups in society. They thus involve extensive outreach efforts to include marginalised, isolated and overlooked groups in the decision processes.

Another proponent of public participation, Frans Foltz, discusses three forms of participation in forming decisions on science policy (Foltz, 1999, pp. 124–5). The first form is participation by expert elites. In the second form non-government organisations participate 'as representatives of different public and private interests'. The third form, which he calls the pluralistic form, is where individuals from the general public participate in science policy formation. Foltz argues that the more participation, the better, therefore the pluralistic form is the preferred one. He also emphasises that

society must consist of truly participatory institutions in order to be really democratic. It is worthwhile noting that, in the example of science policy, neither of the forms discussed by Foltz takes into account the role of elected politicians.

To summarise, the main characteristic of participative democracy (in its broadest sense thus including deliberation and discursion) is a focus on process as much as results. More participation increases the legitimacy of societal decisions. In contrast to the traditional theory of democracy, which emphasises voting as the central institution, participative democracy theorists argue that legitimate lawmaking can only arise from the public deliberation of the citizenry. Participation is not only good for the society as a whole, but also for individual citizens who are rewarded by self fulfilment through participation and deliberation. Proper rules for deliberation will also bring justice and more equality between groups in society. Another strength of deliberative democratic models, according to their proponents, is that they tend, more than any other model, to generate ideal conditions of impartiality, rationality and knowledge of the relevant facts.

The idea of participatory democracy seems, however, too idealistic for our society. It is supposed that citizens in general think that involvement is worthwhile if they just know that the opportunities exist. Ideally participation will make them develop as individuals and find a more meaningful life. However, as Held puts it (Held, 2002, p. 272), 'what if they do not wish to participate in the management of social and economic affairs? What if they do not wish to become creatures of democratic reason?'. Considering the essentially unlimited amount of information each individual has to manage and the level of stress in our society, the Held's concerns seem very realistic. On the individual level, there is simply not enough attention span left for such ambitious participation.[2]

There is another major weakness in the idea of participatory democracy. We simply lack the knowledge needed to find the appropriate procedures to make it work. Therefore, as Held also points out, the participatory society must be experimental in its nature. This is a conclusion that fits well with our findings in Chapter 12 about public participation processes, i.e. that we still lack a systematic approach for their description and evaluation.

Now is also the time to discuss in more detail whether participative democracy can be the answer to the problems we have addressed in this book. Can it help us to avoid narrow framing and fragmentation? Will it give transparency to complex issues? Will it bring accountability for decisions made? Will it increase trust in our political institutions?

It is possible that participation by otherwise neglected groups in society will bring in new perspectives, thus helping to avoid the narrow framing of the experts. It is also possible that certain modes of participation will make fragmentation by strong groups more difficult since it would mean a broader sense of dealing with issues. What is then needed, however, is a structure

for the clarification of the factual and value-laden domains. In a deliberative society this will not come about by itself. Furthermore, there is no stretching function included in the proposed procedures. The result can be a richer flow of information without a structured way to deal with it in order to really enhance transparency and awareness. One could argue that these concerns could well be allayed by introducing awareness creating functions within the framework of participative and deliberative processes. A more pragmatic way, however, is to introduce these functions into the existing framework of representative democracy, especially since this in itself would increase its legitimacy, thus making alternative models of democracy less needed. In addition to this comes, of course, the very fact that citizen involvement to the extent assumed by the alternative models seems unrealistic.

The questions about accountability and trust also deal with the relationship between the citizens and their elected representatives. Participative or deliberative democracy means that the elected assemblies will lose some of their power. At the very least these systems must be based on some trade-off between consensus decision-making and representative democracy. However, if too much of the decision-making is left to forces other than our representative assemblies, they will be even further weakened and giving them our votes will be even less important. Furthermore, it will be even more difficult to understand who should be held accountable for decisions made. This would most probably result in even less trust in party politics. This is the democratic paradox of today.

Having its roots in the left wing movement of the 1960s one would expect that 'the new left' would result in a political system very different from 'the new right'. It is interesting to see, however, that the two alternative systems could in fact be quite close to each other. The legal democracy of the new right gives minimal role to government and parliament, which are replaced by market mechanisms. On the other hand, the institutions of a participative or deliberative democracy are still mostly undefined and we are therefore left with an experimental situation with many competing participative processes. To some extent then, the new left also replaces the representative system with a market system!

An interesting and probably more realistic variant of citizen participation, proposed by Ortwin Renn and Thomas Webler, is called 'cooperative discourse' (see e.g. Renn, 2004). This approach has been applied to studies on energy policies and waste disposal issues in Germany, for waste-disposal facilities in Switzerland and for sludge-disposal strategies in the United States (Renn, 1999; Renn *et al.*, 1993; Renn and Webler, 1998). The model entails three consecutive steps. The first step includes the identification of concerns and objectives among stakeholders. In the second step, indicators approved by stakeholder groups serve as measurement rules for evaluating the performance of policy options. The third step is the evaluation of potential solutions by groups of randomly selected citizens. This part of the

process is similar to a trial by jury with experts and stakeholders as witnesses. The cooperative discourse model uses technical tools to structure the process. In the first step 'value-trees' are used to structure a hierarchy of values and the third step uses multiattribute utility techniques to analyse the different policy options. In contrast to many other approaches using such techniques, such as the Nirex site selection in West Cumbria discussed in Chapter 4, the Renn/Webler approach does not leave the weighting of values to experts but rather to an unbiased jury of uncommitted citizens.

Compared to the processes for citizen participation discussed in Chapter 12 and elsewhere in this book, as well as the participative democracy in the new left version, the cooperative discourse model has several advantages and similarities with the awareness approach proposed in this book. Above all, it brings values into the process up front and not just implicitly. It is also important to recognise that consensus, while being an optional outcome, is not primarily sought after. If consensus is not reached, decisions will be made by ordinary procedures in society, such as majority vote or referenda, but then on a basis of clarification of the options. However, compared to Renn and Webler, the awareness building approach gives more emphasis to the stretching of stakeholders in the public sphere with the aim of clarifying their authenticity as well as to the need for a process guardian. The cooperative discourse model seems to rely on technical tools in the process, which in fact may give much power to the process experts driving the discourse. Furthermore, if in fact the process leads to consensus the normal political framework is set aside and accountability is lost.

Having now tested the new models of democracy that emerged during the second half of the previous century, we find that neither of them seems to give us what we are looking for, namely a system providing us with awareness and accountability. We thus look back to the traditional developmental model of representative democracy and see if there are ways to vitalise it in this direction.

Can representative democracy be vitalised?

Representation is a central element of modern democracy. Following Dahl, already in the early days of liberal democratic institutions it was realised that direct democracy had to be transformed into representative democracy, for the reason of political equality (Dahl, 1989, p. 28). It is also, of course, a matter of the division of labour. Decision-making by 'the people' in deliberative assemblies is impossible for all sorts of reasons (practical reasons, complexity of the issues, lack of time, etc.). Therefore, we have a system where we elect our representatives through the political party system.

Today, however, we have problems with precisely the political party system. The distance between our representatives in parliament and government on the one hand and the ordinary citizen on the other hand has become too

large and the former are seen as a new elite class rather than 'our representatives'. Danilo Zolo contends that the inability to illuminate the 'invisible power' is the most serious broken promise of our democracy (Zolo, 1992, p. 104). Our trust in politicians is low and decreasing. It is therefore not surprising that participative and deliberative democracy are seen as alternative ways of decision-making. In his book (Zolo, 1992), Zolo deals with the relationship between democratic institutions and the increasing complexity of post-modern societies. To him the prospects of democratic institutions seem highly uncertain (ibid., p. 178) and he considers the idea of representative democracy obsolete.

A complementary development is the decreasing importance of the political system, which in fact has been brought about by the politicians themselves. The magnificent increase of the role of the market at the cost of politics during the last two decades is outstanding. One can say the new right has won its victory with the legal democracy! But this does not seem to be enough. Quite often we hear politicians say that 'the power should not be with politicians – it should be with the citizens'. This may sound good but then the simple reasons for the representative system are forgotten. The argument is opportunistic since it appeals to negative emotions towards politicians rather than analytical analysis of our problems with the system. Deliberative democracy may also appeal to industrial leaders and the scientific community, today meeting opposition to their projects, because they may expect it to result in decision-making by 'rational consensus'. Then, however, one could suspect an underlying expectation that deliberation will lead to a consensus supporting the solutions that they preferred from the offset.

There is a tendency to see new participative processes as something extra, outside the normal political framework. I think, and experiences have shown, that one can be innovative within the framework of representative democracy and improve the processes. Deliberative processes are then mobilized for this purpose. A key question is, however, whether the objective should be to achieve consensus or not. My view is that this *should not be the aim*, although if this happens in the process it can be a positive contribution. If closure is the aim of participation, what role is there then for the politicians? The key to the democratic paradox is that public participation should lead to transparency and insight in order for the system to work. The arguments of stakeholders and other actors should be stretched so that the value-laden issues and vested interest come to the surface. One prerequisite for the vitalisation of democracy is to protect it from being dominated by any particular part of society, such as the expert society or the mass media. This, of course, includes the political system itself, which also needs to be illuminated by outside forces.

Just as in private life, intentions and declarations in politics are worth little until they are followed up by action. Political action to increase transparency can take the form of new national legislation; new directives in the

European arena; international conventions; support for research and development aimed at clarifying problems and suggestions for solutions. It could also include many other actions on the international, national, regional and local levels. We are soon ready to suggest how this can be done. But first we shall explore more in depth the role of the media in our society and its role in enhancing awareness and transparency.

14
The Public Sphere – Mass Media and Journalism

In order to understand how awareness about policy issues can be created in the public sphere, we need to take a look at the conditions for how the mass media and journalism operate in contemporary society. Before discussing different forms of journalism in more detail we shall, however, take a more theoretical approach and explore the concept of the 'public sphere'.

The idea of a public sphere

Much of the societal debate about the 'public sphere' over the last few decades goes back to the early work of Jürgen Habermas in 'The Structural Transformation of the Public Sphere' from 1962 (Habermas, 1989). The Habermas notion of a public sphere has its origin in the 18th century when the growing literate bourgeois public took on a political role in discussing and evaluating contemporary affairs, in particular state policy. The arenas for information and political debate in the bourgeois public sphere were for example newspapers, political clubs, pubs and coffee houses. Citizens could influence politics by expressing their needs and interests and shape 'public opinion'. This was of course only possible under certain conditions such as free speech and free press – conditions that were later institutionalised in the democratic development.

Habermas used the bourgeois public sphere as an ideal and took it as a point of departure for criticizing its transformation to a mass media dominated public sphere where citizens have become mere spectators and passive absorbers of entertainment and information. It needs to be remarked that Habermas's idealisation of the early bourgeois public sphere has been problematised and criticised by scholars such as Michael Schudson (1992), Nancy Fraser (1992) and Douglas Kellner (Kellner, 2006). It is doubtful if the public sphere as Habermas has described it, as a way of shaping politics by rational debate and consensus building, has ever existed. The bourgeois public sphere with its arenas for public debate in Habermas's sense probably only existed in a few western societies and there of course it was restricted to limited groups

of relatively well educated middle class people. And it can also be questioned whether Habermas's critique of the 'structural transformation of the public sphere', brought up in the early 1960s, is at all relevant in today's society when so much has happened since then with mass media, electronic media, the Internet, etc.

Despite the, probably relevant, critique against Habermas's idealisation of the 18th century public sphere, the notion of a functioning public sphere as a prerequisite for democracy is still as valid as it was half a century ago. Habermas's work thus points to the increasing importance of the mass media having colonised the public sphere and everyday life with entertainment and of corporate enterprises using the media to promote their own interests. This is a serious problem since in a democracy discussion on public issues and making them transparent must take place in the public sphere. Without that, citizens cannot hold the political decision-makers accountable for their actions. Jürgen Habermas himself has made this point very clear in his monumental work, *Between Facts and Norms*:[1]

> The rational quality of political legislation does not only depend on how elected majorities and protected minorities work within parliaments. It also depends on the level of participation and school education, the degree of information and the precision with which controversial issues are articulated – in short, on the discursive character of non-institutionalized opinion formation in the political public sphere.

By providing a normative standpoint that can be compared to the current situation, Habermas has without question generated solid and sometimes provocative input for discussions concerning the democratization of the public sphere. There is a link between Habermas's notion of the public sphere and participatory democracy as we discussed it in the previous chapter. One idea of participatory democracy is that deliberation and participation in policy-making is good *per se*, since the process of citizen involvement increases the legitimacy of decisions. One can see the public sphere as the arena where the deliberations of participative democracy take place and where not only 'public opinion' but also the solutions to societal problems can be formed. For reasons explained in the previous chapter, however, this is neither realistic, nor desirable. It is not realistic since ordinary people don't have the time or attention span to participate and since the public sphere is colonised by entertainment and corporations, and it is not desirable for reasons of the accountability and integrity of elected assemblies.

Maintaining the awareness principle as our guideline, we first need to form a realistic notion of what the public sphere is today in order to understand how it can be made to function to enhance awareness and transparency. Even if this is a less ambitious and more realistic transformation of *the contemporary*

public sphere than making it to a forum for participative democracy, it is nevertheless a challenge. Today the public sphere is far from being a forum for creating awareness about complex issues. Instead issues are being fragmented by a small number of large and powerful actors in the media market who are manipulating public opinion. Leon Mayhew expressed this perfectly well in the preface to his book (Mayhew, 1997, p. ix):

> The rationalization of public persuasion and its consequent domination by professional communicators erodes the social organization of public opinion. Rationalized techniques employed in systematic campaigns rely on market research to learn what the public believes and wants, or what is likely to prove persuasive. In consequence public opinion loses its social moorings.

The professional domination of public communication further undermines the ties between citizens and the connection between citizens and their leaders. In a true democratic society free citizens influence each other, and thereby their elected leaders, by persuasive arguments. However, in the professionalized public sphere this possibility is lost. Why is this state of affairs not allowing for real participation accepted by the public at large? The explanation is information overflow combined with our limited attention span, or what Mayhew refers to as the 'economics of information' which was recognised early on by economists.[2] Rational actors and individual citizens save time and money by limiting their in- and outflow of information. Full discourse in the Habermas spirit of communicative action is not possible.

Our limited attention span is occupied by public relations professionals getting their messages out through the mass media. Of course they are not responsible for balanced and objective presentations. Instead, providing selected truths that support their clients is entirely appropriate – it is up to other stakeholders to present their own truths (if they have the resources to do so). Public opinion relations experts are employed to impact public opinion on behalf of the interests of their employers. However, the situation is not hopeless. Mayhew (1997, pp. 14–15) shows the way:

> The public sphere does not depend on the unrealistic notion that rhetoric can be banished on favour of fully rational discourse on all issues at all times, but on the institutionalization of forums for the redemption of rhetorical tokens.

Mayhew sees public forums where rhetorical arguments can be evaluated as safety valves for the citizens enabling them able to see if they can trust the actors or not. This is precisely what we in Chapter 11 meant with

transparency arenas where citizens can evaluate the authenticity of actors. Towards the end of this book I will suggest ways to build such arenas.

It is difficult to get a comprehensive picture of the decision-making basis for a complex problem. Interest groups are very well aware of that, so they often give a *fragmented picture* containing the pieces that suit their purpose best. One example could be an industry wanting to implement a certain project, but also environmental groups, other interest groups and even researchers contribute to fragmentation. It is possible for them to imprint the debate, and thereby impact both public opinion and the decision-makers. Often, of course, lobby organisations are used for this purpose. Another way is the use of opinion polls as a means of lobbying for established interests. The results of opinion polls can be used as arguments for certain decisions.[3] If the results are negative from the point of view of the organisation that has conducted or paid for it, there is no reason to publish them. The seemingly neutral measurements of public opinion may thus be manipulated or at least biased for certain interests. The use of opinion polls is also a sophisticated way of creating, or at least reinforcing, 'public opinion'. Once published, the results can themselves be an influencing factor for those who have not yet come to a firm conclusion on the issue at hand. Political parties also use all available means, especially the mass media, *to create 'public opinion'* according to their wishes, often with the use of sophisticated psychological techniques.

Clearly, it is one of the roles of the media to cover the development in the scientific/technocratic sphere. Since in most cases neither journalists nor their audience have scientific and technical competence, it is relatively easy for actors and lobbyists to impact the agendas in public debate. They can use mass media as a means to influence members of the public as well as public opinion and thereby political decisions. An important factor in this context is the high priority the media give to competing claims of scientific evidence promoted by different political and scientific actors. It is the responsibility of the media to report when such opposing evidence occurs. But it also contributes to fragmentation when the competing conclusions become the most important reference points for media reporting on crucial issues. To a large extent, though, there is reason to believe that vested interests set the agenda for media coverage of especially risk related issues.

Another trend is that parts of the media take over as actors rather than just being reporters. In the Swedish 2002 parliamentary elections, for example, the media were the dominating agenda setters, rather than the voters or the politicians. According to Kent Asp,[4] professor in political science, the integration of immigrants in Swedish society dominated the election campaign in the media, whereas for voters, education and medical service ranked highest as the most important issues and integration was only 12th on the list! An investigation carried out by the Swedish Television on the day of the election showed very similar results. A few days later two other professors in political

science (Leif Lewin and Olof Petersson),[5] drew the conclusion that journalists themselves decided which issues should be the most important for the election. Even if it is well known that the media are major agenda setters, in principle it should be the issues that are most important to the voters and the political parties' programmes that set the agenda. The media should then provide arenas for debate. The 2006 election showed a similar pattern – now medical service again had top priority for the voters whereas in the media it was ranked in 9th place (Asp, 2006).

In a broad sense the public sphere consists of arenas where the general public can seek information on societal and political issues and, more importantly, observe and participate in societal debate. As a result of new technologies and other societal developments the public sphere is now a very dynamic entity with quickly changing conditions for the traditional news media (newspapers, TV, radio) and where new technologies are increasingly important (above all various forms of Internet applications). At the core of the debate, however, is still the role of the mass media and journalists as news reporters and critical scrutinisers of those in power.

Although the working conditions and formal procedures are radically different, it is interesting to note that there are substantial similarities between the ethos of journalism and science as we described it in Chapter 2. Both disciplines have the search for truth and independence/integrity as core identity forming values. The Merton principle of disinterestedness has a direct parallel in Joseph Pulitzer's concept of a 'disinterested press'[6] from which the traditional ideas of objectivity, neutrality and impartiality come. This is how individual journalists see themselves and it also how the ordinary citizen wants to see them.

As for science, however, there are strong forces in action, commercialisation being the most important, that challenge the identity of journalism. I concluded the discussion about science with words like 'If the commercialisation of science continues, scientific institutions will become just another actor on the market' and 'the scientific ethos will be lost and we will no longer know where to turn when we want to know the truth'. Similar concerns exist regarding journalism. The problem is not the intentions or actions of individual journalists or editors. As John Street, Professor in Politics at the University of East Anglia, explains in his book (Street, 2001, p. 59):

> Rather, the answer lies in the structure and organization of the media, in the need to deal with events in a limited space and under the demands of tight deadlines. But these constraints are themselves the product of the larger pressures and interests to which the media have to respond. They have to sell their product, and lengthy explorations of the background to events (or refusal to make much of news events) may be very unattractive to readers or viewers.

This says something about the conditions under which journalism operates, however, there are several forms of journalism and we shall now explore some of them more in detail.

News journalism as entertainment

News journalism is the dominant and most important branch of journalism. We buy the newspaper and we turn on our radio or TV to get our daily news. We expect journalists to speak the truth, to be neutral and report without any framing that serves special interests, such as the interest of the owner of the paper or the TV channel in question. We also expect them to select *the most important news* to report to us. This is perhaps the most critical part of news journalism – to decide what is *a newsworthy story*. There may certainly exist many different criteria for what makes a newsworthy story, but one has been given by Evonne Winblad, former news anchor at Swedish Television (Winblad, 21 April 2005, own translation):

- The event should deviate from normality.
- It should be of general interest and of concern not only for those involved.
- It should be unexpected, not previously known.
- There is potential for continuing events leading to an unknown ending.
- There should be a human aspect, for example with winners and losers.
- It should be about a controversial issue.
- It should be close to the readers, viewers or listeners in some way, e.g. geographically or culturally.

Thomas Meyer, chair of political sciences at the University of Dortmund, gives similar factors for the newsworthiness of an event (Meyer, 2004, p. 30). It should have a short time span, be in close proximity to the observer, have surprise value, involve conflict and feature serious harm or great success to somebody. It is striking that these lists are not too far removed from what a similar list for making good entertainment would look like. Clearly when we go to see a show by an entertainer like Elton John, a musical like Mama Mia or if we go to the theatre (or watch any of these on TV), we expect an experience far from our normal life, unexpected and controversial features increases its value, a talk-show should have human aspects and come close to the audience etc.

It is obvious that news programmes, like entertainment events, must attract people. This is most obvious in commercial media which need to link audiences with advertisers. Newspapers and TV channels deliver audiences to their customers, sometimes tailored audiences with special habits, tastes or incomes. In order to do that they need to favour simplicity over complexity, people over processes, emotions over facts, all of which are elements of

entertainment. Moreover, public service radio and television have to compete with the commercial channels, their news programmes with sports and lifestyle coverage on other channels etc. As Thomas Meyer has expressed it (Meyer, 2004, p. 39):

> ... the creators of media fare in the public broadcast sector see themselves as engaged in a competition for professional success with those in the private sector, and they treat high ratings as the badge of success.

John Street quotes a former BBC editor who recalls how his colleagues made assumptions about the political interest of their audiences (Street, 2001, p. 53):

> Editors, even on more spacious programmes than the news bulletin for which I used to work, judge that viewers' and listeners' attention span in political matters is very limited; that they cannot listen to an uninterrupted speech; that their tastes must be titillated by confrontational studio discussion.

Of course this is not just restricted to the BBC – every TV viewer should be able to recognise the situation. Serious societal problems are dealt with by putting outspoken persons with opposing views in the same studio. I am not saying that this is of no value. Such debates have an entertainment, and hopefully also an informative aspect. But perhaps they can be improved by giving each subject more time, by providing more structure, and by going deeper into detailed questioning of the underlying assumptions.

Investigative journalism

An investigative journalist goes more deeply into a topic of interest, often with the idea that there is an abuse of political or economic power that the public ought to be made aware of. An investigative journalist may spend a great deal of time researching, sometimes months or years, whereas a typical news reporter writes items on a day-to-day basis. Investigative journalism concentrates on a specific topic and requires significant amounts of work, patience and financial resources to give results. Seeing it through involves a lot of scrutiny and fact finding, analysis and motivation because doors are often closed and facts are being covered up or even falsified, etc.

Since the results cannot be known at the start it also involves risk taking both by the individual journalist and his/her employer. However, successful projects in investigative journalism give 'hot' material to news journalists. The classic example is the uncovering of the Watergate Scandal by Bob Woodward and Carl Bernstein at the *Washington Post*. This is an example of the 'watchdog' function of journalism as scrutiniser of those in political

and economic power. The job of the journalist is to expose immoral, illegal or otherwise inappropriate behaviour to the public and to make such behaviour the subject of procedures of democratic accountability.

Investigative journalism is the branch of journalism that comes closest to science in ideals and identity. It is hard to see, though, how the trend of commercialisation could impact investigative journalism itself in the same way as it has done with science and the overall media market. Instead one might suspect that the commercialisation of the media makes it harder for investigative journalism to prevail. This is what John Street claims is taking place. In his view, newspapers no longer organise or commit the necessary resources for investigative journalism (Street, 2001, p. 151). This may be too sweeping a statement for which he does not provide real evidence, but it fits in well with the new conditions and the changing structures of journalism he describes: commercialisation and competition of people's attention span. Following market surveys the media offer shorter stories and 'infotainment'.

Besides Woodward and Bernstein, another remarkable team of US investigative journalism is that comprising Donald L. Barlett and James B. Steele. They have worked together for more than three decades, first at The Philadelphia Inquirer, (1971–97) where they won two Pulitzer Prizes and scores of other national journalism awards, then at *Time Magazine* (1997–2006) where they earned two National Magazine Awards. Their speciality is complex issues and institutions that profoundly affect American life. Over the years, Barlett and Steele have investigated a large number of wide-ranging subjects, such as American foreign aid, the criminal court system, energy issues and nuclear waste.

Many were surprised when Barlett and Steele lost their jobs 2006 in a budget squeeze. John Huey, editor in chief of Time Inc., told the *Times*' Kit Seelye that as he cut away at corporate costs, he sought unsuccessfully to shift Barlett and Steele to the payroll of one or another of the company's magazines, but he was unable to find an editor willing to take on the expense. 'They're very good, but very expensive, and I couldn't get anyone to take them on their budget' (Lovelady, 2006). Even if Barlett and Steele quickly got another job together at *Vanity Fair*, this has been described as sad but clear evidence of the decline of investigative journalism in western media.

Science journalism

Until now, academics have to a large extent maintained their respect and confidence among ordinary people, and in the media they represent the factual status of issues. This state of affairs is based on the notion that the scientific community by and large is following Merton's principles of good scientific conduct. However, this is no longer true for large fields of science where scientists have become nothing more than ordinary actors on the market. Still, the press tends to treat science more respectfully than other

professional fields. Furthermore, there is one particular form of journalism – science journalism – which has a special relationship with scientific research. Science journalists often have a role of translating results from the parlance of academic research to the language of ordinary people. They thus adopt the role of educators and are often much appreciated as such by scientists.

Admittedly, science journalists, who often have a scientific education, should be the ones that have the best capacity to stretch scientists about their vested interests and hidden values. However, this does not seem to take place, probably due to the mutual dependence of the two groups. Scientists depend on science journalists to make their area of work accessible to lay people, and science journalists depend on access to the scientists to get their job done. Since science journalism is carried out on the terms of the scientists to a greater extent it can function as a tool for them to tell their story, which may consist of selected pieces of information and not be the whole truth. Science writers' opportunities to produce qualified journalistic contributions on societal matters by the stretching of science are very limited. In this area of journalism, the journalistic ideals of independence and a drive for revealing vested interest and hidden agendas is weaker than in other forms of journalism.

As long as the scientific community at large followed the principles of Merton for good conduct this was not a significant problem. A science journalist could, just as anyone else, expect that meeting with a scientist would bring him as close to the 'objective truth' as realistically possible. However, as the ties between corporations and academic science grow stronger, so do the scientists' conflicts of interest. They may have other considerations than science itself, such as the interest of their employers or their own companies to take care of.

There seems to be a growing awareness among science journalists that they need to be tougher by asking scientists more difficult questions, by doing their own critical research (in the journalistic sense of the word), and by looking for vested interest – that is, to use more of the methods of investigative journalism. For example, science journalists at the Massachusetts Institute of Technology have joined with Investigative Reporters and Editors, a non-profit organisation dedicated to improving the quality of investigative reporting, to set up a joint course in investigative science reporting, with the following motivation:[7]

> It is no longer enough that science reporters serve as good translators of scientific jargon. They must also apply the tools of investigative journalism by probing deeper, asking tougher questions and following the money.

Let us hope there are many good examples of this approach for science journalism! The problem is that when a powerful investigative science journalism

is most needed (due to commercialisation of science), the prerequisites for its realisation are least favourable (due to commercialisation of media).

Media conglomerates

A special aspect of media commercialisation is the media conglomerates which have appeared over the most recent decades. A media conglomerate is a company that owns a large number of companies in various sections of the mass media such as radio and television stations, newspapers, publishing houses, entertainment industries such movies, Internet, video games and even toys. Well-known examples of such conglomerates are Time Warner, the News Corporation with Rupert Murdoch as the majority shareholder and managing director, the Berlusconi group and the Germany-based Bertelsmann.

Critics suggest that the large conglomerates dominate media, making, for example, news programmes become increasingly similar around the globe. The critics also point to a strong incentive to link various parts of a conglomerate. For example, papers can help to sell books and films, films can promote music and introduce new toys and video games, etc. In the end, critics argue, multi-sector ownership will affect news production by prioritizing news about entertainment events and (even more seriously) by holding journalists back from fulfilling their watchdog function in investigating issues that would be harmful to other parts of the empire such as excessive corporate power. Counterarguments used by the companies and their supporters are that they maintain a strict separation between news departments and business lines and that consumers apparently like their products. And in any case, since there are so many information sources in today's world no single company can dominate news production. This is not the place to discuss the impact of media conglomerates on journalism in general or on democracy. We can only note that it is a major factor that needs to be taken into account when considering how the awareness of complex social and technological matters can increase among the general public.

Civic journalism

In the United States there has been an attempt to take the news closer to the people by examining what their interests are and bringing their concerns to the forefront of the media.[8] The initiative has been named *civic journalism* (also known as *public journalism*). The movement gained momentum with support and leadership from organisations such as the Pew Center, the Kettering Foundation and the Public Journalism Network. It emerged after the 1988 U.S. presidential election as a countermeasure to the erosion of trust in the news media and widespread public disillusionment with politics and civic affairs.

The core idea of civic journalism is that journalism should be 'for the people' by changing the way professional reporters do their work. Journalism should be done in a way that invites citizen participation in shaping news coverage, for example in election campaigns, and supports communities in solving their problems. This is done by using methods like opinion polls, surveys and focus groups to help in setting agendas for media coverage, convening community groups to solve problems and sponsoring and covering town-hall meetings, public forums, candidate debates etc. One vivid example was the project 'Taking Back Our Neighbourhoods' in North Carolina, organised by the local paper *The Charlotte Observer* to improve living conditions in central city neighbourhoods (For a brief summary, see Grimes (1999), p. 10). Another example is the multi-media partnership 'We the People/Wisconsin' which provides forums where citizens can question political candidates and public officials and which also organises other citizen initiatives (ibid., pp. 10–11).

By 2003 the civic journalism movement seemed to be petering out, with the Pew Center for Civic Journalism closing its doors. By then more than 100 projects had been funded by the Center. The Executive Director Jan Schaffer now (early 2006) promotes media and citizen interactive experiments through the J-Lab (the Institute for Interactive Journalism at the University of Maryland).The leading theoretician on civic journalism, Jay Rosen, a New York University professor, writes and publishes *PressThink,* a weblog devoted to media criticism.

Civic journalism has been much criticised for actually limiting rather then extending the critical function of journalism. Opponents like William E. Jackson in his article 'Save Democracy from Civic Journalism' feel that civic journalism fails by forsaking the traditional role of the press as the scrutiniser of government by advocating solutions over conflicts (Jackson, 1997). Charlotte Grimes, a former Princeton professor of journalism, has examined the history of civic journalism in a Harvard essay (Grimes, 1999). She notices that some civic journalism projects generate impressive public response. Her major concern, however, is that 'too often, civic journalism projects seem to ally themselves with a community's power players – politicians, civic and business leaders – whom journalists also must cover'(ibid., p. 17). There are thus potential conflicts of interest, something which is very harmful to journalism. There is also a problem with journalists generating their own news by both sponsoring and covering town-hall meetings and other events. Furthermore, there are objections to the use of opinion polls for identifying citizens' concerns and setting journalistic agendas.

Civic journalism also seems to share the problem of getting public attention with other sorts of journalism. The New Jersey Senate election campaign in 1996 was followed by *The Bergen Record*, using the civic journalism methods without any measurable effect. Researchers found that, compared to readers

of other newspapers, *Record* readers were no more knowledgeable, no more interested, and no more likely to vote (ibid., p. 15).

As John Street remarks (Street, 2001, p. 9), 'any useful discussion on the place of mass media in a democracy must address both the different conceptions of democracy and the emerging new technologies'. The trend of 'infotainment' at the expense of more in-depth investigation can thus be seen as a logical consequence of the prevailing model of legal democracy, where the free market always provides what people – in this case consumers of mass media production- want. Equally, civic journalism is based on the philosophy of participative democracy, meaning that participation increases the legitimacy of societal decisions and there is a focus on process as much as on results. In consequence, as the critique by Grimes and others reflect, civic journalism meets the same kind of problems as participative democracy. One is the limited possibilities people have to actually take part – they prefer to use their time and attention span for more private matters. Another, and the most important, problem is that civic journalism, as participative democracy in more general terms, erases the borderlines between different functions in society at the expense of clarity and accountability.

The new media and the public sphere

The technological information revolution based on computers and the Internet raises new issues, hopes and concerns with regard to democracy and power relations. As Douglas Kellner, professor of Social Sciences and Comparative Education at the UCLA Graduate School of Education & Information Studies, points out in an article published on the university web site (Kellner, 2006), the new technologies mean we have to reconsider our notion of the public sphere. Indeed, we now have unlimited availability of information. If you have a computer and Internet access there are no limits to the quantity of information you can access directly. Furthermore, Internet is interactive, it gives information to citizens, and they can give their views back to media debates, commercial companies, government authorities and politicians.

As is the case for all new technologies, the information revolution creates debates about possible future scenarios that are either enthusiastically positive or frightening depending on different conceptions of its use. John Street gives us two scenarios. On one side is a shift of power from large corporations and government to individuals (Street, 2001, p. 275):

> The promise here, at least in terms of the way these technologies are marketed, is of greater choice and control for consumers. We will create our own viewing schedules from an ever-expanding range of alternatives; we will use the channels available to shop, vote, play video games, book holidays and so on. The days of mass consumption and mass viewing will give way to individuals' choice and niche markets, to many private worlds. The

> balance of power will have shifted from states, conglomerates and parties to the world of the voraciously consuming individual.

On the other hand, he sketches another scenario, which is almost the same one seen from another perspective (ibid., p. 19):

> This is a world of isolated individuals, disconnected from communities and groups, vulnerable and manipulable. The new technologies do not represent choice and devolved power; they represent surveillance and centralized suppression. The emerging systems of communication provide conglomerates and state authorities with the ability to monitor movement and thought in ways that were never possible previously. Every cash transaction, every electronic communication, provides data on the desires and actions of citizens. Political parties now no longer lead, they merely follow the swerves and switches of populist opinion. As they acquire more and more data on their constituents, so their policies become ever shallower responses to the twitch of public opinion.

Kellner seems to have quite an optimistic view on all this. He sees the new media technologies as a possible new basis for participatory democratic communication (Kellner, 2006):

> Those interested in the politics and culture of the future should therefore be clear on the important role of the new public spheres and intervene accordingly. A new democratic politics will thus be concerned that new media and computer technologies be used to serve the interests of the people and not corporate elites. A democratic politics will strive to see that broadcast media and computers are used to inform and enlighten individuals rather than to manipulate them. A democratic politics will teach individuals how to use the new technologies, to articulate their own experiences and interests, and to promote democratic debate and diversity, allowing a full range of voices and ideas to become part of the cyberdemocracy of the future.

The growth of the Internet and cable television with their capacity for two way communication created the idea of 'cyberdemocracy' some 10–20 years ago and there were those who believed the Internet could re-create a public sphere in modern society. Using the new media one could arrange citizen participation by means of discussion groups, opinion polls and even formal referenda. Reality has shown that these ideas were quite utopian and unrealistic. However, the optimistic scenario of Kellner may still be feasible provided that the current development towards more electronic surveillance stops and stakeholders in a broad sense take their responsibility for enlightenment seriously. For the moment there is reason for some optimism. When I search for

'GMO' on the Internet I get 4.6 million results. The first 20 of them include six sites of various forms of NGOs, all of them with a resistance agenda against GMOs, but I also get websites of the Human Genome Project, the GMO Africa Blog 'creating awareness on the benefits of biotechnology', the Foreign Agricultural Service representing the interests of US farmers and the US food and agricultural sector in the EU. Together they might represent a relatively well balanced picture of the risks and benefits of GMOs and I could get more tailored results by combining 'GMO' with other search criteria, e.g. 'food safety', 'environment', 'precaution' or 'regulation'. The problem is that as a member of the general public I cannot evaluate the arguments for and against or relieve the framing carried out by the different organisations involved, i.e. there is no possibility to stretch the arguments and the organisations behind them. The situation is no easier for a member of parliament preparing himself for an upcoming decision on GMO regulation.

In terms of insight into complex issues there are thus problems with the Internet. Some are related to reliability and trust. Anyone who has an interest in an issue can now place his or her information on the net, information selected perhaps for certain interests. A normal citizen has no way of knowing which information he can trust. In that sense the net can simply not replace face to face meetings and hearings that could help to evaluate the authenticity of experts and stakeholders.

Another problem with the Internet and the surfeit of TV channels is that all of us have a limited attention span. We have to select quite narrowly what information to look for and partake of. This again gives stakeholders the chance to help us choose – the total amount of information becomes fragmented with the help of lobbyists and other professionals. Thus the new media cannot be the ultimate solution to our problem – it should rather be seen as a tool to be used in broader frameworks.

The influence on politics

The changing media environment with its move towards entertainment in the struggle for listeners and viewers has changed the stage on which politicians operate and even affected the political process itself. This process is traditionally a time consuming business. Party politics are formed as the result of deliberations within each party in which as many individuals as possible should participate. Discussions are held at party congresses where policies are formed which the leaders are supposed to follow. Then, in parliament or minority governments for example, the policies of a party are negotiated with other parties and the results of the negotiations are anchored within the party group in parliament before they become decisions for the country.

Today, this process is too slow to be newsworthy in the media. Thus politics itself needs to adapt and the traditional process is often bypassed in order to

meet media production schedules. The German political scientist Thomas Meyer (Meyer, 2004, p. 24) contends that the media have colonised politics so that politicians now increasingly submit to the media rules of staging and maximizing attention, and because of the short time scale the media offer, leaders have to take initiatives without grounding them in their own parties:

> The traditional model of a political party that reaches consensus via extended discussions with many centres of influence in civil society, that allows decisions and programs to mature gradually, and then insists that top cadres stick to them in their representational and concrete policy-making activities, has become practically an anachronism. While parties may nominally and in some aspects of their outward appearance still inhabit the public arena, their mode of operation, their substance, the game in which they are engaged have all been profoundly altered.

Meyer describes how the traditional public arenas of politics, such as parties and parliaments, lose ground under the prerequisites of 'politainment'. It is easy to conclude that this development is just another factor contributing to decreasing trust, lower levels of awareness about societal issues and decreasing quality in public affairs.

Transparency journalism

The media have a decisive role in selecting for us what we perceive as important enough to take part of our attention span, to establish what Zolo calls 'attention values' (Zolo, 1992, p. 160). The signals which the media thereby send to people don't seem to lead to a higher degree of motivation for public participation, not even by civic journalism – rather the opposite seems to be the case. The conclusions we can derive from the different sections of this chapter may seem rather pessimistic: Habermas's notion of a public sphere is not realistic, news journalism is dominated by an entertainment approach, investigative journalism is on its way out, science journalism is too dependent on commercialised scientists, civic journalism creates its own news, and the Internet gives an infinite amount of information which cannot be handled.

However, this is an overly cynical way of describing the state of affairs. The positive factors are that we have a public sphere with a large diversity of arenas; that journalists have disinterestedness and integrity as core values; that investigative journalism is highly regarded and still in practice; that there are journalists interested in science and that there is place for new ideas for journalistic practices. After all, the media are not only part of our problem, but also a necessary part of new and better procedures for insight and clarity. Journalists themselves and political scientists emphasise the critical function of the mass media to challenge and supervise the elites and defend the interest

of the individual. The mass media are also – by definition – expected to form arenas for public discourse.

Transparency for the general public can never be achieved without access to the mass media. The RISCOM model demands 'transparency arenas' for its application. It is doubtful that academics in natural and social sciences can provide such arenas. In fact the media and journalism must play a role, since without them public awareness can hardly be improved in modern society. This means that we need to find new working formats for interaction between scientific and journalistic skills.

Doubtless, journalistic skills will be needed to stretch stakeholders and interest groups and to make issues and the extent to which they are value laden transparent in the public domain. However, to make complex issues transparent these skills must be combined with the analytical skills of natural scientists, the contextual understanding of social scientists, and the human knowledge of behavioural scientists. Structured ways of cooperation between these groups need to be worked out, and new forms of citizen participation need to be developed, tested, and applied to practical problems. This is not ordinary news journalism (too much entertainment),[9] not science journalism (too much dependence between journalist and scientist), and not civic journalism (not enough independence). It will have elements of investigative journalism but also of the other forms: news journalism to get attention, science journalism to get into the factual issues and civic journalism to involve stakeholders.

In the case of citizen forums and consensus conferences, the proceedings take place in public and with media attention. In the case of technology assessment, both the Danish Board of Technology and the Rathenau Institute in the Netherlands have been placed at the interface between the political and the public spheres and they have been given a high degree of freedom to take initiatives and carry through assessment projects. If they organise interesting events they will without doubt get media attention. By and large, however, there is no public space in which citizens can challenge claims made by different stakeholders, analyse alternative ways of action and examine on what grounds decisions are made.

How can journalists find more efficient ways of contributing to awareness and transparency? As already indicated, in order to accomplish that there needs to be new forms of integration with other groups in society. In the following chapters we shall explore practical ways for how society can be furnished with new arenas for stretching stakeholders and creating awareness in societal issues. Here journalists will have a natural role in cooperation with, for example, scientists. However, this should not take place at the expense of journalistic independence. New forms of interaction must not make journalists cooperate with people that later may be subject to journalistic scrutiny. Also new 'transparency arenas', if successful, will create news, and we must not fall into the trap of civic journalism where the same

media entity first organises a citizen arena, then report from its meetings. The solution may be that individual journalists, or groups of journalists, take a step out of their media organisations and start to work with 'transparency journalism' together with others. This is not an overly dramatic step since there are already now journalists with their own companies who are engaged on a freelance basis as moderators for public meetings in controversial matters. The new factor for them would be a different framework with its own identity within which to work. With this kind of working format the ordinary newspapers and other media would still be there to do their own reporting.

The obvious objection to this reasoning is that having first criticised the media and especially news journalism in this chapter, I am then suggesting a new kind of arena in the public sphere which will *depend on a functioning news journalism* to get the attention needed to raise citizen awareness. It is true that the proposal rests on the assumption that journalists (other journalists than those participating) will report from the new arenas. This means that the events have to be made interesting enough for this to happen. But this is the point of involving professional journalists into the process – they can help make the arenas newsworthy. There is one recent development in the media world that may help. In Sweden, and perhaps in other countries, there is now a TV channel (24 Direkt) that broadcasts from various kinds of public meetings. It can be parliamentary debates or party conventions but also more 'low level' seminars and meetings. The idea of just broadcasting without much follow-up coupled with today's opportunities to devote a channel entirely to this subject matter makes the enterprise relatively cheap and feasible. In the near future it would be fully realistic that such a TV channel would also broadcast from transparency arenas following the principles we outline here. Normal news media reporting would also still be needed, of course, but that would follow if the events proved interesting enough for the public at large.

15
Setting the Values First – towards a New Paradigm

Ideally, the way most of us think democracy should work is that the politicians make their decisions based on the societal values they are elected to represent. Politicians consult scientists in accordance with practical needs, and the experts provide decision-makers with factual material. However, experts often put their own values into their assessments or, to be more precise, the values are hidden in their underlying assumptions. Experts also frame, in narrow technical terms, the issues that have been raised by the politicians. They may also have their own interest in the assessment results, for example that certain areas are more important for future research than others, or that a risk assessment should result in values lower than regulatory limits.[1] Therefore, in a transparent decision-making system, the public must have the opportunity to evaluate the arguments of the experts and decide whether the experts are credible or if they have hidden agendas.

As described by among others Steven Brint (1996), expert influence depends on how issues are framed – it is maximised when experts successfully define matters of substance as narrow technical issues. This is precisely what we have seen in the issues of nuclear waste and genetically modified crops for example, where the risk assessment has been framed to be purely technical whereas broader issues have been out-framed. In addition, expert framing often goes hand in hand with commercial interests which don't want their technologies to be challenged with broader societal arguments.

Jürgen Habermas has discussed three models for decision-making (Habermas, 1971): the *decisionistic model*, in which the expert role is limited to making new technologies available, the *technocratic model,* in which the initiative for decision-making is taken over by scientific analysis and technical planning and the *pragmatistic model* in which there is intense interaction and communication between scientific experts and decision-makers. According to Habermas this communication must be rooted in social interest and value orientations in society and thus be free from domination by power groups. In other words, it has to be accessible and transparent.

With present circumstances, the pragmatistic model, which is the only one of the three that satisfies the conditions of democracy, can hardly be applied:[2]

> These considerations of principle must now, however, disguise the fact that the empirical conditions for the application of the pragmatistic model are lacking. The depolitization of the mass of the population and the decline of the public realm as a political institution are components of a system of domination that tends to exclude practical questions from public discussion.

Thus we are back to the problem of the public sphere. The discussions between politicians and experts have to be transferred to the broader forum of the general public.

As we have seen from our example areas, in today's society we mostly operate within the technocratic model, which I call the *experts-agenda paradigm*, that is now often governed by market conditions, whereas we for the sake of democracy need to change to the pragmatistic model, which I call the *values-first paradigm*.[3] Instead of letting the expert community, often in symbiosis with commercial interests, decide which questions are important, we must put the values at the top of the agenda. This is the new enlightenment which makes citizens responsible and relies on their capability to understand complex relationships. This is the opposite of the technocratic ideal, but interestingly enough also of political populism. These two ideas, which at first we may see as opposites, build on the common assumption that ordinary citizens are incapable of making rational decisions based on both factual and value-laden arguments – they are supposed to act on purely emotional grounds.[4]

Thomas Kuhn[5] has described how the need for a new paradigm emerges in science and how a shift in paradigm takes place. He also describes similarities with how political and social changes take place. Following a paradigm means strong framing of current practice, by which we mean here the technocratic way of societal decision-making. With time, signs ('anomalies') emerge which question whether the paradigm is sustainable. Decision-making in complex issues with the experts-agenda paradigm shows such signs:

- The expert's values in important issues, such as risk, are not in harmony with citizens' values.
- In order to meet public opposition, scientifically based decisions have often been modified afterwards to include the values of the broader society.
- Large projects are stopped at a late stage, when the engineering phase is over and 'only' public acceptance and political decisions remain.
- Politicians believe that wind energy should play an important role in replacing nuclear power, yet the establishment of wind energy installations also meet public opposition in some countries.[6]

- Experts believe that CO_2 disposal will be important for reducing global warming, but are frustrated when challenged by the problem of gaining public acceptance.
- Politicians in Europe want to enhance the use of genetically modified organisms so that Europe can compete with the US on the market, and experts say this will be safe, yet public opposition has, at least, delayed their introduction in the European market.
- There is lack of trust in politicians, expert bodies and industry.

One reaction to a crisis of the prevailing paradigm is according to Kuhn numerous modifications of practices in order to eliminate any apparent conflict. The participative processes now being increasingly used can be seen as such modifications within the experts-agenda paradigm. One reason is that the value-laden issues are only dealt with implicitly in many cases – another is that the majority of the participative processes are only advisory to decision-makers. By and large, participative processes have been brought in on the conditions of the expert community – the experts are not prepared let go of their control. In addition, legal requirements on consultation in environmental impact assessment and requirements for participation in international conventions have not really changed expert and bureaucratic control much. In the nuclear waste area we have an extensive number of participatory processes in use in countries like the UK. We also have EU research projects specially designed for community involvement and an OECD group for stakeholder confidence, yet without any breakthrough in terms of the expert community giving up its agenda-setting power.

A special modification of decision-making is the emergence of 'second order experts'. Today we involve ethical experts and moral philosophers more in the decision processes than before. For example, ethical experts give recommendations on nuclear waste management and biotechnology companies employ philosophers who give them advice on which techniques and applications may be accepted in society. These new groups of expertise should be increasingly involved, since their aspects have earlier been neglected. But their role should be to help making the value-laden aspects visible and transparent rather than to be involved in the political decision-making itself. There are basic ethical values shared by society at large. Often though, there are conflicts between different values held by different groups in society, or the values cannot give the desired practical guidelines. In such cases the solution is a matter of political decision.

We need to distinguish between two ways of involving ethical expertise. One is when they are involved in the political system, either in certain sensitive situations or on a more continuous basis. In this case they can have the role of broadening the decision-making basis to include values in a transparent way. The politicians should, however, avoid using the ethical expertise

Table 15.1 Status of paradigm shift in some areas

Technology	*Evidence of error in decision-making system*	*Modifications in technocratic planning*	*Results of modifications*
Genetically modified organisms	Low levels of trust in politicians and industry	Involvement of ethical expertise	Continued distrust
CO_2 separation and disposal	Frustration with regard to risk communication	Learning from nuclear waste programmes	Yet unknown
Wind energy	Local pubic opposition to windmills	Public meetings	Continued local opposition
Electromagnetic fields	Distrust in national authorities and in WHO	WHO risk communication policy	Continued distrust
Nuclear waste management	Repository siting is stopped (UK, Canada, Switzerland, etc.). Lack of public trust.	Stakeholder involvement Debate on ethical aspects	Little actual change Continued expert control

to actually make decisions for them, which may be an easy way out for the politicians in sensitive matters.

The second way ethics is brought in is by companies who want to include ethical values in a more professional way in their product development and perhaps also in marketing. There is no doubt that the biotech companies of today are much more professional in this regard than, for example, the nuclear industry has been in the past. The natural reaction to this is of course that there can be no harm in this new trend. It can only be of benefit to citizens if their values are included in the performance of industrial companies. However, as scientific risk assessment carried out by industry needs to be scrutinised by outside experts, so too should the ethical evaluation. Then ethical expertise in industry should be stretched in the public sphere by other ethicists as well as by ordinary people. If this can be accomplished we will certainly increase the quality of public debate and the development of society.

Sooner or later a new paradigm takes over if the crisis cannot be solved otherwise. In our case this will lead to new forms of interaction between decision-makers, experts, the 'public' and the media and new institutional arrangements may result. Engaged citizens can be catalysts for this transformation by designing new transparency arenas and otherwise by being proactive in the way we deal with decisions on complex risk issues.

16
Principles for New Arenas

In this book I have argued that awareness should be a lead principle in policy formation and societal decision-making and I have introduced transparency, citizen participation and a functioning public sphere as the three building blocks of a new enlightenment. I have also shown that the post-modern society does not provide us with structures for this to work well when dealing with our most important issues.[1] Or to be more precise, our current structure consists of systems that do not work according to their ideals. In short, this can be formulated with four bullet points:

- *The politicians* are supposed to guard the interests of their voters, but are in the hands of experts, and they are exposed to pressure from lobby groups who can use the overflow of information for fragmentation. They have little time to extend their views beyond these sources of information. Furthermore, in communicating, and to some extent also in forming, their policies they have to follow media rules which tend to make politics into 'politainment'.
- *The experts* are supposed to be objective but they are captured in their own framing, sometimes rooted in their expert culture, sometimes in vested interest. In extreme cases, expert interests merge with industrial or political interests in research cartels forming knowledge monopolies.
- *The media* are supposed to uncover power relations and hidden agendas, but have to act on the information market, are subject to lobbying and have limited resources for in-depth analysis.
- *The public* is supposed to be well informed, but is overloaded with information and has little space for quality review. The Internet does not solve the problem, but rather adds to the information overflow.

Today it is even more obvious that the first three systems operate on the conditions of the market, and that both the political and expert systems thereby depend on the media system.

Clearly this is not a situation beneficial to building awareness among politicians and certainly not among the citizens. For this we need to create new arenas for which I suggest the following four principles:[2]

1 *A multi-perspective starting point*
As issues are discussed in public, various points of view crystallise – they may even become congealed. Crystallisation usually takes the form of 'frames' formed by group culture (values, cognitive styles and ways of thinking), or vested interest, or both in combination. Once a framing has been established it sets the agendas for public discourse thus leaving other aspects out of bounds as irrelevant for the issue being considered. Such narrow framing should be avoided; it can be technical or social, often leads to a great deal of unprofitable discussion, premature closure, and lack of attention to minority views. Instead, procedures should allow a wide range of participants to take part in the discourse, representing diverse perspectives on the issues at hand. People must hear each other out on these issues to achieve a common understanding that there is a variety of legitimate perspectives to consider. An awareness creating forum requires a wide range of participants representing diverse perspectives.
2 *Capacity for stretching stakeholders*
Opening stakeholders to new perspectives requires procedures for elucidating the issues from all possible angles. The arguments of a proponent of a certain project must be tested from different perspectives and alternative solutions must be discussed, as well as alternative outcomes. The procedures should have the capacity to evaluate factual issues, uncertainties, value-laden and ethical issues.

It may seem that the clarification of the factual part should be relatively trivial, since factual truth must rely on the well-established scientific method itself. Normally, however, there are many uncertainties attached to a factual 'truth' which thus can be assigned different degrees of believability. This leads to problems such as disagreement between experts, uncertainty about the importance of these controversies for the issues being assessed, and whether all relevant issues can or cannot be solved with purely scientific and technical methods. These issues imply that the bearers of technical expertise should recognise the values and perspectives brought into play by other groups.

There must be an open discussion about the moral and ethical arguments in concrete decision situations. A prerequisite for this is that hidden values in seemingly neutral expert claims are revealed. Trust in the decision-making process is absolutely crucial. For this it must be possible to evaluate the authenticity of decision-makers, participating stakeholders and experts, and to reveal hidden agendas caused by vested interest. For example, it is crucial that stakeholders are open in their statements of intent and about where their funding comes from.

3 *Impartiality and fairness*
Procedures for awareness and transparency must be perceived as impartial – intellectually neutral as to ideology and with no vested interest. There is a danger that someone controlling the process can use it for concealed strategic action. Therefore, there needs to be a guardian of the process being trusted to maintain dialogue and transparency. Sometimes there exists an organisation possessing the trust of all stakeholders which makes it a natural host for the 'transparency process' – sometimes this is not the case. In practice, practical solutions can often be achieved by compromise. However, this is far from the ideal situation – instead new institutional settings should be created.

Fairness also means that participants must have a real possibility to influence rules and agendas. Agreeing upon and making the 'rules of the game' public among the parties involved as early in the process as possible is an important element of transparency. Fairness also means giving the process sufficient time for lay people to have a real influence. Non-official stakeholders must also be given recourses for participation – especially if we expect them to take an active part and to be stretched themselves.

4 *Publicity*
Without access to the mass media, public discourse for awareness creation and stretching can not take place. Finding appropriate ways to achieve this is one of the most critical issues in developing the new procedures. Here the idea of *transparency journalism* which I introduced in chapter 14 has its place. Public discourse should be a necessary means for political decision-makers to secure valid and relevant information. It should also provide means for the public to gain insight and influence. Finally, it would reveal the motivating factors behind decisions and as a result the decision-makers themselves would have to participate openly. Success in this respect would rely on the normative force of public opinion and on the capacity of the procedures to create social pressure on all stakeholders to take part.

If new arenas can be established based on these four principles they can be an effective countermeasure to the four societal trends we have identified as detrimental to democracy, namely narrow framing, instrumental rationality, the commercialization of science and research cartels. With a multi-perspective approach we will obviously avoid narrow framing and make instrumental rationality difficult to carry through. The purpose of stretching is to reveal hidden values and to challenge vested interests and thereby render the arguments born of commercialized science less legitimate. Stretching should also have as its primary goals the unmasking of research cartels and the bringing to public knowledge of neglected research results. Impartiality and fairness are prerequisites for all this to take place and publicity is needed for public insight.

17
Institutional Anchoring

As we now have put forward the basic philosophy and suggested some cornerstones for the realisation of the awareness principle, the question naturally arises how it can take form in practical life. Should it be included in the legal framework? Should it be subject to academic education? Should it be a guiding light for journalism? Is it an issue for a new popular movement? To me there is no single answer to these questions – it should be all of these. Let me thus present some the elements required for the development of arenas for awareness creation.

We don't need to start from scratch!

There can be no doubt that awareness of both a democratic deficit and the limitations of the experts-agenda paradigm is increasing rapidly, at least in Europe. There can be no other explanation for the heavy emphasis which is now given to concepts such as 'scientific citizenship', 'citizens and governance' and 'stakeholder participation' – even if the present situation can be characterised more as uneasiness and endless debates[1] than action and real change. Interestingly enough though, we do have instruments available, even in the legislative domain, that can be used for the sake of transparency and participation.

In this book we have seen how environmental impact assessment, strategic environmental assessment and participative technology assessment can serve as umbrella processes for this purpose. They have emerged as responses to the need for more participation and transparency but unfortunately they have become rigid procedures without much content. Instead a number of participative processes are being used more or less informally for certain applications, especially in countries like United Kingdom and Denmark. Their use, however, is more on an ad-hoc basis and their function as instruments for transparency and participation is not well understood. There are also international conventions (Rio Declaration, Aarhus convention, Espoo convention) and EU Directives that prescribe participation in environmental

matters. They are important milestones for establishing principles at the international level, but they seem to have limited impact on the actual decision-making processes.

In summary, awareness of environmental problems and the need for new democratic tools has caused new legislation, international conventions and participatory processes to emerge. In a few cases there have been signs of a radical policy shift. However, even in these cases, resistance from the old decision-making paradigm establishment has caused a backlash and now the new tools only serve as modifications of the old system with the ultimate function of preserving it. In the UK, institutions like the new Food Standards Agency and the Parliamentary Office of Science and Technology could potentially empower both citizens and politicians with transparency in the true sense of the word if they were only given the resources to do so. However, the Parliamentary Office is a small institution with limited resources and the role of the Food Standards Agency might now be weakened by the establishment of the European Food Standards Agency, a body that may even take Europe a technocratic step backwards.

Hopefully, all these changes in terminology, legal requirements for participation, international conventions, new policies and new institutions are signs of the coming paradigm shift. As explained earlier, a reaction to a crisis for the prevailing paradigm is numerous modifications of practices in order to eliminate any apparent conflict. The importance of the new formal processes and institutions is that they do exist and can be used and filled with creative procedures inspired by the need for public insight and awareness.

Learn by doing or rely on legislation?

One conclusion is thus that we to some extent have institutional settings at hand that can be used for our purpose. The other side of the coin is that where we don't have legislative frameworks we don't need to wait for them before something can be done. One lesson from the Swedish example is that in reality new processes can be implemented within the existing political and legal system. For example, the achievements made in Oskarshamn using 'EIA best practices' showed the way long before proper legislation came into being. Many of the good examples of public participation briefly described in this book have been developed and used entirely without new laws or conventions.

The paradox is that when creative initiatives are being formalised as parts of a legislative framework they can lose in force. This has happened at least partially with EIA. In Oskarshamn the process has been transformed into something more governed by the industry which now has the legal responsibility for the EIA process in accordance with the Environmental Code. In such a case formalisation can take place at the cost of creativity and content. The originality of the Oskarshamn model may be lost or transformed

by technocratic and bureaucratic forces into a much more formalised and controlled process. There have also been tendencies to regard the earlier 'informal' phases of the project as being of little value compared with the formal phase stipulated by law.

There is thus the issue of striking a balance between the force of a legal process, which an implementer cannot escape, and an informal process that can be very effective in providing awareness but for which there are no guarantees – the informal process is essentially dependent on the good will of key actors. There is also an issue of balancing the level of detail prescribed in a formal process. A high level of detail relating to the steps in a formal process can make it less flexible and less able to adapt to new issues and changing contexts. A low level of detail can give too much agenda-setting power to the implementer or other strong actors who may decide to pursue a minimum level of ambition.

New institutional settings

Even if some instruments already exist in a formal sense, and even if much progress can be made just by using the degrees of freedom they offer, there is no doubt that a need for formal institutional settings for awareness creation exists. Furthermore, if we accept the principles for public discourse I have outlined in this book, new institutions should be formalised by law since legal rule-making is ultimately based on legitimate social needs. The purpose is to enhance transparency by integrating public discourse into the decision-making process and to widen public debate. The critical issue here is to arrange the institutional anchoring so that the new procedures become a support for decision-makers (making them less receptive to lobbying), at the same time as they also obtain the integrity to challenge the decision-makers in full view of the public. There is a need for new institutions at all levels of policy-making.

The local level

Today, at the local and municipal level there is much reliance on the expertise of civil servants in the local administration. They work fulltime with municipality planning while elected politicians have other fulltime jobs. The few local politicians employed by the municipality are the only ones able to gain full insight into community affairs, but their information is also fragmented purely due to time limits, and such information as they do have they do not always choose to share with others. Local journalists are often very skilful and knowledgeable, especially in the most important areas for the community. However, they work alone and can hardly explore issues of high complexity.

The structure of local and regional administrative units varies a great deal in different countries and it is therefore difficult to give general advice on how awareness can be raised among the politicians and citizens. It seems

evident, however, that much can be done through, for example, the more active use of public hearings on local television and with working groups comprised of a mixture of politicians, members of the administration and concerned citizens. One could start with major planning issues, environmental matters and other large projects. Resources for awareness creation available at municipal level might perhaps be formed at county and regional levels.

The national level

In a way, the creation of awareness building institutions should be most straightforward at the national level where the necessary intellectual and economic resources already exist. It is 'only' a matter of transferring the structures in which they operate to serve the new enlightenment. On the other hand, it is also at this level that the structures are most mature and perhaps resistant to new ideas and it is also there that the weakening of the political system is most obvious. Politicians must therefore take back the agenda-setting initiative from external experts, including those serving the government, the market and the media. They need to empower themselves with guardians of transparency and to vaccinate themselves against lobbying and fragmentation, thereby increasing their awareness. These guardians have to operate in the public realm so that the public at large also gets access to the new transparency.

How can such a new factor in policy-making be created and organised? One clue to this is provided by the Parliamentary Office of Science and Technology (POST) in the UK and similar bodies in other countries. The POST operates as a resource to parliament in scientific and technological matters, not only answering parliamentarians' questions but also being proactive in trying to identify future critical issues. The POST and several of its sister institutions attached to other parliaments have recently put much effort into developing various forms of approach for public consultation, using direct contact with citizens or over the Internet. Such offices can empower their parliaments to be less vulnerable to outside lobbying and to become more effective in their scrutiny of government policy.

The success of a body like POST in making issues transparent in the deeper meaning of the RISCOM Model, however, requires that it consciously resists becoming just another expert body. Instead it should exert itself to make the values inherent in complex issues visible and to set up procedures that make it possible for the politicians and the public to evaluate the authenticity of experts and other stakeholders. To fulfil such a mission these offices must clearly be granted more substantial resources than are currently at their disposal.

In general, the new enlightenment requires a new function with institutions having the task of making issues transparent in the public sphere, building their identity from that and being rewarded in proportion to the

extent of their success. The question naturally arises how these institutions can be initiated and funded.

An examination of other institutions shows us that in principle there are two ways of raising funds, one being public funding through legislation, the other being private funding on market terms. In order to be a necessary part of a nations' societal decision-making processes the new institutions need to be set up by parliaments and financed by the state or federal budget. On lower levels of government they can be set up as a recourse to county and municipality councils. Their independence from the party political system and economic interests will then be crucial. This does not, of course, restrain new institutions from emerging subject to market conditions as well, for example within the mass media. In both cases the key to success will be the formation of a new identity of actors outside business, administration, science and media.

What has been said here about the national level is also relevant for the European Union in general. It is obvious that there is uneasiness among the EU leadership about the current state of affairs, and there is awareness of the need for new initiatives – all the talk about stakeholder involvement and new forms of governance can be given no other interpretation. However, there are obvious obstacles to real change in the direction I propose such as the democratic deficit, the strong Brussels bureaucracy and the lack of a European public sphere. One positive factor, though, is the Science and Technological Options Assessment (STOA),[2] which assesses policy options for the European Parliament, even if this institution does not get much public attention.

The global level

Many of our most urgent matters with respect to human values and environmental protection have a global dimension. Already the politicians and the public are fully aware of the fact that global warming and sustainable energy systems cannot be dealt with as national problems. It is true that the ethical issues inherent in biotechnology can be addressed by legislation and transparency activities at the national level, but it is also obvious that this has severe limitations. National legislation, restricting a certain application, can easily be overcome by enterprises moving the application to another country where it is allowed. Thus there are heavy economic arguments against such restrictions for as long as there is no international consensus on how to handle the issues. The European debate about genetically modified organisms which has been going on for more than a decade is a typical example of this.

In this book we have discussed how the system of representative democracy can be vitalised with new institutions to increase the awareness of factual as well as value-laden issues, and transparency has been adopted as a prerequisite for high quality decision-making. On the global level there is no equivalent system of decision-making. Since we don't have a world

government, issues are resolved by negotiation between countries resulting in international conventions, treaties, etc., often with the United Nations as the hosting body. Before issues are treated internationally, decisions have already been made nationally and in our model they would have been made with transparency, public participation and open debate in the public sphere. When the national representatives meet for international negotiations they bring these experiences with them. Value systems and interests can vary between countries – therefore different countries can form different opinions despite sharing the same knowledge base.

It could be argued that international summits are often quite transparent. It is clear what the positions of different countries (or groups of countries) are before a summit, how the negotiations went, and what were the compromises and the results. All this is made public and reported by the international press. One can thus question whether there is a need for new institutional settings on the international level or if this is to be fully satisfied nationally (and in the EU).

There is no doubt that in the event of a breakthrough for a new paradigm and a new enlightenment the international arena will also be impacted and global problems will also have to be made transparent on a global scale. It would be natural for the United Nations to assume a role as guardian of transparency for global issues. For example, the UN could organise international hearings on sustainable energy systems, CO_2 deposition, GMO issues, genetic engineering etc. For such hearings, the UN could set up bodies capable of challenging ('stretching') the arguments of globalised industries, researchers with vested interests, NGOs with their own agendas, etc. This would, without a doubt, generate high levels of media interest and raise public awareness!

A new societal identity

What kind of education and skills will be needed for these new institutions? Will positions be filled with journalists tired of market-driven media? At the end of Chapter 14, in which I discussed journalism and in particular how journalists can contribute to new arenas for public discourse following the ideas outlined in this book, I concluded that journalistic skills will certainly be needed to create attention – a necessary prerequisite for awareness. I also suggested that journalistic competence must be combined with other areas of competence such as the analytical skills of natural sciences and the contextual understanding of social scientists. New, structured frameworks for cooperation between these and other groups, including new forms of citizen participation, need to be worked out, tested, and applied to practical problems.

Progress in this direction will not take place without encountering obstacles, one being the relationship between journalists and scientists. These groups have truth-finding at the core of their identity – with science it is

the truth of nature and society, and with journalists it is the truth of power relations. Since both of these truth-finding perspectives are needed for transparency and awareness the relationship looks ideal! However, there is also an obstacle to such cooperation inherent in journalistic and scientific identities. Both groups must be independent of one another[3] (and of the rest of society) in order for science and journalism to work according to their ideals. Proposals submitted to journalists for any sort of cooperation are therefore met with scepticism.

To be sustainable, the new institutions we have discussed above must be based on pride in a new professional identity with its own ideals, education and culture, just as there is a scientific and a journalistic identity. Among other things, this will require the development of a new element in academic research and education. As a result of the enthusiasm we experienced among young students after the first two VALDOC Summer Schools, I am convinced that this is a real possibility, even if it requires the breakdown of traditional academic barriers. Perhaps a faculty of cross-disciplinary roundtables, as proposed by Bill Vanderburg (2002), Editor-in-Chief of Bulletin of Science, Technology & Society, would do the job in the academic world. Such roundtables could synthesise highly specialised knowledge into a better understanding of complex issues relevant for policy-making.

The creation of such an identity in the new enlightenment can in fact open the way for other means of transparency and awareness to be achieved as a complement to the local, national and global political structures we described above. It would be possible for existing institutions such as foundations, academies and museums to take up the idea. They already have a mission to contribute to public debate, but without the pressure of delivering to the policy-making system within given timescales etc. Perhaps these institutions will care for the life and soul of a new enlightenment based on the awareness principle!

The political responsibility

To me, it looks as if the political parties in post-modern society have lost much of their industrial–society identity. The party system is rooted in an old social structure which no longer exists and it therefore needs to be transformed to meet new challenges. Over recent decades it seems that the grounding values of politics, and thereby the differences between political parties, have declined in many countries. Politics has also become just another voice in the media market and political programmes are being sold just like any other product. As part of this trend, politics has become more personalised, and 'politicians had become part of a nation's soap opera, just as had happened with Bill Clinton and the endless saga of his relationship with Monica Lewinsky', says John Street (2001, p. 273). This is probably a recognisable trend in many countries but there are also exceptions. In the Nordic countries

the personal life of politicians is still relatively well respected even if politics itself is becoming more focused on a few leading politicians.

John Street makes the interesting observation that while the political leaders are made 'ordinary' people in the mass media, real ordinary people are made celebrities and stars in docusoaps (ibid., p. 274):

> This transformation of political life and ordinary life, and the blurring of the two, has led some writers to perceive a bleak future, one in which politics becomes demeaned (literally, de-meaned, deprived of meaning). Politics has become just another game show, another docusoap.

Thomas Meyer uses the term 'media democracy' when describing how political actors now must submit to the stage management form of discourse the mass media offers for getting attention for political messages (Meyer, 2004, p. 87). Some authors such as Pascal Bruckner use the term 'democratic melancholy' (Bruckner, 1990) for the present day state of affairs. It fits well in this context as a description of a sad feeling, in this case about democracy, which can not easily be explained. Melancholy is a kind of a long term depression characterised by loss of vitality and lust for life. Is this where we are today?

To return to our agenda for revitalizing democracy with awareness and transparency, the political parties must not only take the responsibility for creating the institutional settings needed for awareness creation. They must also take back their agenda-setting role by re-establishing their own value bases. Certainly we see numerous issues that require a value-laden standpoint before decisions are taken – in biotechnology, energy policy, communication technologies, etc.

Perhaps the most critical issue where value systems collide is the *ownership of genetic information*. Who should own your genome? For security reasons one would argue that national and international data banks should be organised to prevent terrorism and other kinds of crime. We already see this taking place, with DNA data being used in police investigations – even if those data were originally collected for other purposes. Should it be the commercial market? For example, insurance companies can use genetic information to calculate the probability of an individual developing certain diseases in the future. They can then set life insurance premiums based on this information and thereby optimise their own profit. A person with a 'bad' combination of genes may then have to pay more for his insurance cover, assuming it is even possible for him to get any. Of course, a third alternative is that the individual himself controls his own genetic information. This alternative is for the benefit of individual freedom, integrity and responsibility but it restricts business, research and security controls.

Which one of these three alternatives you prefer depends on your own values and personal interests. Ultimately, it is the responsibility of the political

system to make decisions on the rules that society must follow. We can see that the traditional political party structure, rooted in industrial society and the conflict of interest between capital owners and the labour force, is not fit to take care of this problem. One would believe that socialists, traditionally preferring collective solutions, would argue for the interest of the state – but do they? Conservatives and liberals should prefer that market forces take over – but do they? Or perhaps liberals should guard the interest of the individual? Typically, there is no outspoken position on these issues among political parties, with the possible exception of the Christian Democrats.

A critical issue for the development of new technologies is the *extent of the precautions* society should take. The introduction of a new technology offers new opportunities for people and contributes to economic growth. It is, however, also common that concerns are raised about possible negative effects on human health and the environment. With time research should make it clearer if the concerns were justified or not. The choice is thus between two alternatives. The first alternative is to take the opportunities an early introduction offers thus accepting that negative consequences may follow. The other possibility is a precautionary approach meaning that measures to control risks, including postponing the introduction of a technology, must be taken if there are indications of possible serious harm to humans or the environment. The introduction of mobile telephone systems is a good example of this problem. In spite of numerous research results that indicate health risks, a full scale introduction of the third generation of mobile phones is in progress. If you value technological progress and economic growth you will be willing to support the development even if there are possible, but unlikely, risks. If you were more cautious you would argue for a moratorium until we know more about the risks. In fact, both attitudes contain certain kinds of risk. The market approach risks serious problems, if not disasters, for business, individuals and society if early warnings prove right. The precautionist risks a stagnating society where great opportunities for economic and personal satisfaction, are lost. In this kind of issue, the positioning of political parties is clearer. Left wing and green parties tend to ask for more precaution, liberals want the more entrepreneurial approach.

A third dimension of societal vales is *the conflict between local self-governance and national interest*. We have seen this tension between centralised and localised power in several areas. It is of national interest to find a disposal site for nuclear waste, but communities often resist. It is a national interest to be a leading high tech society but local politicians have to give permits for building masts and base stations for mobile phone systems. They also have to face local opposition and take responsibility for people who are very sensitive to electromagnetic radiation. In Sweden there is a national goal to clean up sites contaminated with chemicals, but municipalities are expected to take the responsibility for the actual cleanup projects. Sometimes, the conflict is between the commercial interests of multinational companies and

local farmers, such as in the GMO case. Again it should be up to the political parties to form principles for how society should solve these kinds of problem.

There are other contemporary societal value conflicts such as animal ethics versus human health, risk concentration allowing control (such as nuclear waste management) versus risk dilution (such as in many other forms of energy production), centralisation of power (proposed by some for the European Union) versus national autonomy (advocated by many others), etc.

It is the responsibility of political parties to formulate value systems that address these and other challenges that we meet due to social change and technological innovation. When they do so they will discover the need for arenas that help them look through the value assumptions that lie behind expert framings and identify possible risks and value conflicts in market driven technological developments. Only then will democracy work as most of us expect!

18
Final Remarks

In this book, I have presented a framework for the enhancement of decision processes which includes the three elements of transparency, public participation and public discourse. I have presented a workable model for transparency and a possible framework for enhancing public participation. All this has been grounded in democratic theory by the formulation of the awareness principle. Furthermore, I have suggested the combination of elements which exist in scientific and journalistic identities to form an identity in the new enlightenment. So what are the objections?

One objection certainly comes from the experts and the scientific community, and says '*science first*'. I agree that solutions must be based on scientific evidence – without that we are lost. But one can with the same level of conviction say 'values first'. As the Economic and Social Research Council (1999) in the UK has pointed out 'the policy of relying on claims of "sound science" may, ironically, itself be unsound'. Hopefully we build our society on the value system shared by the public at large, and not only on the value system of the experts. The right order of things should be that expert solutions reflect the needs expressed by values in society.

A second objection could be that the framework given here for decision-making is *academic and theoretical* and has little to do with practical reality. However, we have already seen that the RISCOM model adds new insights, gives structure and actually gives ideas for improved participative processes, hearings, etc. You don't have to know the theory of thermodynamics to drive your car. In the same way, you don't have to know the theory behind the RISCOM model to appreciate the improved procedures it may suggest. Typically this argument against the RISCOM model comes from experts, technocrats and market fundamentalists, not from ordinary people more representative of the general public. It is easy to understand the basic ideas in the RISCOM model and the overall democratic framework we have presented here, and most people do.

A third, and possibly the most serious, objection to these ideas is that *perhaps no one in 'the establishment' has an interest in transparency and public*

participation. By nature public awareness will meet resistance in almost any group, because it will mean fewer possibilities for political parties, interest groups, industries etc to fragment and frame issues for their own purposes. Furthermore, with more citizen participation they lose control over the outcome. The notion of the political system as a market competition between parties means that the politicians will act to prevent, and perhaps reinforce, the general conditions of the market. Here we can only rely on the force of the strong argument. Who can argue against more transparency and more participative decision processes? After all I would guess that politicians want to make well grounded decisions and should have nothing against counter forces to the extensive lobbying activities they are exposed to.

Some initiatives have already been taken in this direction. The RISCOM project, supported by the European Commission, is one. The RISCOM model was early used for the design of hearings about site selection and it continues to inspire the Swedish nuclear waste programme. In the fall of 2006 a 'transparency programme' was launched by the Swedish National Council for Nuclear Waste which will apply the same methodology in the most critical phase of the Swedish programme for dealing with high level nuclear waste. Recently, a Transparency Forum for risk assessment about mobile phone systems was organised on the initiative of the Swedish Radiation Protection Authority. It made it possible for major stakeholders such as industry, the authorities, municipalities, and an association of people hypersensitive to electromagnetic fields and resistance groups to sit around the same table to set up a process aimed at making risk management in this area transparent. A third area of application is the Swedish programme for the cleaning up and remediation of contaminated sites. Municipalities need to be empowered to raise their own competence and awareness and thereby avoid falling into the hands of national authorities and big consultant companies.

Another initiative is the VALDOC Summer School where we bring together natural scientists, behavioural scientists, experts, decision-makers and journalists to educate and discuss with students the issues addressed in this book. A new paradigm can only come into force if younger generations find it attractive and workable!

These are of course small-scale activities but I know that many have similar lines of thought and there are many local initiatives. One question here is how political leaders can help and take the lead towards more transparency and participation. Let me suggest four elements for such a strategy:

- First the political leadership needs to evaluate and enhance its own functions for transparency and critical insight, thereby empowering themselves with counter forces to lobbying. If these functions are not strong enough the politicians won't have the prerequisites for a serious dialogue with stakeholders and the public at large.

- All arguments should be tested before the public and political decision-makers. This includes not only the arguments of industry and other financially strong stakeholders but also the arguments of all stakeholders and interest groups. However, having this as a requirement is unfair unless all stakeholders are given the resources to fulfil such a role.
- New ideas for citizen involvement and new formats for hearings and dialogue should be encouraged. We must have communication and dialogue and not one-way information. There must be the means for lay people to set the agendas with questions originating in their concerns and values.
- Different participative and deliberative processes should be systematically tested and evaluated in order to develop an understanding of how they can best be used, further developed and tailored for specific situations.

Finally, some words of caution are in order. Some may hope that this process will lead to easy decisions as a result of consensus building, but this will not necessarily be the case. Transparency means that all arguments become open and visible, and not necessarily that everyone will agree. However, it is healthier to have the arguments transparent than invisible in hidden agendas. There will always be different values and opinions. What we can do is to build decision-making processes that are appreciated as open, transparent and fair. If people trust in the process there is a greater likelihood that they will accept the decisions it produces.

Considering the limited attention span we all have as individual citizens – is this realistic at all? One part of the answer is that transparency does not necessarily have to lead to more information for us to handle. It may be possible to replace parts of today's information overflow with new ideas and new ways of formatting news. If the present information overflow continues it will create conformity and apathy. But this is not what people want, especially not young people. Just replacing parts of what is said in media today with what is still unsaid could do a lot!

Active measures to gain awareness on transparency arenas should also be an effective means of revitalizing political life. As Thomas Meyer has pointed out, the accelerated tempo of top level politics caused by the media has dissociated it from the ongoing deliberations within political parties and thus marginalised traditional party politics. The new arenas I have outlined here should have the capacity to bring political leaders closer to civil society and political parties because they require participation of all in stretching activities.

Notes

Introduction

1. There have been various translations to English. In the German original it reads 'Aufklärung ist der Ausgang des Menschen aus seiner selbst verschuldeten Unmündigkeit'. Being 'Unmündig' means 'not being of age' – 'cannot manage your own affairs'. Some translations use the word 'nonage'.
2. Not only ordinary lay-people but also decision-makers suffer from limited attention span and limited processing capacity. They try to make the best decisions they can but information and cognitive deficits impair sound decision-making. See Jones (2001).

1 The Democratic Challenge

1. Zolo (1992) gives an overview of democratic theory in Chapter 3 of his book. In Chapter 10 in this book , we return to democratic theory thereby referring to Held (2002).
2. In general trust was, among the measured groups, highest for organisations responsible for protecting populations (the army and the police).
3. The figures indicate the percentage of Europeans who would have confidence in different sources of information about radioactive waste management (European Commission: Special Eurobarometer 227 – Radioactive Waste 2005).
4. The Eurobarometer report explains the increased level of trust in governments and industry with respect to biotechnology as being due to a changed focus in biotechnology from being associated in the public mind with controversial agri-food technologies to increasingly being associated with bio-medical and industrial applications. Furthermore, from 2002 agri-food biotechnologies became less newsworthy as a result of the de-facto EU moratorium on GM foods.
5. Ralf Dahrendorf, member of House of Lords and former director of London School of Economics, has expressed these concerns and argued for a revolt of the parliamentarians (Dahrendorf, 2002).

2 Science Has Lost Its Ethos

1. One interesting case, which is almost an icon for excessive university reliance on industry support, is the much-debated $25 million research-support contract between the University of California, Berkeley, and the agricultural biotechnology company Syngenta, formerly Novartis. The deal, announced in 1998, authorised a five-year collaboration between the UC Berkeley's Department of Plant and Microbial Biology and what was then the Novartis Agricultural Discovery Institute, a research arm of parent company Novartis. During the course of the contract, Syngenta provided about 30 per cent of the total research budget of the Berkeley department. The agreement gave Novartis the right to review in advance all proposed publications based on the research supported and the first right to negotiate for a licence on any patents resulting form the research

(Book, 2003, pp. 151–2). According to an external review made by the Institute for Food and Agricultural Standards at Michigan State University (Busch, 2004) expectations with respect to the generation of intellectual property went unfulfilled. The review gives much space to describing the deepening divide caused by the agreement between faculty members who do research on sustainable agriculture and those who do work in biotechnology. The two sides of the internal Berkeley conflict were supported by colleagues and activists outside the university, in more general terms proponents of biotechnologies and those who are critical of current technoscientific tendencies generally and genetic engineering specifically. The agreement is (in April 2007) available for download at UC Berkeley web site: http://www.berkeley.edu/news/media/releases/2004/07/NovartisAgreement_public.pdf.

2. Source: GM Watch, http://www.gmwatch.org/p1temp.asp?pid=1&page=1
3. Source: Biotechnology and Biological Sciences Research Council (BBSRC), Press Release, 2 April, 2003. http://www.bbsrc.ac.uk/media/pressreleases/03_04_02_newchair.html
4. Responding to the Lambert Review recommendations, the UK Government has introduced a number of measures to facilitate higher levels of business-university collaboration, including giving the Regional Development Agencies enhanced responsibility for business-university links; providing dedicated funding to support knowledge transfer and commercialisation activities in English universities through the Higher Education Innovation Fund (HEIF; and publishing a range of model Intellectual Property agreements (Her Majesty's Treasury, March 2006).
5. University of Oxford. http://www.lambertreview.org.uk/
6. Imperial College London, 2003, http://www.imperial.ac.uk/P4778.htm
7. www.sr.se 14 May 2006: 'Ordered work and bought silence – is free research threatened?' (own translation).
8. The paradigm concept was introduced by Thomas Kuhn in his book '*The Structure of Scientific Revolutions*' (Kuhn, 1962) as an idea that sets the framework for how things are done in natural sciences. Already Kuhn himself described similarities with political and social sciences and the concept has later been used in a much broader context than just natural sciences. It is with this broader meaning I use the term.
9. 'Technicism' can be defined as fundamental idea that promises to solve all problems and to assure progress through technology and science. Brown uses the term throughout his book also as an elitist attitude that excludes normal citizens, being incompetent, from the societal discourse on matters of some complexity.
10. The Action Plan is part of the sixth Framework Programme for Research of the European Commission (European Commission, Research Directorate).
11. In its response to the report, the UK Government agreed with the Committee that there is a need to engage the public more fully in debates about the possible implications of the use of technology, however, it was also emphasised that consultation in whatever form has costs, both in time and financial terms.
12. Source: *Cordis Focus*, No. 203, p. 17.
13. Source: *Cordis Focus*, No. 194, p. 9.
14. The role of Myrdal in this discussion is described in Forsman (2002).
15. The phlogiston theory postulated that in all flammable materials there is present phlogiston, a substance that is given off in burning. The theory received strong and wide support throughout a large part of the 18th century until it was refuted by the work of A. L. Lavoisier, who revealed the true nature of combustion. He

freed society from the disillusionment of the phlogiston theory by showing that the mass of the products in a reaction are equal to the mass of the reactants.

16. Mary Douglas and Aaron Wildavsky, recognise this in their book about Risk and Culture when they conclude: 'Cultural analysis need not become a conversation stopper which allows anyone to block an argument by referring reductively to its social genesis. Its own claims to attention would be destroyed at the same stroke. This provides a procedure for inquiry that can accommodate the social context of belief without cutting out the basis of discourse' (Douglas and Wildavsky, 1982, p. 82).
17. There are other forces than commercialisation that can distort the identity of science as a pure truth finding endeavour. One is inappropriate political pressure that may result for example from government appointed university board members. Another is defence funded research for which either the results or the context are kept secret. The development and use of new information and genetic technologies, and of combing them into 'converging technologies' for security reasons, may further increase the threats to the integrity of science and create new ethical dilemmas.

3 Values, Emotions, Interests and Rationality

1. Paul E. Griffiths, in *Philosophy of Mind*, referring to Calhoun (1994) and De Sousa (1987, p. 290).
2. These particular bullets come from Joel Tickner and Lee Ketelsen (2001) when referring to Fiorino. Even if Fiorino deals with environmental risk in his book (Fiorino, 1990) his arguments are valid in a more generic sense.

4 Radioactive Waste Management

1. For a good overview of current trends in risk communication the reader is referred to Drottz- Sjöberg (2003a).
2. The text in this chapter partly builds on a Background Paper written for the Nuclear Waste Management Organisation, Canada, (Andersson, January 2004). The text is updated till the end of 2007, extended to include US and Canada and otherwise revised.
3. Transmutation is a technology for the transformation of highly radioactive nuclides in spent nuclear fuel to stable non-radioactive nuclides, thus ideally making the spent fuel free from dangerous materials. There are different possible technologies for transmutation but they all rely on reprocessing the spent fuel with an on-going nuclear industry. In addition, transmutation, if it could be done on a commercial scale, would still require waste repositories, however for waste with a shorter radioactive lifespan.
4. See http://www.radwastegovernance.eu/
5. State of Nevada web site: http://www.state.nv.us/nucwaste/npf/npf2.htm
6. Report And Recommendations of The Nevada Commission on Nuclear Projects. Presented to the Governor and Legislature of the State of Nevada, December, 2000.
7. Basically, the selection of waste management method is a value-laden decision, provided that safety can be shown for the chosen alternative. For example, the

desired degree of retrievability of the waste is a societal decision, which governs the choice of disposal method. With near surface disposal retrievability will be easy, deep into the bedrock it will be much harder and with disposal in very deep boreholes it can be made impossible.

8. Every third year SKB must on behalf of the Swedish nuclear utilities present a programme for research and development for the management of nuclear waste.

5 Risk Assessment and Risk Management

1. Here we use the term quantitative risk assessment (QRA) as synonymous with probabilistic risk assessment (PRA) which is the term most commonly used in reactor safety. The reason is that QRA is a more generic concept used in other areas. In QRA (and PRA) risk is quantified mathematically by quantifying the probabilities of undesired events.
2. International Commission on Radiological Protection web site http://www.icrp.org/
3. It is interesting to note that for the first decades of the ICRP, until the middle of the twentieth century, protection was only concerned with keeping individual doses below the thresholds for deterministic effects. Low levels of radiation were deemed beneficial and radioactive consumer products abounded.
4. A study by Paul Slovic (2001) shows that young smokers give little or no conscious thought to risks. Instead they are driven by the affective impulses of the moment, enjoying smoking as something new and exciting, a way to have fun with their friends. Lennart Sjöberg, in a paper about personal and general risk (Sjöberg, 2000b, p. 1154), discusses information campaigns aimed at improving people's health behaviour, such as stopping smoking. He concludes that in these cases people see risk as true mostly for others and that such campaigns are less relevant for themselves.
5. It is called 'ecological' because sociology uses the term *ecology* for the study of groups.
6. Perhaps, an equally problematic aspect of the Dread/Novelty diagram is simply the aggregation of a large number of attributes to the two dimensions. Authors like Vlek (1996) have avoided this problem by grouping risk attributes into eleven categories: (1) potential degree of harm/fatality, (2) physical extent of damage (area affected), (3) social extent of damage (number of people involved), (4) time distribution of damage (immediate and/or delayed effects), (5) probability of undesired consequence, (6) controllability (by self or trusted expert) of consequences, (7) experience with, familiarity, imaginability of consequences, (8) voluntariness of exposure (freedom of choice), (9) clarity, importance of expected benefits, (10) social distribution of risks and benefits, and (11) harmful intentionality.
7. Of course, this would have been the case also if the psychometric paradigm had been true. But the new results mean essentially two things. Firstly, they eliminate an argument (that ordinary peoples risk perception is based on emotion and ignorance) in the political debate about risk management. Secondly, they make it more legitimate to explore the value-laden characteristics of risk management alternatives.

6 Biotechnology and Nanotechnologies

1. *USA Today*, 6 April 2004.
2. The National Nanotechnology Initiative web site http://www.nano.gov/describes NNI history, funding etc and gives the US Government view on the prospects of nanotechnology.
3. ETC Group web site http://www.etcgroup.org/en (June 2007).
4. The US approach, following Roco (2004), is more to inform the public with a balanced approach about the benefits and potential unexpected consequences.
5. The open letter was submitted by 20 non-governmental organisations: American Federation of Labor and Congress of Industrial Organisations, Beyond Pesticides, Brazilian Research Network in Nanotechnology, Society and Environment, Center for Environmental Health, Center for Food Safety, Corporate Watch, Edmonds Institute, ETC Group, Friends of the Earth Australia, Friends of the Earth Europe, Friends of the Earth United States, Greenpeace, Institute for Agriculture and Trade Policy, International Center for Technology Assessment, International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations, Natural Resources Defense Council, Sciencecorps, Silicon Valley Toxics Coalition, Third World Network, United Steelworkers of America.
6. These are areas of application are given at the web site (http://pbd.lbl.gov/synthbio) of the Synthetic Biology Department, established in 2003 at Berkeley Lab; California, USA.

8 Examples from Other Areas

1. EFSA web site: http://www.efsa.europa.eu/en/press_room/press_release/2005/980.html
2. In fact, just the day after the press conference, the Swedish Minster of Agriculture, Margareta Winberg, put aside an extra 1.5 million Swedish crowns for the National Food Administration Agency budget.
3. See: http://www.who.int/peh-emf/standards/en/
4. If we had both the epidemiological evidence and known mechanisms, it would be possible to calculate the consequences of different levels of exposure, we would know enough for risk informed decision-making and the precautionary principle would not be necessary anyway.

10 Insights into Democratic Theory – and the Awareness Principle

1. In his book '*Models of Democracy*' David Held gives a description of the developments of democracy in the western world from classical democracy in the Greek city states to the current situation.
2. There seems to be confusion in the literature about the terminology with regard to different models of democracy. For the sake of consistency, I follow the terminology used by Held (2002).
3. It is worthwhile to distinguish between a pluralist society, which we have as matter of fact and a pluralist democracy. In a pluralist society there can be room for a representative system of political decision-making with elected assemblies having a special role, whereas in a pluralist democracy the roles of the political organisations would be further diminished to being just one actor among others

involved in decision-making. I interpret the Robert Dahl version as a pluralist society with a special role for elected assemblies. The form of pluralist democracy which also gives market forces more or less complete power in societal decision-making, I refer to as what Held calls 'legal democracy' or 'the new right'. We return to this in chapter 12.

11 Awareness and Transparency

1. Here we only deal with a limited part of the model ('the RISCOM triangle'). Communicative action concerns interaction between individuals which takes place in a specific organisational context. The RISCOM model offers a methodology to analyse what are the prerequisites for transparency within a given organisational framework. The RISCOM Model here relies on the organisational theory of Stafford Beer (Beer, 1979). 'Transparency loops', stretching and levels of meaningful debate are important RISCOM ideas for the structuring and managing the dialogues having their origin in Beer's work. Examples of organisational analyses with the RISCOM model, which have been done with Raul Espejo and Clas-Otto Wene as the key persons, are found in (Andersson, Espejo and Wene, 1998, Espejo, 2003, and Andersson, Grundfelt, Wene, 2006).
2. In the RISCOM literature the terms 'transparency loops' and 'transparency channels' are used. These concepts refer to the channels for dialogue that must exist within an organisation, and between the organisation and its surrounding environment, for the organisation to be viable. The existence of such channels, as well as if they are strong or weak, comes out from the analysis that rest on the organisational theory of Stafford Beer (Beer, 1979). My concept of 'transparency arenas' refers to arenas that can be organised to support political decision-making within specific policy areas with more transparency and awareness. In relation to the RISCOM theory such arenas should be seen as one of the six transparency channels – the stretching channel. For details the reader is referred to the references given in the previous footnote.
3. This definition is a slightly modified definition from Wene and Espejo (1999).
4. Habermas distinguishes between open strategic action and concealed strategic action for which manipulation is one form.
5. Figure 11.1 is a slightly modified extract from Andersson, Grundfelt, and Wene (2006).
6. For example, in nuclear waste management, the overall nuclear waste management system is one level, selection of disposal method a second, site selection for the preferred method a third and site investigations a fourth level. One can also include a top level of energy system since nuclear waste is only produced by one alternative way of electricity production.
7. The hearings were evaluated by Britt-Marie Drottz-Sjöberg (Drottz-Sjöberg, 2001).

12 Public Involvement

1. To be more precise, the Board in its present form was established in 1995 as a successor of the earlier Technology Board, which was set up as a statutory body in 1986.
2. For information about the Board: See /http://www.tekno.dk/ with links.
3. In May, 2007 twelve methods were given on the Board web site http://www.tekno.dk/

4. Following Gnaiger and Martin, it is useful to distinguish between two main models of science shops: those which follow the Dutch model and are university based and those which are not based in a university. The second type can be further divided into those which have a relationship with a university, those without such a relationship and those which act as incubators for establishing a science shop. All these models share the aim of providing research support to civil society organisations. (Gnaiger and Martin, 2001, p. 6)
5. For a description of the format, see Beer (1994).
6. The interested reader is referred to 'Focus Groups : A Practical Guide for Applied Research' by Richard A. Krueger and Mary Anne Casey (Krueger and Casey, 2000). This book gives the standard for learning how to conduct a focus group, but it also contains comparisons to market research, academic, non-profit and participatory approaches.
7. The interested reader is referred to Drottz-Sjöberg (2003b).
8. By 'transparency' Rowe and Frewer mean transparency *of the process* so that citizens can see what is going on and how decisions are made. Their meaning of transparency is thus different from the meaning of the RISCOM model which deals with the framing and structure of issues.
9. This analysis of public participation processes is a further development of the concept first presented in Andersson, Balfors, Schmidtbauer and Sundqvist (1999).
10. To add to the confusion, EIA and EIS are sometimes used with different meanings, namely that EIA means the *process* of environmental impact assessment which results in a *document*, called Environmental Impact Statement.
11. International Association for Impact Assessment (IAIA), Principles of Environmental Impact Assessment Best Practice, http://www.iaia.org/modx/assets/files/SP4%20web.pdf
12. European Union Directive 85/337/EEC as amended by Directive 97/11/EC.
13. In 2002, the municipality agreed to become one of two remaining municipalities in the site selection programme.
14. The convention text talks about the 'Party of origin' and 'affected Parties'. The Party of origin is the Contracting Party under whose jurisdiction a proposed activity is envisaged to take place, and an affected Party is a Contracting Party likely to be affected by the transboundary impact of the proposed activity. For the sake of simplicity instead we use the terms 'country of origin' and 'affected country' since Parties of the convention are actually countries with only one exception (the European Union).
15. United States Council for International Business, http://www.uscib.org/
16. United Nations Economic Commission for Europe, web site http://www.unece.org/

13 The Democratic Paradox

1. Both these authors have published a number of books within the theme of critique of the liberal democracy followed by ideas for more participation. We refer to '*The Life and Times of Liberal Democracy*' by Macpherson (Macpherson, 1977) and '*Participation And Democratic Theory*' by Pateman (Pateman, 1970).
2. However, even if citizens may not always be aware, they are mobilisable if something comes to their attention. For example, there are cases where proposed rules in the US *Federal Register* have caused wide spread public activity stimulated by stakeholders.

14 The Public Sphere – Mass Media and Journalism

1. Habermas (1996). The quotation is from Outhwaite (1996), p. 13.
2. Mayhew (1997) refers to Simon (1961<1947>), Downs (1957) and Stigler (1961).
3. A recent Swedish example can illustrate this. A poll was ordered by Swedish industry on Sweden joining the euro. A majority of 50% were in favour of Sweden joining within four years, and only 30% were against. This result was the main argument of three representatives of industry to state that the Government should announce a date for a referendum on the issue. This was done on the most prominent page in the Swedish press for debate articles (Tunhammar *et al.*, 2002).
4. 'The voters reject the favourite issues of the media' (own translation), Dagens Nyheter, DN Debatt, 15 September 2002 (Asp, K., 2002).
5. 'The voters are left in the lurch' (own translation), Dagens Nyheter, DN Debatt, 18 September 2002 (Lewin and Petersson, 2002).
6. 'Our Republic and its press will rise or fall together. An able, disinterested, public-spirited press, with trained intelligence to know the right and courage to do it, can preserve that public virtue without which popular government is a sham and a mockery. A cynical, mercenary, demagogic press will produce in time a people as base as itself. The power to mould the future of the Republic will be in the hands of the journalists of future generations' (Pulizer,1904).
7. Knight Science Journalism Fellowships web site: http://web.mit.edu/knight-science/
8. To read about the philosophy and conduct of civic journalism: see e.g. Rosen (1999) and Schaffer (2004).
9. As Thomas Meyer points out, infotainment is not the enemy of information *per se*. Instead its commitment to entertainment, drama, and emotional involvement may open up access routes to the domain of political affairs that would otherwise remain closed (Meyer, 2002, p. 131).

15 Setting the Values First – Towards a New Paradigm

1. By this I don't mean that the experts manipulate the results of quantitative analy ses, but rather that they can choose to neglect certain cases or scenarios for the future. Typically these scenarios are more value-laden than the normal scenarios that are included in the analysis.
2. This quotation is from '*The Habermas Reader*', edited by William Outhwaite (1996), p. 51. The chapter 'Scientisation of Politics and Public Opinion' is an extract from Habermas (1971).
3. The notion of the experts-agenda paradigm versus the values-first paradigm was introduced at the VALDOR symposium in Stockholm in June 2001 (Andersson, 2001).
4. I am grateful to Gitte Meyer, at the Centre for Bioethics in Copenhagen, for making this point so clear to me.
5. With his book '*The Structure of Scientific Revolutions*' Kuhn introduced the paradigm concept which, although originally used for natural sciences, has been used in a much broader context (Kuhn, 1962).
6. This is the case in Sweden, which, based on the history of the energy debate, is a country where one would expect the public to be especially friendly to renewable energy sources.

16 Principles for New Arenas

1. Majone (1989, page 3) comes to similar conclusions: 'While rules of debate have hardened into institutions in the traditional forums of public deliberation, in newer arenas of debate such as nuclear safety, technology assessment, and environmental and health regulation appropriate procedures and standards of argument are still lacking. One reason it has proved difficult to institutionalise debate in these and other areas of policy-making is that the issues under discussion here are seldom purely technical or purely political. Rather, they often are of a type that Alvin Weinberg has called "trans-scientific" – questions of fact that can be stated in the language of science but are, in principle or in practice, unanswerable by science.'
2. These principles have their origin partly in the RISCOM Model (Andersson, Espejo and Wene, 1998), partly in the four conditions for a 'National Citizens' Forum' proposed by Leon Mayhew in his book '*The New Public*' (Mayhew, 1997). I am grateful for his comments on my ideas before he sadly passed away in the year 2000.

17 Institutional Anchoring

1. The following quote from the EU research magazine Cordis Focus is a good example: 'dialogue between scientists and citizens is fundamental to an open debate on the ethical implications of new technologies for human dignity and future generations in a Europe which is the expression of diverse traditions and cultures'; from a talk by Commission President Romano Prodi. Cordis Focus, No. 211, 16 December 2002, p. 211.
2. For information: the STOA web site: http://www.europarl.eu.int/stoa
3. One exception is the mutual dependence between scientists and science writers.

References

F. Adlkofer, 'Lessons from the REFLEX study on biological effects of radiofrequency electromagnetic fields', presentation at the RFID Workshop, 2 June 2006. http://www.rfidconsultation.eu/docs/ficheiros/Adlkofer.pdf. Copyright 2006 Franz Adlkofer

Advisory Committee on Releases to the Environment: 'Advice on the implications of the farm-scale evaluations of genetically modified herbicidetolerant crops', 13 January 2004 http://www.defra.gov.uk/environment/acre/advice/pdf/acre_advice 44.pdf

American Association of State Climatologists (AASC). 'Policy statement on climate variability and change', 2 April 2002.

J. Andersson, K. Andersson, and C.-O. Wene, 'The Swedish Dialogue Project: an attempt to explore how different actors may take part in the decision process related to disposal of radioactive waste', High Level Radioactive Waste Management, Fourth Annual International Conference, Las Vegas, 1993.

K. Andersson (ed.), 'Review/decide and inquiry/decide – two approaches to decision making', SKI Report 98:5, RISCOM Pilot Study, Stockholm, January 1998.

K. Andersson, R. Espejo, and C.-O. Wene, 'Building channels for transparent risk assessment', SKI Report 98:5, RISCOM pilot study, Stockholm 1998.

K. Andersson, B. Balfors, J. Schmidtbauer, and G. Sundqvist, 'Transparency and public participation in complex decision processes – prestudy for a decision research institute in Oskarshamn', KTH, TRITA-AMI Report 3068, 1999.

K. Andersson, 'Transparency and public participation – the need for a new Paradigm', VALDOR Symposium, pp. 57–67, Stockholm, June 2001.

K. Andersson, C.-O. Wene, B-M. Drottz Sjöberg, and M. Westerlind, 'Design and evaluation of public hearings for Swedish site selection', SKI Report 2003:32, (RISCOM II Deliverable 5.3).

K. Andersson, M. Westerlind *et al.* 'Transparency and public participation in radioactive waste management', RISCOM II Final report, SKI Report, August 2004.

K. Andersson, 'Overview of European initiatives: towards a framework to incorporate citizen values and social considerations in decision-making, background paper', Nuclear Waste Management Organization, Canada, January 2004.

K. Andersson, R. Espejo, and C.-O. Wene, 'What are the communication challenges for politicians, experts and stakeholders in order to enhance transparency in nuclear waste management decisions?', Report from Team Syntegrity Meeting. RISCOM II Deliverable 3.3. SKI Report 2004:25, Stockholm, 2004.

K. Andersson, B. Grundfelt, and C.-O. Wene, 'Transparent remediation projects', Swedish Environmental Protection Agency. Contract E-48-04, Final Report, Stockholm, 2006.

K. Andersson, R. Johansson, and C.-O. Wene, 'Dialogos prestudy', (in Swedish), Elforsk Rapport 06.36, Stockholm, 2006.

K. Andersson, 'Making the decision-making basis for nuclear waste management transparent, summary of a pre-study report', KASAM Contract 38/06. Karita R: 07:01. ISBN 978-91-976858-0-1. In Swedish with an English summary, April 2007.

Y. Andersson-Sköld, J. Norrman, and K. Kockum, 'Survey of risk assessment methodologies for sustainable remediation', *Proceedings of the fourth VALDOR*

Symposium (ed. Kjell Andersson), Swedish Nuclear Power Inspectorate, ISBN 91-6318876-7, Stockholm, 14–18 May 2006.
S.R. Arnstein, 'A ladder of citizen participation'. *American Institute of Planners Journal*, 35(2): (1969) 216–24.
K. Asp, 'The voters reject the favourite issues of the media' (free translation), Dagens Nyheter, DN Debatt, 15 September 2002.
K. Asp, 'The alliance has been favoured by the media election coverage' (free translation), Dagens Nyheter, DN Debatt, 17 September 2006.
A. Bale, *L'Attention*, Presses Universitaires de France, 1970.
H. H. Bauer, 'Science in the 21st century: knowledge monopolies and research Cartels', *Journal of Scientific Exploration* 18, No. 4 (2004), 643–60.
S. Beer, *Beyond Dispute – The Invention of Team Syntegrity* (Chichester: John Wiley 1994).
T. Beierle, 'Using social goals to evaluate public participation in environmental decisions', *Policy Studies Review* 16(3/4) (1999), 75–103.
T. Beierle, and J. Cayford, 'Democracy in practice: public participation in environmental decisions', *Resources for the Future*, RFF Press book, Washington DC, 2002.
J.E. Bekelman, Y. Li, and C.P. Gross, 'Scope and impact of financial conflicts of interest in biomedical research: a systematic review', *Journal of the American Medical Association* 289, 2003, 454–65.
Berkeley Lab. Synthetic Biology Department, web site http://pbd.lbl.gov/synthbio
Biotechnology and Biological Sciences Research Council (BBSRC), Press Release, 2 April 2003. http://www.bbsrc.ac.uk/media/pressreleases/03_04_02_newchair.html
Biotechnology and the European Public Concerted Action Group, 'Europe ambivalent on Biotechnology', *Nature*, 387, 26, June 1997.
Th. B. Birkland, 'Focusing events: mobilization, and agenda setting', *Journal of Public Policy*, 18 (1), 1998, 53–74.
D. Bok, *Universities in the Marketplace – the Commercialization of Higher Education* (Princeton and Oxford: Princeton University Press, 2003).
T. Brante, and H. Norman, *Epidemisk masspsykos eller reell risk? En sociologisk studie av kontroversen kring elöverkänslighet* (Stockholm/Stehag: Brutus Östlings Bokförlag Symposion, 1995).
S. Brint, *In an Age of Experts – the Changing Roles of Professionals in Politics and Public Life* (New Jersey: Princeton University Press, 1996).
R.H. Brown, *Towards a Democratic Science* (Yale University Press, 1998).
D. Bruce, and J. Tait, 'Interests, values and biotechnological risk', VALDOR Symposium, pp. 109–18, Stockholm, June 2003.
P. Bruckner, *La mélancolie démocratique* (Paris: Edition du Seuil, 1990).
C.R. Bråkenhielm, 'Safe disposal? review of the EIA Forum in Kalmar County, 1997–2000, from an ethical and democratic perspective', 2001 (in Swedish).
V. Bräuer, 'A new approach for siting a radioactive waste repository in Germany', International High Level Radioactive Waste Management Conference, Las Vegas, 30 March–2 April 2003, pp. 112–19.
J. Burton, *Conflict: Resolution and Prevention* (Basingstoke and London: Macmillan Press, 1990).
L. Busch, 'External review of the collaborative research agreement between Novartis Agricultural Discovery Institute, Inc. and The Regents of the University of California. Institute for Food and Agricultural Standards (IFAS)', Michigan State University, 13 July 2004.
C. Calhoun, 'Cognitive emotions?', in C. Calhoun, and R.C. Solomon (eds), *What Is an Emotion: Classic Readings in Philosophical Psychology* (New York: Oxford University Press, 1994).

T. Carlsson, K. Hallberg, K. Andersson, C.R. Bråkenhielm, and H. Åhagen, 'The Oskarshamn model for public involvement in the siting of nuclear facilities', VALDOR Symposium, Stockholm, June 2001.

D. Caruso, Intervention – *Confronting the Real Risks of Genetic Engineering and Life on a Biotech Plane* (San Francisco: Hybrid Vigor Press, 2006).

CEC. *EU White Paper on Governance*, 2001.

Civil Society–Labor Coalition. 'An open letter to the International nanotechnology community at large – civil society–labor coalition rejects fundamentally flawed Dupont–Ed proposed framework', 12 April 2007 (submitted by 20 non-governmental organizations) http://www.etcgroup.org/upload/publication/610/01/coalition_letter_april07.pdf

A. Clark, 'Artificial Intelligence and the many faces of reason', in *Philosophy of Mind*, (eds), S. Stich, and T.A. Warfield (Blackwell Publishing, 2003) pp. 309–21.

Code of Federal Regulations (40 CFR 1500). Title 40: Protection of Environment, Part 1502: Environmental Impact Statement. Sec. 1502.9 Draft, final, and supplemental statements.

J. Cohen, 'Deliberation and democratic legitimacy', in R.E. Goodin, and Ph. Pettit (eds), *Contemporary Political Philosophy*. (Oxford: Blackwell Publishers, 2002, first print 1997).

Committee on Radioactive Waste Management, UK, 'Managing our radioactive waste safely: CoRWM's recommendations to the Government'. CoRWM Doc 700. July 2006.

M. Considine, 'Quantifying risks in the oil and chemical industry', in *Proceedings: Promotion of Technical Harmonisation on Risk-Based Decision-Making*, 22–24 May 2000, Stresa/Italy.

Cordis Focus, No. 194, 8 April 2002, Published by the European Commission.

Cordis Focus, No. 200, 1 July 2002, Published by the European Commission.

Cordis Focus, No. 203, 12 August 2002, Published by the European Commission.

Cordis Focus, No. 211, 16 December 2002, Published by the European Commission.

Cordis Focus, No. 236, 12 January 2004, Published by the European Commission.

Cordis Focus, No. 237, 26 January 2004, Published by the European Commission.

Cordis Focus, No. 238, 9 February 2004, Published by the European Commission.

Cordis Focus, No. 247, 14 June 2004, Published by the European Commission.

Cordis Focus, No. 249, 12 July 2004, Published by the European Commission.

COWAM. The COWAM European Concerted Action, www.cowam.com , June 2003.

R. Dahl, *A Preface to Democratic Theory* (Chicago: The University of Chicago Press, 1956).

R. Dahl, 'Hierarchy, democracy, and bargaining in politics and economics', in H. Euleau (ed.), *Political Behaviour*, Glencoe (Ill): the Free Press, 1956.

R. Dahl, *Democracy and Its Critics* (Yale University Press, 1989).

R. Dahrendorf (Member of House of Lords), *Dagens Nyheter*, Stockholm, 23 August 2002.

Department for Environment, Food and Rural Affairs, UK, 'Response to the Report and Recommendations from the Committee on Radioactive Waste Management (CoRWM)', by the UK Government and the devolved Administrations. London 2006.

R. De Sousa, *The Rationality of Emotions* (Cambridge: MA: MIT Press, 1987).

D. Dickson, *The New Politics of Science* (New York: Pantheon Books, 1984).

M. Douglas, and A. Wildavsky, *Risk and Culture* (Berkeley: University of California Press, 1982).

A. Downs, *An Economic Theory of Democracy* (New York: Harper & Brothers, 1957).

B.-M. Drottz-Sjöberg, 'Evaluation of hearings with questionnaires and Interviews', SKI Rapport 01:39. In Swedish with a 2-page English summary (RISCOM II Deliverable 5.4), 2001.

B-M. Drottz-Sjöberg, 'Current trends in risk communication – theory and Practice', Directorate for Civil Defence and Emergency Planning, Norway, 2003a. Also available at http://www.dsb.no/

B.-M. Drottz-Sjöberg, 'Focusing on SSI's risk and radiation protection Criteria: a report based on discussions in focus groups in Östhammar and Öskarshamn municipalities', SSI rapport: 2003:20b, 2003b.

J. Dryzek, *Deliberative Democracy and Beyond* (Oxford University Press, 2000).

Economic and Social Research Council (UK). 'Global environmental change programme: the politics of GM food: risk science and public trust', *Special Briefing No. 5*, October 1999.

Environmental Assessment Panel, 'Report of the Nuclear Fuel Waste Management and Disposal Concept Assessment Panel, Canadian Environmental Assessment Agency', Minister of Public Works and Government Services, Canada 1998.

Environmental Defense–DuPont Nano Partnership, Nano Risk Framework, Environmental Defense (Washington, DC) and DuPont, (Wilmington), 21 June 2007. http://www.environmentaldefense.org

Environmental Protection Agency, '40 CFR Part 197: Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada: Proposed Rule', Federal Register, v.70, No.161, 22 August 2005, pp. 49014–49065.

R. Espejo, 'Structure for transparency in nuclear waste management: 'comparative review of the structures for nuclear waste management in France, Sweden and the UK', SKI Report, 2003: 26.

ETC Group web site http://www.etcgroup.org/en

Eurobarometer 55.2, 'Science, citizens and technology', December 2001.

Eurobarometer 56.2, 'Europeans and radioactive waste', April 2002.

Eurobarometer 64.3, 'Europeans and biotechnology in 2005: patterns and trends'.

European Commission, Research Directorate – 'General Science and Society Action Plan', European Research Area, Brussels. ISBN 92-894-3025-7.

European Commission, 'Communication from the Commission on the precautionary principle,' Brussels, 2 February 2000, COM(2000).

European Commission: Vision 2002, 'Nanoelectronics at the centre of change: a far-sighted strategy for Europe Report of the High Level Group,' June 2004 EUR 21149.

European Commission. 'Life sciences and biotechnology – A strategy for Europe. Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions,' COM(2002)27 of 23 January 2002.

European Commission COM (2003) 334. 'Report from the Commission to the European Parliament and the Council on the Application and Effectiveness of the EIA Directive (Directive 85/337/EEC as amended by Directive 97/11/EC) – How Successful Are the Member States in implementing the EIA Directive?'.

European Commission. Regulation (EC). No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed.

European Commission. Regulation (EC). No 1830/2003 of the European Parliament and of the Council of 22 September 2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms.

European Commission, Press release, 20 December 2004, http://europa.eu.int

European Commission: Special Eurobarometer 227 – Radioactive Waste 2005.
European Commission, MEMO 06/61, Brussels, 7 February 2006.
European Commission. Special Eurobarometer. Europeans and Biotechnology in 2005: Patterns and trends. Final report on Eurobarometer 64.3. July 2006.
European Commission. Standard Eurobarometer 64. Public opinion in the European Union, June 2006.
European Commission – Commission Staff Working Document. Document accompanying the mid-term review of the Strategy on Life Sciences and Biotechnology COM(2007) 175.
European Commission. Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the mid term review of the Strategy on Life Sciences and Biotechnology. SEC(2007) 441.
European Food Safety Authority, web site: http://www.efsa.europa.eu
European Group on Ethics in Science and New Technologies to the European Commission. Opinion on the ethical aspects of nanomedicine – Opinion No. 21. 17 January 2007.
European Parliament. Science and Technological Options Assessment (STOA). Web site: http://www.europarl.eu.int/stoa
European Union. World energy, technology and climate policy outlook 2030, EUR-OP, Luxembourg, 2003.
European Union. Directive 85/337/EEC as amended by Directive 97/11/EC.
European Union. Directive 2001/42/EC of The European Parliament and of The Council.
G. Falkemark, *Politik, Lobbyism och Manipulation* (Nya Doxa, 1999).
Federal Register. 66 FR 55732. Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada. Final Rule 10 CFR Part 63.
Th. Field, 'Pursuing transparency through science courts', VALDOR Symposium Stockholm, June 1999.
D. Fiorino, 'Citizen participation and environmental risk: a survey of institutional mechanisms', *Science, Technology, and Human Values* 15(2) (1990) 226–44.
B. Fischhoff, P. Slovic, S. Lichtenstein, S. Read, and B. Combs, 'How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits', *Policy Sciences*, 9 (1978) 127–52.
B. Fischhoff, S. Lichtenstein, P. Slovic, P. S.L. Derby, and R.L. Keeney, *Acceptable Risk*, (New York: Cambridge University Press, 1981).
B. Fischhoff, 'Risk: a guide to controversy', Appendix to National Research Council *Improving Risk Communications* (Washington, DC: National Academy Press, 1989) pp. 211–319.
P. A. Fleming, Examining Recent Expert Elicitation Judgment Guidelines: Value Assumptions and the Prospects for Rationality, Proceedings of the first VALDOR Symposium (ed. Kjell Andersson), pp. 243–54, Swedish Nuclear Power Inspectorate, Stockholm, 13–17 June 1999.
F. Foltz, 'Five arguments for increasing public participation in making science policy', *Bulletin of Science Technology & Society*, Vol. 19, No. 2 (1999) 117–27.
N. Fraser, 'Rethinking the public sphere: a contribution to the critique of actually existing democracy', in Craig Calhoun (ed.), *Habermas and the Public Sphere* (Cambridge, MA: MIT Press, 1992).
G. Gaskell, N. Allum, W. Wagner, T. Nielsen, E. Jelsoe, and M. Kohring, 'In the public eye: representations of biotechnology in Europe', in G. Gaskell, and M. Bauer (eds),

Biotechnology 1996–2000: The Years of Controversy (London: Science Museum Press, 2001) pp. 53–79.

A. Gnaiger, and E. Martin, Science Shops: Operational Options SCIPAS report no. 1 Study financed by the EC-DG XII programme 'Improving the Human Research Potential and the Socio-Economic Knowledge Base(IHP)' and 'Strategic Analysis of Specific Political Issues' (STRATA), HPV1-CT-1999-00001, July 2001.

Government of Canada, *An Act Respecting the Long-term Management of Nuclear Fuel Waste*, 49–50–51 Elizabeth II, 2001–2002, First session, 37th Parliament, Royal Assent 13 June, in force 15 November: House of Commons of Canada, Ottawa 2002.

Government Office for the North West, Town and Country Planning Act 1990, Appeal by UK Nirex Limited, Proposed Rock Characterisation Facility on land at and adjoining Longlands Farm, Gosforth, Cumbria (LPA Ref. 4/94/9071): Decision letter on behalf of the Secretary of State for the Environment, with Inspectors and Assessors Reports, 17 March 1997.

P. E. Griffiths, 'Emotions', in S. Stich, and T. A. Warfield (eds), *Philosophy of Mind*, (Blackwell Publishing, 2003) pp. 288–308.

C. Grimes, 'Whither the civic journalism bandwagon?', Discussion Paper, The Joan Shorenstein Center on the Press, Politics and Public Policy. John F. Kennedy School of Government, February 1999.

J. Habermas, *Toward a Rational Society* (London: Heineman, 1971). (Transl. of German original: *Technik und Wissenschaft als Ideologie* (Frankfurt: Suhrkamp, 1968).

J. Habermas, *Communication and the Evolution of Society* (Boston: Beacon Press, 1979). (Transl. of German original: *Zur Rekonstruktionen des historischen Materialismus* (Frankfurt: Suhrkamp, 1979).

J. Habermas, *Theorie des kommunikativen Handelns*, 2 vols (Frankfurt: Suhrkamp, 1981). (Transl. by Th. McCarthy as *The Theory of Communicative Action*, 2 vols, (Cambridge: Polity Press, 1987).

J. Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into the of Bourgeois Public Society* (Cambridge: MIT Press, 1989). (Transl. by Th. Burger of the German original *Strukturwandel der Öffentlichkeit* (Herman Luchterhand Verlag,1962).

J. Habermas, *Faktizät und Geltung* (Frankfurt: Suhrkamp) Transl. by W. Rehg, *Between Facts and Norms* (Cambridge: Polity Press, 1996).

B. Hedberg, 'Transparency forum for mobile telephone systems – a risk management project', Proceedings of the fourth VALDOR (VALues in Decisions On Risk) Symposium (ed. Kjell Andersson), Swedish Nuclear Power Inspectorate, Stockholm, 14–18 May 2006.

D. Held, *Models of Democracy, 2nd edn* (Oxford: Polity Press, 2002).

D. Henderson, 'Governments and climate change issues: the case for rethinking', *World Economics*, Vol. 8, No. 2, (2007).

R. Henderson, A.B. Jaffe, and M. Trajtenberg, 'Universities as a source of commercial technology: a detailed analysis of university Patenting, 1965–1988', *The Review of Economics and Statistics* 80(1) (1998)119–27.

Her Majesty's Stationery Office. *The Forward Look of Government-funded Science, Engineering and Technology*, CM3257, 1–2 May1996.

Her Majesty's Stationery Office. *Lambert Review of Business–University Collaboration*, London, 2003.

Her Majesty's Treasury. *Managing Risks to the Public: Appraisal Guidance*. London, June 2005.

Her Majesty's Treasury. *Science and Innovation Investment Framework* 2004–2014: Next Steps, March 2006.

M. Hildén, and P. Jalonen, 'Key issues in strategic environmental impact assessments – finnish experiences', In Hilding-Rydevik (ed.), *Environmental Assessment of Plans and Programs: Nordic Experiences in Relation to the Implementation of the EU Directive 2001/42/EC* (Stockholm: Nordregio, 2003), ISBN 91-89332-34-2.

T. Hilding-Rydevik (ed.), *Environmental Assessment of Plans and Programs, Nordic Experiences in Relation to the Implementation of the EU Directive 2001/42/EC* (Stockholm: Nordregio, 2003), ISBN 91-89332-34-2.

House of Lords: Science and Society. 3rd Report of the Select Committee on Science and Technology, 2000, HL 38.

J. Hunt, K. Day, and R. Kemp, *Stakeholder Dialogue: Experience and Analysis*, RISCOM II Deliverable 4.1, Lancaster University, Galson Sciences, Environment Agency and NIREX, August 2001.

Imperial College London response to the Lambert Review, 4 December 2003, http://www.imperial.ac.uk/P4778.htm

Intergovernmental Panel on Climate Change (IPCC), (2007), 'Summary for policymakers, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor, and H.L. Miller (eds), (in: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK and New York, NY.

International Association for Impact Assessment (IAIA), 'Principles of environmental impact assessment best practice', http://www.iaia. org/Non_Members/Pubs_Ref_Material/pubs_ref_material_index.htm

International Commission on Non-Ionizing Radiation Protection (ICNIRP) 'Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)', *Health Physics*, 74(4) (1998) 494–522.

ICRP, International Commission on Radiological Protection (Presented by Professor Roger Clarke, ICRP Chairman). 'The evolution of the system of radiological protection: the justification for new ICRP recommendations', *Journal of Radiological Protection* 23 (2003)129–42.

ICRP, International Commission on Radiological Protection, 'The optimisation of radiological protection – broadening the process – Report by the ICRP Committee 4 Task Group on Optimisation of Protection', updated draft after public consultation, January 2006 http://www.icrp.org/

International Energy Agency, *Energy Technology and Climate Change – A Call to Action*, (Paris: OECD/IEA, 2000).

International Energy Agency, *The World Energy Outlook* (Paris, 2006).

A. Irwin, *Citizen Science: A Study of People, Expertise and Sustainable Development*. (London & New York: Routledge, 1995).

A. Irwin, and B. Wynne (eds), *Misunderstanding Science? The Public Reconstruction of Science and Technology* (Cambridge: Cambridge University Press, 1996).

W. Jackson, 'Save Democracy from Civic Journalism: North Carolina's odd Experiment', *Harvard International Journal of Press/Politics* 2(3) (1997), 102–17.

P. James, F. Kemper, and G. Pascal, *A European Food and Public Health Authority. The Future of Scientific Advice in the EU,* EFPHA & FSA-8-12-99, for Commission, 1999 http://ec.europa.eu/food/fs/sc/future_food_en.pdf

S. Jasanoff, *The Fifth Branch: Science Advisors as Policy Maker* (Cambridge, MA: Harvard University Press, 1990).

S. Jasanoff, *Science at the Bar: Law, Science, and Technology in America*. (Cambridge, Mass.: Harvard University Press, 1995).

B. Jones, *Politics and the Architecture of Choice* (University of Chicago Press, 2001).
S. Joss, 'Toward the public sphere – reflections on the development of participatory technology assessment', *Bulletin of Science and Technology, Special Issue: Democratising Technology*, Vol. 22, No. 3, (Sage Publications, 2002), pp. 179–89.
I. Kant, 'What is Enlightenment?', in the *Berlinischer Monatscrift*, a Berlin monthly directed to the general public. 1784.
A. Kantrowitz, Testimony. Before the Government Research and Technical Programs Subcomm. of the House Comm. on Government operations , 90th Cong. 1st Sess (16 March 1967).
Karolinska Institutet. Annual Report 2004.
KASAMs Review of the SKBs R&DD Programme 95, p. 22, KASAM, Stockholm 1996.
D. Kellner, 'Habermas, the public sphere, and democracy: a critical intervention', web site: http://www.gseis.ucla.edu/faculty/kellner/papers/habermas (10 July 2006).
M. Kenney, *Biotechnology : The University Industrial Complex* (Yale University Press, 1988).
M. Kenney, 'Biotechnology and the creation of a new economic space', *Private Science: Biotechnology and the Rise of the Molecular Sciences*, (Scholarly Book Services Inc, 2002).
M. L. Khandekar, Letter, *The Hill Times, Canada's Politics and Government Newsweekly* 13 August 2007.
I. Klimanskaya, Y. Chung, S. Becker, S.-J. Lu, and R. Lanza, 'Human embryonic stem cell lines derived from single blastomeres', *Nature*, 23 August 2006; [Epub ahead of print], PMID: 16929302.
L. Klüver, 'consensus conferences at the Danish Board of Technology', pp. 41–9 in S. Joss, and J. Durant, J. (eds), *Public Participation in Science: The Role of Consensus Conferences in Europe*. Science Museum with the support of the European Commission Directorate General XII (c). 1995.
L. Klüver *et al.*, 'EUROPTA: European Participatory Technology Assessment – Participatory Methods in Technology Assessment and Technology Decision-Making', The Danish Board of Technology, Copenhagen, 2000.
I. Kozine, H. Duijm, and K. Lauridsen, 'Safety and risk analysis activities in other areas than the nuclear industry', Risø National Laboratory Rapport NSK-21, 2000, ISBN: 87-7893-071-5.
S. Krimsky, 'Biotechnics and society – the rise of industrial genetics' (Praeger Publishing Company, 1991: Currently under Greenwood Publishing Group).
S. Krimsky, *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?* (Rowman-Littlefield Publishing, 2003).
R.A. Krueger, and M.A. Casey, *Focus Groups: A Practical Guide for Applied Research*, 3rd edn (SAGE Publications, 2000).
Th. Kuhn, *The Structure of Scientific Revolutions, 2nd edn, enlarged* (The University of Chicago Press, 1962).
F. Laird, 'Participatory analysis, democracy and technological decision making', *Science, Technology & Human Values*, 18, (1993) 341–61.
F. Laird, 'Institutional Learning and Development – the Case of Renewable Energy', Annual Meeting of the American Political Science Association, Atlanta, 2–5 September 1999. Copyright by the American Political Science Association, web site: http://www.du.edu/~flaird/
P. Lerman, 'Impact assessment in Swedish planning', in Hilding-Rydevik (ed.), *Environmental Assessment of Plans and Programs, Nordic Experiences in Relation to the Implementation of the EU Directive 2001/42/EC* (Stockholm: Nordregio, 2003), ISBN 91-89332-34-2.

A. Leskinen, and M. Turtiainen, 'Interactive planning in the EIA of the Final Disposal Facility for Spent Nuclear Fuel in Finland', Diskurssi Oy, Helsinki, 2002, (RISCOM II Deliverable 4.8).
L. Lewin, and O. Petersson, 'The voters are left in the lurch'(free translation), *Dagens Nyheter*, DN Debatt, 18 September 2002.
H. Longino, *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry* (Princeton University Press, 1990).
S. Lovelady 'Once There Were Giants', *Columbia Journalism Review,* 18 May 2006 http://www.cjr.org/
C.B. Macpherson, *The Life and Times of Liberal Democracy* (Oxford: Oxford University Press, 1977).
C. Marris, B. Wynne, P. Simmons, and S. Weldon, 'Public perceptions of agricultural biotechnologies in Europe', Final Report of the PABE research project, Contract number: FAIR CT98-3844 (DG12-SSMI), December 2001.
G. Majone, *Evidence, Argument, & Persuasion in the Policy Process* (New Haven and London: Yale University Press, 1989).
M.G. Malsch, Nevada, NRC and 'Yucca Mountain16th Annual Regulatory Information Conference', 11 March 2004.
P.J. May, 'Reconsidering policy design: Policies and publics', *Journal of Public Policy*, 11 (2) (1990) .
L.H. Mayhew, *The New Public* (Cambridge: Cambridge University Press, 1997).
A. Mazur, 'Science Courts', *Minerva* 15 (1977), 1–14.
R. P. Merges, 'Property rights theory and the commons: the case of scientific research', in P.E. Frankel, F.D. Miller, Jr and J. Paul (eds), *Scientific Innovation, Philosophy, and Public Policy* (Cambridge University Press, 1996).
R. Merton, 'The normative structure of science', in R. Merton, R. (ed.), *The Sociology of Science, Theoretical and Empirical Investigations* (Chicago: Univ. of Chicago Press, 1973) (original article in 1942).
Th. Meyer, *Media Democracy – How the Media Colonize Politics* (Cambridge: Polity Press, 2004, first published in 2002).
J. S. Mill, 'On Liberty', 1859, in M. Cohen (ed.), *The Philosophy of John Stuart Mill* (New York: Modern Library, 1961).
J.S. Mill, 'Considerations of Representative Government', 1861. In H.B. Acton (ed.), *Utilitarianism, Liberty and Representative Government* (London: Dent, 1972).
M. Milligan, and J. Rowley, 'What the mobile industry is doing in response to RF concerns', Proceedings, VALDOR Symposium, Stockholm, May 2006, pp. 387–94.
N. Myers, 'The precautionary principle puts values first', *Bulletin of Science and Technology, Special Issue: Democratising Technology*, Vol. 22, No. 3, Sage Publications (2002) 210–19.
G. Myrdal, *The Political Element in the Development of Economic Theory* (London: Routledge, 1953), 1st edn 1929.
National Academy of Sciences. 'Technical Bases for Yucca Mountain Standards', August 1995.
National Academy of Sciences. *Animal Biotechnology: Science Based Concerns*, Board on Agriculture and Natural Resources (BANR), Board on Life Sciences (BLS) (The National Academies Press. 2002).
National Environmental Policy Act, 1969.
National Research Council, *Risk Assessment in the Federal Government: Managing the Process* (Washington, DC: National Academy Press, 1983).

National Research Council, *Improving Risk Communication*, Committee on Risk Perception and Communication (Washington, DC: National Academy Press, 1989).
National Research Council, *Understanding Risk. Informing Decisions in a Democratic Society* (Washington, DC: National Academy Press, 1996).
National Science Foundation, 'Grant proposal guide' (GPG), NSF 04–23, Arlington, 2004.
National Nanotechnology Initiative (NNI) web site http://www.nano.gov/
Nirex, 'The way forward', Discussion document, UK Nirex Ltd, 1987.
Nirex. Transparency Policy, UK Nirex Ltd, http://www.nirex.co.uk, April 2003.
H. Nissenbaum, 'Protecting privacy in an information age. 'the problem of privacy in public', *Law and Philosophy*, 17 (1998) 559–96.
Nuclear Regulatory Commission (NRC). *The reactor safety study: an assessment of accidental risks on US commercial nuclear power plants* (NUREG-74/104, WASH 1400). Washington, DC: Government Printing Office, 1975.
Nuclear Regulatory Commission, 'Severe accident risks: an assessment for Five U.S. Nuclear Power Plants', NUREG-1150, (Vol. 1) December 1990, (Vol. 2) December 1990, (Vol. 3) January 1991.
Nuclear Regulatory Commission, 'Use of probabilistic risk assessment methods in nuclear activities: final policy statement', Federal Register, Vol. 60, p. 42622 (60 FR 42622), 16 August 1995.
Nuclear Regulatory Commission (NRC), 'Risk-informed regulation implementation plan', September 2003.
Nuclear Waste Management Organization (NWMO). 'Approach to development of analytical framework', Ontario, July 2003.
Nuclear Waste Management Organization (NWMO). 'Choosing a way forward: the future management of Canada's used nuclear fuel (Final Study)', Toronto, November 2005.
Nuclear Waste Policy Act, 1982. 42 U.S.C. 10101–10133. (1988).
Nuclear Waste Technical Review Board, Press Release, 6 April 2004.
OECD, 'Public information, consultation and involvement in radioactive waste Management: an international overview of approaches and experiences', OECD, Nuclear Energy Agency, Paris, 2003.
OECD/Nuclear Energy Agency, Forum on Stakeholder Confidence (FSC), 'Strategic directions of the RWMC forum on stakeholder confidence', EA/RWM/FSC (2001)2/REV2, Paris , 2001.
OECD/PUMA, 'Citizens as partners: information, consultation and public participation in policy-making', Paris, 2001.
C. Oguamanam, 'Tension on the farm fields: the death of traditional agriculture?', *Bulletin of Science Technology & Society*, Vol. 27, No. 4 (2007) 260–73.
N. Oreskes, 'The Scientific Consensus on Climate Change', *Science*, Vol. 306 (2004), p. 1686.
W. Outhwaite (ed.), *The Habermas Reader* (Cambridge: Polity Press, 1996).
J. Owen-Smith, and W.W. Powell, 'Standing on shifting terrain: faculty responses to the transformation of knowledge and its uses in the life sciences', *Science Studies*, 1(2002), 3–28.
C. Pateman, *Participation and Democratic Theory* (Cambridge: Cambridge University Press, 1970).
L. Pilarski, M. Mehta, T. Caulfield, K. Kaler, and C. Backhouse, 'Microsystems and nanoscience for biomedical applications: a view to the future', *Bulletin of Science, Technology & Society*, Vol. 24, No. 1 (2004) 40–5.

S. Pollard, R. Yearsley, R. Kemp, and M. Crawford, 'Strategic risk assessment: a decision tool for complex decisions, *Proceedings*, VALDOR Symposium, Stockholm, June 2001.

I.F. Pryme, and R. Lembcke, 'In vivo studies on possible health consequences of genetically modified food and feed – with particular regard to ingredients consisting of genetically modified plant materials', *Nutrition and Health*, Vol. 17, (2003) 1–8.

Pulizer, J., *The North American Review* (May 1904).

J. Rawls, *A Theory of Justice* (Cambridge, Mass.: Harvard University Press, 1971).

REFLEX, 'Risk evaluation of potential environmental hazards from low energy electromagnetic field exposure using sensitive *in vitro* methods.' European Commission Contract: QLK4-CT-1999-01574. End date: 31 May, 2004.

O. Renn, Th. Webler, and P. Wiedermann, *Fairness and Competence in Citizen Participation* (Klüwer Academic Publishers, 1995).

O. Renn, 'A model for an analytic–deliberative process in risk management', *Environmental Science and Technology*, 33, No. 18 (1999), 3049–55.

O. Renn, 'Participatory processes for resolving conflicts about risk. In 'Public Participation in Risk Management'; Report from a Session at the EuroScience Open Forum in Stockholm, Stockholm 2004, Swedish Radiation Protection Authority. SSI Draft Report.

O. Renn, and Th. Webler, 'Der kooperative Diskurs – Theoretische Grundlagen, Anforderungen, Möglichkeiten', in: O. Renn, H. Kastenholz, P. Schild, and U. Wilhelm (eds), *Abfallpolitik im kooperativen Diskurs. Bürgerbeteiligung bei der Standortsuche für eine Deponie im Kanton Aargau* (Hochschulverlag AG an der ETH Zürich, 1998), pp. 3–103.

O. Renn, Th. Webler, H. Rakel, P.C. Dienel, and B. Johnson, 'Public Participation in Decision Making: a Three-Step-Procedure', *Policy Sciences,* 26 (1993), 189–214.

M. Repacholi, 'An overview of WHO's EMF project and the health effects of EMF Exposure', Proceedings of the International Conference on Non-Ionizing Radiation at UNITEN (ICNIR 2003). Electromagnetic Fields and Our Health, 20–22 October 2003.

D. Rigby, 'GM food, risk, regulation and the EU–US trade dispute', The University of Manchester, School of Economic Studies. Discussion Paper Series, No. 0410, August 2004.

M. C. Roco, 'The US national nanotechnology initiative after 3 years (2001–2003)', *Journal of Nanoparticle Research 6* (2004) 1–10.

J. Rosen, *What Are Journalists For?* (New Haven, CT: Yale University Press, 1999).

J.-J. Rousseau, *Du Contrat Social* (Amsterdam, 1762).

G. Rowe, and L.J. Frewer, 'Public participation methods: a framework for evaluation', *Science, Technology and Human Values*, 25 (2000) 3–29.

G. Rowe, and L.J. Frewer, 'Evaluating public participation exercises: a research agenda', *Science, Technology, and Human Values* 29 (2004) 512–56.

G. Rowe, and G. Wright, 'Differences in expert and lay judgements of risk: myth or Reality?', *Risk Analysis,* Vol. 21, No. 2 (2001) 341–356.

The Royal Society & The Royal Academy of Engineering. *Nanoscience and Nanotechnologies: Opportunities and Uncertainties*. (London, 2004).

The Royal Society. Policy Document 09/04, 2004.

Royal Society News Stories. 'Government commits to regulating nanotechnologies but will it deliver?', Royal Society web site, 25 February 2005. http://www.royalsoc.ac.uk/news.asp?id=2976

L.G. Salford, E. Brun, J.L. Eberhardt, L. Malmgren, and B.R.R. Persson, 'Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phone', *Environmental Health Perspectives* Vol. 111, No. 7 (2003).

P. Sandman, 'Because people are concerned – How should public outrage affect application of the precautionary principle?', Peter Sandman web site: http://www.psandman.com/, July 2004 .

P. Sandoe, 'The ethical framework for risk assessment – the case of genetically modified crops', *Proceedings of the second VALDOR Symposium* (ed. Kjell Andersson), pp. 200–7, Swedish Nuclear Power Inspectorate, Stockholm, 10–14 June 2001.

S.L. Santos, and C. Chess, 'Evaluating citizen advisory boards: the importance of theory and participant based criteria and practical implications', *Risk Analysis*, Vol. 23, No. 3, Blackwell Publishing (2003).

J. Schaffer, 'The role of newspapers in building citizenship, Keynote Remarks', 5th Brazilian Newspaper Congress, São Paulo, Brazil, 13 September 2004.

R. von Schomberg, 'The normative dimensions of the precautionary principle and its relation to science and risk management decisions', Th. Achen (ed.), *Microscopic Modification and Big Politics*', Linkoeping Studies in Arts and Science, Vadstena, Sweden, 2004.

M. Schudson, 'Was there ever a public sphere?: if so, when?: reflections on the American case', in C. Calhoun, (ed.), *Habermas and the Public Sphere*, (Cambridge, MIT Press. 1992) pp. 143–63.

J. Schumpeter, *Capitalism, Socialism and Democracy* (London: Allen and Unwin, 1987).

S.H. Schwartz, 'Universals in the content and structure of values: theoretical advances and Empirical tests in 20 countries', in M. P. Zanna (ed.), *Advances in Experimental Social Psychology*, vol. 25 (Orlando: Academic Press, 1992) 1–65.

S.H. Schwartz, 'Beyond individualism/collectivism: new dimensions of values', in U. Kim, H. C. Triandis, C. Kagitcibasi, S. C. Choi, and G.Yoon (eds), *Individualism and Collectivism: Theory, Method, and Applications*.(Thousand Oaks, CA: Sage, 1994).

R. Sclove, *Democracy and Technology* (New York: The Guilford Press, 1995).

R. Sclove, 'STS on Other Planets', *EASST Review* 15 (2) (1996)12–16.

A. Sen, 'Accounts, actions and values: objectivity of social science', in C. Lloyd (ed.), *Social Theory and Political Practice* (Oxford: Clarendon Press, 1983) 87–107.

S. Shackley, C. McLachlan, and C. Gough, 'The public perceptions of carbon capture and storage. Tyndall Centre for Climate Change Research', Working Paper 44, January 2004.

Silicon Valley/San Jose Business Journal. 'Advanced cell technology raises money after stem cell news', 25 August 2006.

H. Simon, 'A Behavioral Model of Rational Choice', *Quart. J. Econ.* 64, (1955) 99–118.

H. Simon, *Administrative Behaviour*. 2nd edn. (New York: Macmillan, (1961[1947]).

H. Simon, 'Theories of Bounded Rationality', in C. McGuire, and R. Radner, (eds), *Decision and Organization* (Amsterdam: North Holland, 1972).

L. Sjöberg, 'The psychometric paradigm revisited', paper presented at the Annual. Meeting, Royal Statistical Society, University of Warwick, UK, 1999.

L. Sjöberg, 'Perceived risk and tampering with nature'. *Journal of Risk Research*, 3 (2000a) 353–67.

L. Sjöberg, 'The different dynamics of personal and general risk'. In M.P. Cottam, D.W. Harvey, R.P. Pape, and J. Tait (eds), *Foresight and Precaution*, Vol. 2 (Balkema, Rotterdam/Brookfield, 2000b).

L. Sjöberg, J. Truedsson, L. Frewer, and A. Prades, 'Through a glass darkly: experts' and the public's mutual risk perception', in M.P. Cottam, D.W. Harvey, R.P. Pape,

and J. Tait (eds), *Foresight and Precaution*, Vol. 1 (Balkema, Rotterdam/Brookfield, 2000).
L. Sjöberg, 'Are received risk perception models alive and well?', *Risk Analysis, 22*, (2002a) 665–70.
L. Sjöberg, 'Attitudes to technology and risk: going beyond what is immediately given', *Policy Sciences, 35*, (2002b). 379–400.
SKB, 'Swedish nuclear fuel and waste management Co, SR 97 – post-closure safety', Main Report. SKB Technical Report, TR-99-06, Stockholm, 1999.
SKB R&DD Programme 95, 'Swedish Nuclear Fuel and Waste Management Co., Stockholm, 1995.
P. Slovic, B. Fischhoff, and S. Lichtenstein, 'Behavioral decision theory', *Annual Review of Psychology*, Vol. 28 (1977)1–39.
P. Slovic, B. Fischhoff, and S. Lichtenstein, 'Rating the risks', *Environment*, 21(4) (1979) 14–20, 36–9.
P. Slovic, 'Trust, emotion, sex, politics and science', in M.H. Bazerman, D.M. Messick, A.E. Tenbrunsel, and K.A. Wade-Benzoni (eds), *Environment, Ethics and Behaviour,* (San Francisco: Lexington Press, 1997), pp. 277–313.
P. Slovic, 'Cigarette smokers: rational actors or rational fools?', In P. Slovic (ed.), *Smoking: Risk, Perception and Policy* (Thousand Oaks, CA: Sage, 2001) pp. 97–124.
G. Stigler, 'The Economics of Information', *Journal of Political Economy* (1961).
S. Stirling, and S. Mayer, 'Re-thinking risk. a pilot multi-criteria mapping of a genetically modified crop in agricultural systems in the UK', SPRU, University of Sussex, 1999.
J. Street, *Mass Media, Politics and Democracy* (New York: Palgrave, 2001).
G. Sundqvist, *The Bedrock of Opinion, Science – Technology and Society in the Siting of High-Level Nuclear Waste* (Kluwer Academic Publishers, 2002).
Swedish Environmental Protection Agency. 'Quality manual for the use of grants for restoration of contaminated sites', In Swedish. Efterbehandling av förorenade områden. Kvalitetsmanual för användning och hantering av bidrag till efterbehandling och sanering. Manual efterbehandling. Utgåva 1. Best no. 1234–7. Statens Naturvårdsverk, Stockholm, 2003.
Swedish Radiation Protection Authority. 'The Swedish Radiation Protection Authority's regulations on the protection of human health and the environment in connection with the final management of spent nuclear fuel and nuclear waste, 28 September 1998.
The Science Court Experiment, 'An Interim Report. Task Force of the Presidential Advisory Group on Anticipated Advances in Science and Technology', *Science* 193 (20 August 1976), 653–656. See also: A. Mazur, 'Science Courts', *Minerva* 15 (1977), 1–14.
J. Tickner, and L. Ketelsen, 'Democracy and the precautionary principle', *Science and Environmental Health Network, Newsletter*, Vol. 6, No. 3 (May 2001). www.sehn.org
G. Tunhammar, A. Dreber, and M. Hulth, 'A majority wants the euro within four years', *Dagens Nyheter* (29 July 2002, in Swedish).
UK Government. Response to The Royal Society and Royal Academy of Engineering Report: 'Nanoscience and nanotechnologies: opportunities and uncertainties', HM Government in consultation with the devolved administrations. February 2005.
UK House of Lords Science and Technology Committee. 5th Report of Session 2003–2004 on Radioactive Waste Management, December 2004.
United Nations Economic Commission For Europe. Convention on Environmental Impact Assessment in a Transboundary Context. Espoo, Finland, 25 February 1991.

United Nations. Report of The United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992. Annex I: Rio Declaration on Environment and Development A/CONF.151/26 (Vol. I).

United Nations Economic Commission For Europe. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. Aarhus, Denmark, 25 June 1998.

United Nations Economic Commission For Europe. The Aarhus Convention: An Implementation Guide, New York and Geneva, 2000.

United Nations Economic Commission for Europe, web site http://www.unece.org/

University of Oxford, Lambert Review of Business – University Collaboration – Consultation Response from the University of Oxford, http://www.lambertreview.org.uk/

B. Vanderburg, 'Johannesburg, Kyoto and the Need for Knowledge Infrastructure and Renewal', Editorial in *Bulletin of Science, Technology & Society*, Vol. 2, No. 6 (2002).

C. Vergez, Evaluating Public Participation Exercises – PUMA Findings, NEA/RWM/FSC (2003)10.

C. Vlek, 'A multi-level, multi-stage and multi-attribute perspective on risk assessment, decision-making and risk control', *Risk Decision and Policy*, 1(1) (1996) 9–31.

J. Washburn, *University, Inc.: the Corporate Corruption of Higher Education* (Basic Books, 2005).

J. Washburn, 'The Best Minds Money Can Buy', *Los Angeles Times* (21 July 2006).

M. Weber, *Economy and Society* (eds), G. Roth, and C. Wittich (Berkeley: University of California Press, 1978).

Th. Webler, and S. Tuler, 'Unlocking the puzzle of public participation', *Bulletin of Science and Technology, Special Issue: Democratising Technology*, Vol. 22, No. 3, Sage Publications, (2002) 179–89.

A. Weinberg, 'Science and Trans-Science', *Minerva* 10 (1972).

C.-O. Wene, and R. Espejo, 'A meaning for transparency in decision processes,' Proceedings of the first VALDOR Symposium (ed. Kjell Andersson), pp. 404–21, Swedish Nuclear Power Inspectorate, Stockholm, 13–17 June 1999.

E. Winblad, talk at SKB Dagen, 21 April 2005.

World Health Organization, 'Electromagnetic fields and public health: mobile telephones and their base stations,' Fact sheet No. 193, http://www.who.int/mediacentre// Revised June 2000

World Health Organization, 'Establishing a dialogue on risks from electromagnetic fields', 2002.

World Health Organization, 'Precautionary framework for public health protection', draft for review (2 May 2003), http://www.who.int/peh-emf/meetings/Lux_PP_Feb2003/en/

J. Ziman, 'Non-instrumental roles of science', *Science and Engineering Ethics*, Vol. 9 (2003)17–27.

D. Zolo, *Democracy and Complexity: A Realistic Approach* (Polity Press, 1992).

H. Åhagen, T. Carlsson, K. Hallberg, and K. Andersson, 'The Oskarshamn model for public involvement in the siting of nuclear facilities', VALDOR Symposium, Stockholm, June 1999.

Bibliography

D. Book, *Universities in The Marketplace – the Commercialization of Higher Education* (Princeton and Oxford: Princeton University Press, 2003).

S. Brint, *In an Age of Experts – the Changing Roles of Professionals in Politics and Public Life* (New Jersey: Princeton University Press, 1996).

R.H. Brown, *Towards a Democratic Science* (Yale University Press, 1998).

R. Dahl, *Democracy and Its Critics* (Yale University Press, 1989).

J. Dryzek, *Deliberative Democracy and Beyond* (Oxford University Press, 2000).

Habermas, J. *The Structural Transformation of the Public Sphere: An Inquiry into the of Bourgeois Public Society* (Cambridge: MIT Press, 1989). (Translated by Th. Burger of the German original *Strukturwandel der Öffentlichkeit* (Herman Luchterhand Verlag, 1962).

D. Held, *Models of Democracy,* 2nd edn (Oxford: Polity Press, 2002).

M. Kenney, *Biotechnology : The University Industrial Complex* (Yale University Press, 1988).

S. Krimsky, '*Biotechnics and Society – the Rise of Industrial Genetics*' (Praeger Publishing Company, 1991. Currently under Greenwood Publishing Group).

S. Krimsky, *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?* (Rowman-Littlefield Publishing Co., 2003).

G. Majone, *Evidence, Argument, & Persuasion in the Policy Process* (New Haven and London: Yale University Press, 1989).

L.H. Mayhew, *The New Public* (Cambridge University Press, 1997).

Th. Meyer, *Media Democracy – How the Media Colonize Politics* (Cambridge Polity Press, 2004, first published in 2002).

W. Outhwaite (ed.), *The Habermas Reader* (Cambridge: Polity Press, 1996).

J. Rawls, *A Theory of Justice* (Cambridge, Mass.: Harvard University Press, 1971).

G. Rowe and L.J. Frewer, 'Evaluating public participation exercises: a research agenda', *Science, Technology, and Human Values* 29 (2004) 512–56.

J. Street, *Mass Media, Politics and Democracy* (New York: Palgrave, 2001).

J. Washburn, *University, Inc.: The Corporate Corruption of Higher Education* (Basic Books, 2005).

J. Washburn, 'The Best Minds Money Can Buy', *Los Angeles Times* (21 July 2006).

A. Weinberg, 'Science and Trans-Science', *Minerva* 10 (1972).

D. Zolo, *Democracy and Complexity, A Realistic Approach* (Polity Press, 1992).

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