Foresight between Uncertainty and Convention

An ethnographic study of research policy foresight at the Research Council of Norway

PhD thesis

Stefanie Jenssen

Centre for Technology, Innovation and Culture (TIK)

University of Oslo, Norway

2010

Acknowledgements

Writing a thesis is both individual and collective work. Without the inspiration, guidance and support I received from many people throughout this period of my life there would be no thesis. First of all I want to thank the institutions and people within them who enabled me to do a PhD. My studies of foresight and scenario development were funded by the Research Council of Norway's FIFOS programme (Research for Innovation and Modernisation of the Public Sector) as part of EFFIN, a research cooperation between the Centre for Technology, Innovation and Culture (TIK), University of Oslo, and the research institute SINTEF, focusing on user-centred methods for the development of public-sector electronic services. At the end of my research period I received a three-month stipend from the TIK centre to conclude my work. I want to thank the former and present directors and administration of TIK for the financial and institutional support that enabled me to conduct and complete this work. My thanks also go to the administrative and technical staff for the support they gave me through these years.

My second expression of thanks goes to the people who organised and participated in the foresight project on ICT, UTSIKT, at the Research Council of Norway. It has been a privilege to study and observe the foresight project and make unrestricted use of my observations to inform this thesis. Especially I want to thank Hilde Erlandsen and Jan Dietz for inviting me to study the foresight project and for their comments about my work. Without your collaboration this thesis would never have been written. My thanks go also to Erik Øverland for inviting me to observe two more projects under the umbrella of the CREATE foresight project. Thanks also to Asbjorn Floden for accompanying me at some of the fieldwork observations and to the Norwegian foresight professionals I have met and from whom I have learned about the challenges of foresight practice.

Brita Brenna has been my main supervisor and John Law my co-supervisor. Thank you both for guidance, encouragement and lively criticism. Thank you, John, for inspiring talks about the strange landscape of fieldwork and for sharing your knowledge with me. Brita, I am indebted to you for your constant motivation over many years and your belief in my work, especially when I could not see the wood for the trees. I always left our meetings with renewed energy to keep pursuing my interests.

Göran Sundqvist at TIK has read this thesis in different phases of its realisation. Thank you for constructive and helpful comments. Special thanks also go to Jan Erik Karlsen from the University of Stavanger who assessed the progress of my thesis at the final seminar. Your comments have been thorough and helped me focus on the most important questions in my thesis. I am also indebted to former colleague Beate Elvebakk, who has patiently read almost everything I have ever attempted to write, including this thesis. Your comments on language and logic have been invaluable.

Melanie Newton has read and edited the entire thesis. Thank you for your professional work. Any remaining language mistakes are mine.

My professional life has moved several times between academic studies, consulting and working with educational media. I want to thank my former employer Jon Lanestedt at the Centre for Information Technology for supporting my return to academia. While writing my project proposal I also received comments and inspiring ideas from Claus Emmeche at the University of Copenhagen. Thank you for your interest in my work.

A big thank you to all my colleagues at TIK who have made academic life exciting and challenging! Thank you, Ingunn Moser, for encouraging me to write a project proposal about foresight and scenario development in the first place. You have been a supportive colleague for many years. Hilde Thygesen, Siv Frøydis Berg and Linda Madsen have been my closest companions in different phases of my studies. Thank you for intellectual inspiration, shared conferences and seminars and for putting all things academic into perspective! Many former and present colleagues at TIK deserve thanks in different ways for having directly or indirectly informed my work and made life at the office worthwhile. My thanks go to you all.

My research would be uninformed without the people, places and networks I have got to know during my studies. I have learned about foresight and future thinking from practitioners, policy makers and researchers at conferences and workshops in Norway, the EU Commission's Joint Research Centre IPTS in Seville and the University of Strathclyde Business School. My research has been influenced by the communities and conferences dedicated to science and technology studies (STS), the seminars held by the sociology of expectations network and not least the communities combining an interest in STS studies and the future such as the Netherlands Graduate School of Science, Technology and Modern Culture (WTMC) and the Swiss STS seminar at the ETH in Zurich. I want to thank especially Barbara Adam and Matt Staton. Barbara, our shared conference lunches and dinners have been inspiring and encouraging. Matt, your comments on foresight, the future and the uses and misuses of theories have influenced this thesis, and improved it, I believe.

Thanks to all my friends who have remained faithful to me during years of social neglect here in Oslo. I want to thank my family in Germany for their love and their long-term interest in my work and the rest of my life. My family here in Norway has made this place my second home with their lasting support in all family matters.

I dedicate this thesis to my husband Gard and our children Vilde Franziska and Felix Werner. I am not sure it is very useful to you in any way, but no one knows better than you how much work went into it. Thank you Gard, for your patience, for believing in me and for constantly and generously creating space for my work! Thank you three for these past years of shared life, workloads and happiness. I am looking forward to our future adventures.

Oslo, March 2010

CONTENTS

1 OPENING AND SHAPING THE FUTURE

Thinking about the future implies imagining it in ways it might, might not, should or should not come into being – and working towards it in ways we perceive to be best. But is the future still negotiable? Or is it already occupied by political visions, economic interests and the advancement of technology?

Is the future open or is it already decided? The immediate answer to this question is clearly neither one nor the other; rather, it depends on the context in which we frame the question. We need to ask: What future? And equally important: Whose future? Today's politicians face problems that have to be solved in order for some, many or all of us to have a future. People, organisations, businesses, political parties and interest groups spend their time describing possible futures and explaining their choices on the basis of the futures they perceive. Such future scenarios may be short-term – for instance, concerning immediate changes in next year's budget based on the prospects on the financial market. They may be medium-term, as political parties tailor their programmes to the envisaged needs of society in the next round of elections; or else they may be much longer-term, as climate change experts predict what awaits us in the next century. Today's society has been characterised as being the most future-oriented society that has ever been (Giddens 1998). On an individual, organisational, national and global scale we envision, negotiate and decide upon the future on a daily basis. Thinking about the nearer or the longer-term future is thus nothing outstanding or particularly special. It is the most common way of relating to time in modern society (Adam and Groves 2007).

This thesis is the outcome of an interest in organised thinking about the future in the public sector. Rather than studying documents, speeches or political programmes that address the future, my studies have focused on projects which involve stakeholders, users or citizens engaging in future-oriented activities. I am interested in how ideas, visions and scenarios about the future are created collectively, in the conditions that form these stories, in how they take shape and in what effects they produce in politics and public institutions. It is here that new knowledge and new perspectives about an uncertain future emerge under specific political and institutional conditions. This thesis seeks to contribute to understanding the present possibilities for producing collective futures.

1.1 My theoretical approach

Through my background in literature and language studies, specifically my study of science fiction, I have been interested in stories about the future for a long time, both thematically and in terms of how they work as texts. When studying collective future orientation, however, I do not interpret finished stories but instead follow the process of their creation. In earlier studies I discussed the influence of organisers (Jenssen 2007), the inclusion of stakeholders in municipal visioning (Jenssen 2009) and the possibilities and limits of reflexive governance in municipal long-term planning (Jenssen, 2010). In this thesis I explore collective future orientation in the context of national research policy. The role of research policy institutions in shaping national priorities in science, technology and innovation is gradually being redefined to meet the demand for more open and inclusive planning processes (Arnold et al. 2001). This thesis discusses how policy institutions try to meet this challenge by using *foresight*. Foresight is a comprehensive term for collective and systematic approaches used to think about, debate and shape the future (Von Schomberg et al. 2005). It is increasingly applied across various fields of policy-making and in the strategic development of organisations. The objectives of foresight can be to collect information regarding policy priorities, to inform decision-making or to increase cooperation between actors (Georghiou 2001).[1] I will discuss the characteristics and challenges of foresight below.

The foresight project I studied was conducted by Norway's most important public research funding agency – the Research Council of Norway (RCN). The RCN is the principal adviser on research policy issues to the Norwegian government and parliament, which are, in turn, responsible for formulating objectives, establishing the framework and assigning overall priorities for Norwegian research activities (Erawatch 2009).[2] The RCN coordinates generic and basic research as well as applied research and innovation. It is also responsible for the entire

[1] See also FOR-LEARN online foresight guide. (2005–7).

[2] 'The Norwegian research system is often described as being divided into three levels: a research policy level, a research strategy level and a research-performing level. The research policy level comprises the Storting (Norwegian national assembly), the government and the ministries. The Research Council of Norway serves as the key institution at the research strategy level, although universities and colleges also have important functions in strategic research planning. The research-performing level consists of the higher education and independent institute sectors as well as the industrial sector' (The Norwegian research system, RCN 2007).

range of research fields and meant to foster knowledge development within all sectors of society and industry (Dietz and Forfang 2003).[3]

Between 2002 and 2005 the RCN conducted a comprehensive foresight project called 'CREATE' to renew existing ways of thinking about the future of research from a national perspective.[4] It was in this particular setting that I studied the design, use and evaluation of foresight. I learned how foresight is used to induce change, particularly change in approaches to policy and research programme development. I also increasingly realised how foresight is affected by the specific setting in which it is conducted. These empirical and ethnographic experiences were informed and consequently shaped by my theoretical approach towards the case study.

My main theoretical perspective in studying foresight in practice is derived from the relatively new academic field of science and technology studies (STS). According to Jasanoff (Frodeman et al., forthcoming) the roots of STS emerged in the interwar period, continuing into the start of the Cold War. By the end of the 1960s, the sociology of scientific knowledge (SSK), one of the most important sources for the development of STS, represented a new approach to social studies of science, in which 'scientific facts were seen as products of scientists' socially conditioned investigations rather than as objective representations of nature' (ibid).[5] Today, STS has become an interdisciplinary field that is creating an 'integrative understanding of the origins, dynamics, and consequences of science and technology' (Hackett et al. 2007).[6]

My approach is informed by versions of STS which emerged from social studies of technology from the early to mid-1980s (Bijker et al. 1987). One direction within these studies was based on an understanding of technology as socially constructed.[7] Here, artifacts, practices

[3] The Ministry of Education and Research and the Ministry of Trade and Industry are the most important contributors to the RCN's budget, channelling almost 30% of public research funding into universities, institutes and industry (RCN 2008a). The Ministry of Education and Research also directly funds the core institutional activities of higher education institutions (Erawatch 2009). The remaining funding is provided by other ministries such as trade and industry, fisheries and petroleum and energy (RCN 2008a). The RCN is thus the largest public body funding Norwegian R&D.

[4] RCN (2005a, in Norwegian). There is little information in English about the foresight project CREATE, but see the report on 'Aquaculture 2020: transcending the barriers' (RCN 2005c, 40-42).

[5] Jasanoff (ibid) cites Thomas Kuhn's classic 1962 study *The Structure of Scientific Revolutions* as the best known product of this interest.

[6] For an overview of STS and the major issues addressed see Thygesen (2009, 20–51). On how STS influences the research policy arena, see Hackett et al (2007) and Webster (2007).

[7] See Elvebakk (2003, Chapter 2) for an in-depth discussion of constructivism in STS.

or technologies were seen as the 'constructions of individuals and collectivities that belong to social groups' (Law 1987, 111). This direction in STS investigated controversies over technological developments and explained the resolution of these controversies as social settlements, often through powerful groups imposing their interests on other parties involved (ibid). A second direction did argue that the social is not especially privileged in determining the outcome of such processes. Instead its proponents saw socio-technical change as the effect of the interaction of many elements, including material, natural, economic or technical (ibid, 113). This approach developed during the late 1980s and early 1990s into actor-network theory (ANT). ANT became both renowned and criticised for assuming equal possibilities for agency of human actors and artifacts.[8] This specific direction in STS has inspired me not so much because of its disputed symmetrical approach towards the human and non-human, but rather because of its attention to detail and the fact that it allows many different elements to be considered as equally influential in the outcome of processes (Callon 1986, Law 1987, Callon 1991, Law 1994, Latour 1995).

While early ANT informed my overall perspective on collective future orientation as heterogeneous practice, my particular theoretical inspirations have been more recent studies developed through and after ANT which have addressed the materialities of language, writing, accounting, calculation and evaluation. These studies, inspired by feminist engagements with STS, have contributed with a critical perspective on the role of strong actors in determining social, scientific and technological developments. Law (2003b) and Moser and Law (2006), for example, turn the focus towards resistance to change in accounting and medical practice. Moser and Law (1999) investigate the technical and bodily materialities of writing, Law (2000) looks at different ways of telling technological stories and Dugdale (1999) and Callon (2002) examine the complex distribution of collective writing. What these studies have in common is a much broader concern than in earlier ANT for who and what is able to influence socio-technical development and who is affected by change, and how. This is also a concern with values, as for example in medical care and the possibilities for agency of disabled people (Mol 2002, Moser 2003, and Thygesen 2009). These studies were important for my analysis of the collective

[8] 'The development of early ANT is most closely associated with Madeleine Akrich, Michel Callon, Bruno Latour and John Law' (Thygesen, 2009, 36). For a critique of ANT see for example Amsterdamska (1990) and Whittle and Spicer (2008).

creation of future scenarios and how scenario writing is evaluated in the context of research policy organisations. Finally the discussions on how calculation is achieved (Callon and Muniesa 2005) and how we can talk about what cannot be calculated (Callon and Muniesa 2003, Callon and Law 2005) informed my analysis of the relationship between foresight methods and uncertainty. In this thesis I investigate especially how the concept of non-calculation (Callon and Law 2005) can produce new insights into processes which use uncertainty to produce creativity. I will discuss several of these aspects in more detail in Chapter 3.

Thus recent STS and ANT have influenced my perspective on foresight not as a pre-fabricated and fixed tool which can be applied to a process but rather as an instrument that is created and recreated through practice involving not only social, but also material, technical and methodical elements.[9] I will explain how ANT and several other perspectives inspired my use of the term 'collective' in more detail below.

A second theoretical inspiration has been a growing number of social science studies which investigate how different kinds of expectations about the future influence developments in science, technology and innovation. Some of these studies address explicitly how future narratives influence technological and scientific creation processes and how, for example, breakthrough motifs, stories of promise and foresight organise the future (Van Lente 1993, Brown 2000, Deuten and Rip 2000, de Laat 2000). From a number of studies and growing networks of researchers interested in these dynamics a 'sociology of expectations' has evolved, which draws on a wide range of perspectives, including STS, history, economics and innovation studies (Borup et al. 2006). Looking at scientific and technological expectations as central factors in future-oriented activities has proved to be a fruitful approach, since these expectations address both the possible and desirable futures and (implicitly) the unlikely and undesirable ones. The scholars contend that scientific innovation and technology do not 'pre-exist themselves except and only in terms of the imaginings, expectations and visions that have shaped their potential' (Borup et al.. 2006, 285). The sociology of expectations provided me with a fruitful conceptual

[9] For early ANT studies involving the concepts 'scenarios' and 'scripts' see Callon (1987) and Akrich (1992). Akrich's notion of 'scripts' focuses on how designers inscribe their vision of the world into a new technical object (ibid, 206-7). In Callon's study of the development of an electric car (VEL) in France in the early 1970s a scenario becomes a place where society is shaped to give space for technological development (Sataøen 2008). The collective scenario process I have studied differs from these understandings in several ways; see especially Chapter 3, subchapter 3.2. and Michael (2002, 22).

understanding of the future within the framework of a single case study.[10] I will discuss this theoretical resource and its relevance for my study in more detail in Chapter 3.

My approach to foresight is complemented by concepts of coordination and evaluation used in convention theory, which informed my understanding of coordination between actors under conditions of uncertainty. Here, rather than drawing on the different perspectives within convention theory, I have used the works of political sociologist Laurent Thévenot as my primary resource. His discussions of concepts such as convention, value, responsibility and engagement (Thévenot 2002a) have helped to address how actors work to enable both stakeholder participation and institutional relevance. In applying these concepts to a study of foresight I seek to draw special attention to coordination in processes where uncertainty is met with different forms of evaluation and calculation (Stark 2000, Thévenot 2001b, Callon and Law 2005, and Thévenot 2006).

I have chosen to use theories and concepts deriving from these fields because they help me address questions that I find in foresight processes and because they in various ways give me concepts that I find necessary to explore. They also resonate in different ways with concerns which became important through the empirical investigation. Of particular importance for my choice of theories are the ways these theoretical directions help me study the specific contexts and locations which are both influenced by foresight and redefine how it is used. Among these concepts two have been the most influential on my discussion: convention and non-calculation. I will explain my approach towards these concepts and the different perspectives related to them further in Chapter 3.

1.2 Foresight practice

Foresight is linked to the human desire to look into the future, and to be prudent about the future, in other words, to have sufficient *foresight* to make provision for the future. It is a way to address both the possibilities the future offers and the potential risks awaiting us. Those who practise and write about foresight today ground their arguments in the human drive to

[10] Contributions to the sociology of expectations that informed my perspective on future orientation include also Brown, Rappert and Webster (eds) (2000), Sanz-Menéndez and Cabello (2000), Brown and Michael (2003), Brown (2005), Borup, Brown, Konrad and van Lente (2006), Konrad (2006) and Berkhout (2006).

'understand and reveal the future', which is 'almost as ancient as human history and human inquiry itself' (Johnston 2008, 18). Neumann and Øverland (2004, 259) contend that future orientation as institutional practice can be found 'in urban planning from the seventeenth century onwards'.

Foresight as a specific term emerged in US military strategic planning after the Second World War. During the 1960s and 1970s foresight, and especially scenario planning, were introduced into corporate strategy, and became renowned as strategic tools at Royal Dutch Shell during the first economic oil crisis in 1973 (Van Notten 2005, 5).

For several decades foresight has been used to enable longer-term strategic thinking in the private and the public sector in the United States, Japan and Europe.[11] Only towards the end of the twentieth century, however, did it become an important national policy instrument 'not only in science and technology policy, but also in relation to sustainability and other long-term, risk-prone issues' (Weber 2006, 197).[12] With the growing strategic importance of science and technology and public funding constraints that are probably here to stay, governments need to identify the areas of research that might yield the greatest economic and social benefits (Martin 2001). During the last two decades national foresight studies designed to inform strategic research policy have been carried out with regard to science, technology and innovation all over Europe.[13] They have been conducted by organisations responsible for the development of national research priorities such as government departments or research advisory bodies (Johnston 2008). Foresight has thus become a widely used research policy tool viewed as an appropriate response to widespread uncertainty about the future.

Yet what is foresight in practice? In the recently published *Handbook of technology foresight: concepts and practice* (Georghiou et al. 2008), innovation scholar and foresight practitioner Rafael Popper (2008) suggests five complementary phases which most current foresight activities have in common. These start with the *pre-foresight or design phase* in which sponsors and project-owners define 'the rationales and objectives, assemble the project team and design

[11] Foresight is used extensively in policy development in the form of national foresight programmes in Europe and Japan, whereas foresight in the United States is directed at corporate strategy development mostly in the form of scenario planning (Selin 2008, 1880).

[12] Martin and Irvine's 1989 publication *Research foresight* is considered to have effectively 'launched the modern foresight era' (Johnston, 2002, 1).

[13] See, for example, Brown et al (1999), Rappert (1999), Brown et al (2001), Böhle (2003a and b) and Cuhls and Georghiou (2004).

the methodology' (ibid, 45). During the *recruitment phase* the core team (administrative coordinators and methodological experts) supply the team with additional members, such as facilitators and expert panel members, and identify key stakeholders who can contribute to and support the process. The third phase, called *generation,* is considered 'the heart of the process' (ibid, 47). Here new and existing knowledge is combined and 'new visions and images of the future are created'. [14] The *action phase* then involves 'prioritisation and decision-making'. As Popper writes: 'This may involve moving directly forward to promoting or transferring particular strategies, technologies or policy instruments' (ibid, 48). Finally the *renewal phase* involves 'constant monitoring and evaluation in order to assess whether the foresight process has helped to achieve its original objectives and how far results are being acted on' (Popper 2008, 49). Foresight therefore 'should only be undertaken when it is possible to make use of the outcomes' (ibid). The whole five-phase process is depicted as a circle; implying that action and renewal can lead to new foresight activities.

In this respect, foresight is not identical with the production of alternative future narratives but rather is supposed to 'go beyond the presentation of scenarios [...] and beyond the preparation of plans. What is crucial is the elaboration of a guiding strategic vision, to which there can be a shared sense of commitment' (Georghiou et al. 2008, 12). According to these writers, the value of foresight lies not in the depiction of alternative futures but in how it informs concrete decision- making processes and creates a sense of shared ownership and responsibility in relation to present and future challenges.

The five phases of foresight presented above can be seen as generic descriptions of activities most foresight projects have in common. Yet the concrete methods and practices used in these different phases can differ substantially. Popper (2008, 50-1) identifies 33 different qualitative and quantitative methods used in different phases of foresight activities. Research and strategy management scholar Bastiaan De Laat (2000, 179) argues that 'terms are not so precise and that depending on the situation, methods which should clearly be separated in the eyes of one author intermingle and interact for another [...] formal definitions might exist, but in practice different labels are used for a variety of foresight activities, in an even greater variety of combinations'. In

[14] See, for example, Uotila, T. and H. Melkas (2007) and Karlsen and Karlsen (2007) on the production of shared knowledge in foresight processes.

fact it appears easier to agree on what foresight is not. According to Georghiou et al. (2008, 14), foresight differs from other forms of future orientation in only two respects: It is not 'only forecasting (let alone prediction)', and it is not 'ivory tower' future studies, in which an expert academic or consultant group produces its vision of the future or of alternative futures'. Most writers on foresight today draw a distinction between *forecasting* as a way to predict the future and *foresight* as exploring alternative futures within a specific policy context including relevant stakeholders and interest groups. Instead of seeing variations in the definition and application of foresight methods as 'immense definitional confusion' (ibid, 8) they might contribute to keeping foresight adaptable to local needs. Foresight can thus be seen as a 'boundary object' used in different ways by different communities but with enough immutable content to maintain integrity.[15]

From the diversity and wide application of foresight presented above, we see that it can be an influential policy tool that helps policy-makers look *into* the future and helps them collect, structure, systematise and represent various kinds of knowledge, expectations and texts. My study focuses on a foresight project conducted by a research policy institution and is hence closely linked to practice. When following foresight in practice I increasingly came to regard five features of foresight as part of its 'immutable content' which enables foresight practice to travel between different contexts and locations. In the following I will present these five features which in combination distinguish foresight as a particular policy tool. I want to argue that these features become relevant in a study of foresight practice since they are both prominent in the discussions referred to above and emerged in the process I observed.

1.3 Five features of foresight

Foresight practice does not only *deal with* present and future challenges. It also *raises* social, political or organisational issues. Its application shapes collective activities, which, in turn,

[15] See the definition of boundary objects, Star and Griesemer (1989, 393). On the other hand, one can also consider the different methods used to address the future, such as scenario development, expert or citizens panels, or trend extrapolation (see Popper 2008) as relatively stable and durable methods, having existed in different forms for more than half a century. This may lead us to view foresight simply as a fashionable term that may be replaced with a new one when policy politics shift back, for example, to expert predictions of the future (Staton 2008). Following the upsurge in the popularity of the term over the past two decades many activities have been relabelled as 'foresight' to make them more appealing to policy-makers.

produce specific realities. Researchers of 'prospective techno-science' have therefore argued that foresight and other future-oriented practices should be studied closely to explore *how they are performed* instead of merely evaluating them as improvable tools for more prudent strategic decision-making. They have termed this focus on the ways foresight is enacted as looking *at* the future. Looking *at* the future explores how the future 'as a temporal abstraction is constructed and managed, by whom and under what conditions' (Brown et al. 2000, 4).

According to proponents of the sociology of expectations, looking *at* the future instead of *into* the future can also offer 'observations about the less strategic and formalised way in which futures and expectations are enacted and performed' (Borup et al. 2006, 296). My approach follows this line of thinking. In looking at the practice of foresight my main interest was in five features which distinguish foresight from other policy tools and which became relevant in my study of the Research Council of Norway project. They do not represent an exhaustive catalogue of foresight features. Rather they highlight important challenges in applying foresight as a strategic policy tool.

First, foresight requires *competence* about how to make sense of the future (Chia 2004, Miller 2007). This expertise in thinking about the future – represented by facilitators, project groups or consultants – must be included in foresight processes. However, what this competence means in practice and how it influences the process and outcome of foresight projects is a matter for empirical investigation. This thesis will look into the practice of 'making meaning of looking ahead' (Fuller 1999) by discussing how this specific competence becomes articulated.

Second, among advocates and users of foresight the common understanding is that it is above all *a systematic way of thinking about the future.* Foresight has been described as 'systematic attempts to look into the longer-term future of science, technology, the economy, the environment and society...' (Martin 1995, 140). According to a website describing foresight in the Research Council of Norway, the 'systematic consideration' enabled by foresight 'addresses the complex and uncertain realities to come and helps to identify, discuss and handle emerging challenges in different areas of society' (RCN 2008b). *Making foresight systematic by defining it as systematic* ascribes an immediately accessible value to foresight in research policy development. 'Systematic' has connotations with a scientific approach, co-ordinated procedures and taxonomy. Foresight is thus presented and formulated as a coherent body of ideas and

principles that are methodical in their procedure and plan.[16] My point is not to question whether foresight *is* systematic, but to explore what systematic means in practice.

A third understanding regards foresight not only as forward-*looking*, but also as forward-*acting*. In definitions produced by trans-national foresight communities, such as the European Commission's Joint Research Centre, Institute for Prospective Technological Studies (JRC-IPTS), foresight becomes an instrument directed at action in the present: 'Foresight is a systematic, participatory, future intelligence-gathering and medium- to long-term vision-building process aimed at enabling present-day decisions and mobilising joint actions'.[17] This is undoubtedly an ideal concept of foresight as a process in which progress values meet values of reflexive governance (Voß et al. 2006). This comprehensive definition addresses the most elusive aspect of foresight, which is the relationship between foresight's *collective future-orientation* and the politics of *today's decision-making*, such as in policy issues, research funding and scientific and technological development. In this thesis this relationship will be discussed specifically in the context of decision-making in research policy and programme development.

A fourth feature of foresight is the willingness to consider *unintended effects of foresight* in addition to evaluating its utility in terms of whether it achieves its original objectives. Brown et al. (1999) argue that foresight draws on a heritage linking it to technology forecasting and the rationale of long-term planning procedures. In this respect foresight practice is still connected to traditional ideas about predictable and plannable futures. However, as Brown et al. (2001, 24) argue, attempts to get actors with diverse interests to coordinate collective responses to future uncertainty may also potentially produce different effects from those resulting from conventional policy processes. Because of its relatively short history, foresight could be seen as part of a range of 'new policy tools [which] may induce unintended effects which can be worthwhile to maintain or even to elaborate instead of or in addition to the original objectives' (ibid). Rather than responding exclusively to predetermined objectives foresight can open and renew policy processes in unexpected ways. In this thesis intended and unintended effects are discussed as products of concrete coordination processes between different actors in the foresight project.

[16] See the definition of 'systematic' at http://www.merriam-webster.com/dictionary/systematic. For a discussion of the importance of system thinking in foresight see Loveridge (2009).

[17] This definition can be found in the For-Learn Online Foresight Guide (2005-2007).

The fifth feature deals with the relationship between *social priorities and technological possibilities*. Inviting stakeholders from different industrial and technological fields to discuss future research priorities can be challenging given their wide range of interests. Brown et al. (2001, 82) argue that 'given the complication given by sectoral variation, it might well be more sensible for foresight initiatives to focus less on technological and more on social priorities which can be served by appropriate technologies, or conversely, inhibited by factors not wholly technical'. Similarly, the idea of 'third generation foresight' (Georghiou 2001, Georghiou et al. 2008) proposes a shift from technological expert forecasting via a second generation of participation from science and industry towards thematic foresight including social stakeholders (Warnke and Heimeriks 2008). Recent discussions of foresight have become increasingly reflective about the importance of social priorities vis-à-vis technological options.[18] Yet given the role of economic priorities in the development of national research strategies, technological and scientific possibilities and expert views are still seen as more important than the participation of social stakeholders (Georghiou and Harper 2008). In this thesis I will discuss how this challenge was approached in developing scenarios to inform national research policy.

I do not associate these five features with foresight processes in a linear way, by, for example, linking each of them to the five phases of foresight described by Popper (2008) above. Rather they are seen as operating simultaneously throughout a foresight process and may reinforce, cooperate or collide with, or even exclude one another.

By looking at the microphysics of the interactions between these features in a case study I address how foresight is used to *steer, govern and shape* the future through a systematic approach, the focus on forward-acting, and the use of specific knowledge and expertise on how to approach the future. I also analyse how foresight *opens* political processes by including stakeholders and weighing technological potential against social needs. In this respect I see foresight as part of a wide range of so-called political technologies. As STS scholars Asdal, Borch and Moser (2008, 6) argue: 'Political technologies are not to be understood in a context of the microphysics of power, as techniques of domination exclusively, but as tools for public

[18] See for example Warnke and Heimeriks' (2008) discussion of the influence of STS on technology foresight and Barré and Keenan's (2008) suggestions about reconceptualising technology foresight with the help of the social sciences and the humanities. See also evaluations of foresight in S&T policy in the context of reflexivity (Grunwald 2004, Voß and Kemp 2006) and sustainability (Konrad and Voß 2006).

involvement, for democratization, or deliberation, as well'.[19] By adapting this perspective to my study I propose research that approaches foresight as a social and political technology rather than as a policy tool in need of constant improvement to match today's challenges. Studying foresight practice can thus reveal issues of social, political and technological development *related to future orientation* and thus broaden the range of analytical approaches in social science.[20]

1.4 Case study, two central concerns and two research questions

The foresight project CREATE was initiated as a response to an international evaluation of the RCN a year earlier, which had highlighted the need for renewal in a changing research policy landscape (Technopolis evaluation, Arnold et al. 2001). The evaluation had pointed to several shortcomings in the way the RCN conducted policy and questioned how research priorities were arrived at, debates organised and power distributed (Jenssen 2007, 409). It recommended that the Research Council initiate national or sectoral foresight exercises to cope with 'a lack of institutional responsibility for strategically oriented innovation policies' (Arnold et al. 2001, 40). It said this responsibility should not be assumed alone, but should include a wider group of stakeholders outside the research funding institution. The Technopolis evaluation suggested: 'The RCN should champion and initiate an open foresight process; inviting a *wider than normal debate* about priorities and *empowering more parts of society* in relation to the national research agenda' (ibid, 118, italics added). Foresight was presented as an enabler of dialogue between research communities, the Research Council and the public about the future of research, and thus also as a democratic instrument, reflecting on and potentially changing the existing debate on research priorities. The evaluation also argued that using foresight could help align the RCN with similar European organisations already employing foresight as a strategy tool. The use of foresight was thus not presented as a 'radical break from existing practices' (Rappert 1999, 533), but as a way to strengthen the RCN's public legitimacy as an important national advisory body.

[19] The relationship between foresight and deliberation is also discussed by Von Schomberg, Guimarães Pereira and Funtowicz (2005). For a different perspective on political technologies see Barry (2001) who demonstrates the way in which technology is increasingly written into the conduct of politics.

[20] See, for example, Callon (1987, 83) who proposes a similiar approach to the study of technology, seeing it not as a problem which has to be fixed, but as a 'tool for sociological analysis, which 'would enlarge the methodological range of the social sciences' and 'facilitate the understanding of technological development'. Such work has been commenced by Brown et al (2000) using STS, organisation studies, as well as innovation studies, economics and sociology as starting points for studies of future orientation.

This recommendation led to the initiation of the 'Foresight project CREATE' in the autumn of 2002 (RCN 2005a). The project was described as a 'development and strategy project' with both 'theoretical and method-oriented objectives' (RCN 2006a). It was part of a larger organisational process designed to serve as a new way of informing strategy processes and to help detect possible new research areas of crucial interest to the RCN and to national research development (ibid). Foresight was thus meant to make rational planning processes more reflexive and inclusive, by involving stakeholders and creating new networks between industry, academia and government institutions.[21]

One of the concerns of my study is to explore how the participation of stakeholders was translated into practice. Foresight expert Denis Loveridge and management researcher Penny Street (2005, 47) describe stakeholders as 'individuals or groups who can be affected by and/or affect an organisation and its activities'. I studied coordinating activities which aimed to include the multiple perspectives of a range of stakeholders and thus to *open the future* by including the unexpected and creative.

Science policy scholar Andrew Stirling (2006, 258) argues that there are three rationales for interactive engagement (stakeholder participation) in foresight and strategy development. The 'normative democratic point of view' establishes participation as the 'right thing to do irrespective of the outcomes', while the 'instrumental rationale' employs participation to ensure 'support for particular decisions'. The third argument for participation is the 'substantive' one, in which the aim is to 'establish a broader knowledge base and more effective social learning in order to achieve better outcomes' (ibid). The normative, instrumental and substantive approaches are thus associated with different ways of opening and shaping the future and address, as Stirling states, 'the prevailing distribution of political, institutional and economic power' (ibid). In the case of the RCN the normative view had been expressed in the international evaluation recommending empowering more sectors of society. I became interested in exploring whether, and if so, how, the instrumental and substantive rationales for engagement emerged in the project. Based on this interest I formulated the following research questions:

[21] In innovation studies foresight is often associated with the 'Triple Helix model', which is a description of networks between the three institutions of government, university and industry (Leydesdorff and Etzkowitz 1998). Because of its participative approach, foresight has been described 'as a way of catalysing the multidisciplinary relationships among the three different spheres of the Triple Helix model' (Ughetto, 2007).

How does the interaction between stakeholder involvement and the need for a result useful to the organisation produce future stories? To what degree are participants' contributions to a particular story about the future an effect of coordination?[22]

These two questions address both process and effects of foresight practice. The first question, focusing on the 'how', allows me to regard the production of scenarios not as a predetermined development but dependent on the instant interactions of different elements coming together to produce a material outcome. These elements can be human actors, documents related to the foresight project, methods used during the process and the unpredictable substantiations of scenario ideas. Following an actor-network approach none of these elements has any predetermined explanatory power for the specific outcome of the process. In this respect studying the process with the help of this question addresses especially how this process became 'substantive' (Stirling 2006) and whether it established a broader knowledge base and social learning.

The second question however, relativates this approach. It addresses the fact that that the foresight project was conducted based on specific intentions expressed by the project organisers prior to the foresight process. Here the 'instrumental rationale' to employ participation to ensure support for particular decisions is addressed. That includes that there were specific decisions made prior to the project which also shaped the outcome of the project and in certain ways affected contributions. Thus the second research question connects my interest in participation with studying how relevance of the foresight project was achieved in relation to research policy development.[23] The foresight project was meant to 'detect possible new research areas of crucial interest to the RCN and to national research development' (RCN 2006a). Hence, anything considered both *new* and *of interest* to the Research Council and national research policy was deemed to be relevant.

Gradually I realised that a discussion of relevance needed to consider how the results of the project was were evaluated *outside the framework of the foresight project*. Therefore my study

[22] I prefer the term 'coordinating' to 'organising', even though their meanings are quite similar. However, to coordinate means to put in the same order or rank, to bring into a common action, movement or condition, while to organise means to develop an organic structure, a functioning whole or coherent unit (www.meriam-webster.com). Based on this difference in meaning I associate coordinating with a more open outcome than organising.

[23] On the relationship between participatory foresight processes and their results see also Keenan and Uyarra (2002).

includes material related to the development of the large ICT research programme VERDIKT which was to be informed by the foresight project (RCN 2009b, 2008c).[24] It was through the study of processes firmly embedded in the institutional and organisational procedures of research programme development that the idea to use concepts dealing with convention suggested itself. It inspired me to discuss coordination in the foresight project from the perspective of convention theory (Thévenot 2002b), choosing concepts which would bring out similarities as well as differences between foresight and research programme development. These concepts which originally belong to economic sociology were thus used to highlight issues of participation and relevance in research policy foresight.

1.5 Emerging issues: responsibility, value and uncertainty

The foresight project CREATE was a first attempt to use a participatory approach by involving a large number of stakeholders representing research and industry. Five separate foresight projects were organised, covering the areas of aquaculture, clean energy systems, material technology (nanotechnology), biotechnology and ICT. Between thirty and forty external participants were invited to participate in each of the five projects. The projects were headed by foresight project groups consisting of ten to fourteen members, which were responsible for the design, conduct and results of the projects. They included both RCN staff and representatives of research institutes, universities and private companies invited by virtue of their professional backgrounds, experience and perspectives.[25] Responsibility for the projects was thus distributed among different actors within and associated with the RCN. The five project groups had to report to the line management of the three divisions of the RCN and received guidance from a cross-divisional management group. The CREATE project was also required to meet the expectations of three boards overseeing the three divisions (Jenssen 2007, 411).

My original research plan had been to conduct a comparative study of two of the projects conducted under the CREATE umbrella project. However, for reasons I will explain further in

[24] VERDIKT was founded as one of a series of 'large-scale programmes' designed by the Research Council of Norway as a 'special funding instrument [...]to build long-term knowledge in order to encourage innovation and enhance value creation as well as to help find solutions to important challenges facing society' (RCN 2008c).

[25] An overview of the participating stakeholders, the five project groups and the umbrella foresight group responsible for the foresight project CREATE can be found on the project website (RCN 2005a).

Chapter 2, I decided instead to study the foresight project on Information and Communication Technology (ICT), called 'UTSIKT' in Norwegian (RCN 2004b).[26]

As I observed the process of producing scenarios and evaluating them for research programme development in the RCN three issues became empirically important. These issues on their own as well as the way they work together became meaningful not least because they combined empirical observation with theoretical perspectives. They might be seen as my own interpretative angle in this thesis, although this does not mean that they necessarily exclude other important issues. Nevertheless, I see them as relevant to both users of and researchers on foresight and other ways of engaging with the future. In my opinion they offer a specific perspective on the practice of foresight in relation to a policy context.

The first issue is closely linked to how foresight is coordinated – namely, involving stakeholders and delivering results useful to the project owners. These activities raise questions about *responsibility*. Responsibility is first and foremost an issue for actors who are busy coordinating the process. However, in accordance with my theoretical approach I will discuss further in Chapter 3, I see responsibility not exclusively as an issue of accountability of central actors. In this thesis responsibility is associated with *engagement* (Thévenot 2002a). Drawing on both Thévenot and ANT resources I understand engagement as threefold: *engaging in a process* by showing interest and investing time and competence; *engaging with heterogeneous material*, that is writing devices, competences, rhetoric, methods and approaches in the process; and *being engaged* through a limited contract such as an invitation to a process, which coordinates collective actions under specific conditions.[27] By linking responsibility to engagement I question the understanding of responsibility as being divided into public accountability and private responsibility.[28]

The second issue is the question of *value*. Here I was inspired by Thévenot's argument that value can be explored by studying how evaluation is coordinated (ibid). I specify this approach

[26] UTSIKT means 'outlook' in English. For an overview over attended meetings in the ICT foresight project see appendix 9.1. Until 2009 I intended to include a case of visioning in municipal long-term planning in this thesis but eventually decided to discuss the findings of this case study elsewhere (Jenssen 2007, 2009, 2010).

[27] In a footnote to his text, Thévenot (2002a, 81) explains the extended meaning of 'engagement' in French, which ascribes a coordinating and binding quality to the term: 'In French, the word 'engagement' works better still because the notion of both material and moral engagement is highly developed. The key is 'engaged' in the lock, just as two parties are 'engaged' in a contract (and not just when they are married).'

[28] A STS perspective on the relationship between private responsibility and public accountability is discussed in Singleton (2007).

by looking at how value is assessed in participatory processes through the collective and dynamic evaluation of relevance. This approach was also inspired by the work of STS scholars on future values (Brown 2005), calculation (Callon and Muniesa 2005) and non-calculation (Callon and Law 2005). I will discuss value in more detail in Chapter 3.

The third issue this thesis deals with is *uncertainty.* However, rather than exploring the 'conditions of uncertainty' (Rappert 1999, Stirling 2006) which foresight is meant to be a response to, I study how uncertainty contributes to shaping a foresight process during concrete interactions between participants. Organisers of foresight use uncertainty actively, rather than reducing it to calculations of possible risks. In this respect uncertainty enables the inclusion of many perspectives on possible futures. This, however, also increases complexity in the face of a need for rational decisions about preferred solutions (Rask 2008).

My thesis is thus concerned with the dynamics between participation and relevance, and in a broader sense with studying how the future is opened and shaped in collective foresight processes. Following the activities of foresight facilitators, RCN employees and invited participants I became increasingly interested in the interactions between the three issues responsibility, uncertainty and value. My contribution to existing studies of foresight is to discuss these issues and concerns with the help of two guiding research questions. Thus I want to yield a perspective on foresight's 'rhetorics and the complexities of its practical implications' (Brown et al. 1999, 3) which allows me to explore present possibilities for producing collective futures.

1.6 A word on the collective

The future stories developed in the foresight project by the RCN were not based on either individual or organisational action, but produced *collectively* by organisers *and* stakeholders. Unlike individual fictional accounts, the stories were informed by multiple perspectives, specific methods and approaches and the context of research policy development. In this thesis there are

four reasons why I employ the concept of 'collective' as a specific description of the foresight project I have studied.[29]

My understanding of the collective is first and foremost inspired by actor-network theory. Science anthropologist Bruno Latour, a central figure in STS and ANT, argues for the term 'collective' to take the place of the term 'social'. The collective, he argues, always 'collects different types of forces', involving not only humans, but also non-human elements (Latour 2005, 74-5). Sociologist, STS and ANT scholar John Law writes: '... left to their own devices human actions and words do not spread very far at all ... Other materials, such as texts and technologies, surely form a crucial part of any ordering' (Law 1994, 24). The collective processes I studied were made up of groups, meeting procedures, competencies, routines, texts, screens, writing devices as well as language and nonverbal communication.[30] The 'non-human elements' such as writing tools and computer screens were part of the coordinating processes I observed. However, this study will not single out the importance of non-human elements in the process but rather show how different materials and actors produce effects together. STS scholar Ingunn Moser (2003, 299) writes that the 'conditions of possibility […] have to be arranged and ordered, take effort and work, and are precarious and fragile. And so the realities enacted remain open precisely because they need to be enacted anew in every instance'. This idea of a continuous opening and shaping of realities informed my approach. It presupposes that the collective is heterogeneous, forms anew in each new setting, and always produces different effects.

The foresight project in the Research Council of Norway is symptomatic of this hybrid and dynamic understanding of the collective. Here previously untried approaches and methods were used and people were assembled who had not come together in such a setting before. The field work material suggests that the RCN employees involved in the project expressed and enacted interests and agendas related to concepts and objectives captured in the RCN's strategy papers and planning documents. In this respect they acted as employees of their organisation. Their activities, however, were also influenced by their individual positions, skills and experience, and with regard to this particular foresight project by their understanding about how to approach the

[29] See Schwandt and Gorman (2004, 78) for a concept of the collective in foresight related to business management.

[30] See also Hayles (2002) on the technologies of writing.

future. In this respect, their actions always reflected something more than the officially published objectives of the organisation. So a second reason why I use the word 'collective' is to distinguish it from 'organisational' and to draw attention to the interdependency of individual and organisational agency.

Third, I want to highlight the fact that actors – both organisers and stakeholders – always have various possibilities for influencing the outcome. Some perspectives on participation use descriptions like 'collaborative', 'communicative' or 'cooperative', which imply a sense of presupposed mutual understanding. Urban planning theorist John Pløger (2001) offers a critique of 'communicative planning processes' questioning the use of the term 'communicative' on the basis that these processes are always related to power. I use the term 'collective' to avoid descriptions which already imply more predefined perspectives on participatory processes assuming equal influence on the results and are therefore in this respect already normatively defined.

Finally, my perspective on the collective draws also on studies inspired by the sociology of expectation. Here the 'collective' is used to describe expectations shared by many different actors about developments, in biotechnology or telecommunications, for instance. As sociologist and innovation scholar Kornelia Konrad (2006) argues, even though expectations about certain technological developments can be 'widely shared', this does not necessarily mean that the actors have the same interests in seeing these expectations materialise (Konrad 2006, Truffer et al. 2008). This specific meaning of collective is useful for this study because it underlines that a collective foresight process can involve people who, although they might share expectations about the future, express different, though not necessarily opposing interests. Hence collective does not always mean consensus-driven interaction.[31]

It is thus this particular understanding of the term 'collective' that I use to investigate how methodical elements, organising strategies, people and writing devices interacted were assembled together, how perspectives were expressed and discussed, and how different, or opposite interests were negotiated.

[31] Sociologist and STS scholar Anni Dugdale (1999) discusses the question of consensus from an actor-network theory perspective in a study of collective writing of a policy document on women's health choices. On the problem of consensus in foresight and scenario development see also Van't Klooster and Van Asselt (2006).

1.7 The structure of the thesis

The thesis is divided into eight chapters, including this introduction. Chapter 2 is concerned with establishing the context of the case study and my ethnographic approach. I explain how foresight was introduced in the Research Council of Norway and what expectations about organisational renewal and relevant knowledge accompanied it. I then introduce my methodological approach to fieldwork and to the interpretation of empirical material based on a discussion of studying the project as a collection of ethnographic moments.

In Chapter 3 I develop my theoretical perspective. I outline aspects of the sociology of expectations that inspired my approach but also show in which respects my work differs from and might contribute to this research. Then I discuss the theoretical perspectives of my thesis, beginning with the question of value and its relation to uncertainty. Finally I discuss my main concepts: convention and non-calculation.

Chapter 4 to 7 follow the foresight project as it was conducted. Chapter 4, *Collective Scenario Creation,* starts with an overview of important aspects of scenario development today, stating its ambitions, variety of uses and relationship to strategy development. I then discuss the invitation of stakeholders to the foresight project and the collective production of driving forces, scenario ideas, scenario axes and drafts. The starting point for this discussion is the argument that scenarios are not 'discovered' but created, and that, since they are mostly produced by more than one writer, they are also collective socio-material constructions. Thus, following the process of producing scenarios can provide insight into the coordination of participation and relevance in policy processes. In this chapter I concentrate on how openness was coordinated and how responsibility for collective scenario creation was assigned. The empirical findings are connected to issues of value, calculation and uncertainty.

Chapter 5 deals with collective scenario writing. The argument in this chapter is that writing scenarios is geared towards a concrete textual product which has to be completed in a certain timespan and that it is here that the relevance of scenarios for other strategic processes is determined. There are, to my knowledge, no ethnographic case studies which concentrate on the writing process in participatory foresight, and this stage has been characterised as an area which deserves more academic attention. I first discuss how scenario writing relates to issues of authorship and then approach the writing process as a contract which binds different actors

together, but which is based on a limited agreement about the distribution of competence, responsibility and ownership. I then describe how scenario ideas were ordered, negotiated and evaluated. Here questions of scenario credibility raised challenges regarding the role of technology in the scenarios and the competence and responsibility of the participants. I show how this process can be seen as creating equivalences across contexts to ensure relevance in relation to research programme development.

Chapter 6 relates scenario writing to the development of research programmes. I start by discussing the value of foresight and scenarios in relation to the development of research priorities. Both processes are geared to producing specific texts which have to be relevant in various contexts and involve complex coordination of competences, methods and involvement. In the case studied here the two processes progressed almost simultaneously and were coordinated by one responsible project group, who had involved additional competencies in the process of writing scenarios. The argument here is that writing a research programme proposal does not only rest on creating equivalences across contexts but also involves negotiating what is considered irrelevant. I then show how the scenarios were evaluated in relation to research programme development. It is this evaluative operation which both expresses but also recreates conventions, i.e. common forms of evaluation in research policy.

In Chapter 7 I follow the collective evaluation of scenarios in the final participatory workshop in which the participants were to develop strategic recommendations for future ICT research based on the finished scenarios. Here openness and a multitude of perspectives produced evaluations different from the former attempts to create equivalences across contexts and to evaluate what is irrelevant. Then I describe how the scenarios were finally evaluated within the foresight project group as relevant for writing a research programme proposal. I discuss the negotiation of the value of scenarios as a question of change versus progress.

In the eighth and concluding chapter I reassess my theoretical and methodological approach. I highlight some of the arguments made in this thesis and speculate on questions which it might be valuable to pursue further.

2 STUDYING FORESIGHT PRACTICE

The methods and approaches for shaping the future are broad and complex. Future thinking, future methods and the creation of texts about the future are naturally wide areas of activity within organisations dealing with decisions about future issues, such as business organisations, public institutions or governmental authorities. Thinking about the future finds expression in planning documents, strategy papers and organisational visions. Various methods for negotiating and shaping the future can also be found in planning processes and budget procedures, such as trend extrapolation and statistical predictions. While foresight has a shorter history than long-term planning does, in the context of planning in research development, foresight can be seen as a specific approach that aims at being inclusive, socially oriented and ready to include new thoughts and ideas.[32]

The organisational context of this study is the Research Council of Norway, a national research funding institution which had chosen to use foresight as a new method of long-term strategic development. In the first part of this chapter I explain the RCN's role as the main initiator of the foresight project, illustrating my account with official documents, online presentations and interviews. I do not attempt to provide a comprehensive description of the RCN's role as a complex organisation engaged in developing national research policy but instead focus on published material related to the RCN's foresight project in which the concepts, arguments for and context of the project are outlined. In other words I present the RCN as the initiator of large-scale foresight in terms of the areas of interest in this thesis.[33] The latter form

[32] In Norge2030: Fem scenarier om offentlig sektors framtid (Norway 2030: five scenarios about the future of the public sector, Øverland et al. (2000) present an introduction to socialeconomic planning and a short history of scenario planning in Norway. According to the authors, public sector planning had been dominated by social economists since the early 1950s. They were considered experts in planning which was defined as 'a system of strategic decisions and institutional frameworks applied to shape future action'(ibid, 15). This kind of expert work was mainly embedded in the ministry of trade and the ministry of finance and influenced the work on the national budget. This kind of future thinking and planning has been described by political scientist Øyvind Østerud as a form of 'orienteering' in which the planner tried to find the shortest way between two points, the present and the future. The turn towards foresight does in this respect present a more inclusive approach towards planning and strategic thinking.

[33] See Law (1994, 33-4) on avoiding definitions of 'the formal organisation'. He argues that even if in some instances an organisation can represent itself as a homogeneous actor, usually organisations are 'many different things at once' (Morgan (1986, 339) quoted in Law (ibid)).

the subject of the second part of this chapter. Here I describe the methodology used and discuss the kind of data that helped to elucidate issues and concerns.

2.1 A short history of long-term planning in the RCN

In her article on 'The Research Council and the Power of Knowledge'[34] STS scholar and historian Kristin Asdal (2002) discusses the introduction of long-term planning in the Royal Norwegian Council for Scientific and Technical Research (NTNF). The NTNF was one of five research councils responsible for scientific and industrial research development in the early 1970s and a precursor to today's Research Council of Norway.[35] The NTNF issued guidelines for how long-term programmes should be introduced and used and for how to justify their introduction. In these guidelines, the authors wrote:

> Through systematic evaluation of future possibilities the Council wanted to promote research programmes which could contribute to creating the social conditions and industrial possibilities 'we wish to establish' (ibid).

Asdal describes the NTNF's system for long-term planning as a concrete technology[36] which 'built in "the social" in the form of expectations about the future and about different knowledge producers as well as the users' priorities about what real research would be in the years to come' (ibid, 112). However, Asdal argues, planning was not to intervene too much in research, which was seen as free by nature. Therefore the guidelines specified:

> One needs to ensure, without losing the advantages ensuing from firm planning and evaluation, that room is provided for flexibility in the system, to enable new systems and new thoughts to be considered continuously and to influence the evaluation of priorities and plans (ibid).

Planning in research policy was here already described as a way to control development while remaining open to new ideas and new ways of looking at the future, much as foresight has been promoted as a way to consider new ideas and influence research priorities. However, 'new systems and new thoughts' were not related to the inclusion of stakeholders from outside the

[34] Title in Norwegian: 'Norsk Forskningsråd og kunnskapsmakt', translated by the author.
[35] According to Asdal (2002, 114) the introduction of long-term programmes was the result of cooperation between the NTNF and Professor Brian Quinn at Dartmouth College in the USA.
[36] See also Asdal, Borch and Moser (2008) on political technologies, Chapter 1, subchapter 1.3.

research council's planning context. Thus Asdal asks: 'Who was to write their priorities into this planning technology? Which priorities should come first? And who was to gather all the different parts of planning into one whole? The new long-term planning approach in the NTNF was to ensure that research would concentrate on the areas and questions which are the most important for our national goals' (ibid, 115). These national goals were not, however, to be decided by the NTNF itself but by representatives of organisations 'which first and foremost work on these questions'. Public authorities and industrial organisations were considered the 'relevant and competent agencies to evaluate and prioritise the profile and research areas of the NTNF'. Asdal argues that public authorities and industrial organisations became 'the national interest' in a concrete way. She continues: 'Therefore these organisations were not defined as users with special interests – but as representatives of those representing the national interest. The NTNF defined itself as the administrator of this national interest' (ibid).

It is against this background of early long-term planning in the NTNF as one of the precursors of today's Research Council of Norway that the question of foresight as a new political technology becomes interesting. Apparently several characteristics of foresight were already in demand in the approach to long-term research policy planning in the early 1970s, such as being open to new thoughts and ensuring flexibility 'in the system'. Involving 'relevant and competent agencies' meant in practice that public authorities and industrial institutions were the main parties considered interested in research policy development. Applying foresight some thirty years later these authorities and organisations became individualised by inviting individual representatives of these parties to participatory foresight workshops. How these individual representatives were formed into participants in the foresight project will be discussed in detail in Chapter 4.

In 1993, several mergers of formally separate research councils and innovation actors led to a new 'innovation infrastructure' in Norway (Arnold et al. 2001, 17). 'The five existing research councils were merged with the Norwegian National Committee for Environmental Research to form the RCN' (ibid). Since its establishment the RCN has had three main tasks. It functions as an advisory body on research policy to the Norwegian government; it funds and evaluates research and innovation; and it is responsible for providing forums for all kinds of research

actors to meet.[37] The RCN's responsibility for research and innovation policy is much broader than that of most other European research councils (Dannemand Andersen et al. 2007, 34). On its website dedicated to providing policy and strategy information the Research Council describes its role in the following way:

> In its role as an advisory body on research policy issues, a central task of the Research Council is to initiate and prepare strategic plans and policy documents for individual disciplines, subject areas and research topics. Such documents may be drawn up to stipulate specific research-policy priorities, or may be formulated in response to an evaluation of the relevant research community.[38]

In this sense, the central task of the RCN is to produce directives for research policy. The texts of these directives are already future-oriented, and rather than defining the future of the Research Council as an organisation, they influence the future of universities and research institutes, research centres and R&D departments of private businesses. The main activity of the RCN as an organisation is thus to produce policy and strategy documents which open and shape the future for research areas deemed to be of national importance. In this respect it becomes interesting to study how collectively produced scenarios interact or even possibly intervene in the ongoing production of conventional policy documents.

2.2 Expectations about organisational renewal

The Technopolis evaluation (Arnold et al. 2001) had pointed to the specific strategic role of the RCN not only as an administrative but also as a political actor regarding research strategy. The Research Council was instructed by the government to develop and use new and more inclusive organisational work processes (Dietz and Forfang 2003, 4). In Chapter 1 I introduced five features of foresight that distinguish it from other policy tools and which I see as important in a discussion of foresight practice. These features also became relevant in the official documents, online presentations and interviews published by the RCN which expressed the expectations about the foresight project before its initiation.

[37] The Research Council's present role as policy-maker is described on the European Commission's information website on Norway's national and regional research system, Erawatch (2009).
[38] RCN (2009a).

The main objective of the CREATE project was 'to strengthen the quality of long-term strategic priorities in the RCN's areas of activity, in order to achieve enabling preconditions for future-oriented, broadly embedded research and innovation policies'.[39] The scenarios created in the five projects were to provide ideas both 'new and of interest to the RCN' (RCN 2006a) and thus constituted the forward-looking element of the foresight project which eventually could increase the quality of long-term research priorities. This emphasis on increased quality of long-term research priorities illustrates the recent 'strategic turn' (Borup et al. 2006, 286) discernable in the development of explicit research and innovation policies as well as in funding structures in many countries.

Achieving 'enabling preconditions' could be seen as the forward-acting part of the foresight exercise. These preconditions could take many forms in the foresight project and beyond. They could be new networks between research actors and institutions, as well as new possibilities for research activities arising from foresight and follow-up activities. Enabling preconditions might finally lead to 'future-oriented, broadly embedded research' as the final goal to be achieved. At the same time, reaching this goal would also imply a number of decisions to be made in the course of this process, especially about which strategic priorities would be considered of interest by the RCN.

The second objective was to 'develop a national platform for competency exchange regarding foresight and thus to enable Norwegian research institutions and scientific communities to use foresight tools' (Fagerheim 2003, 54). Here the role of foresight as involving specific competence and knowledge about *how to approach the future* was highlighted. The RCN concluded that part of its responsibility was to develop and distribute this specific competency by creating a national platform. Foresight was defined as a specific area of expertise highly relevant to future-oriented activities in research and scientific communities.

The RCN described the CREATE project in the following way on its website:

> The objective of the CREATE project – 'foresight and dialogue about priorities in research and innovation policy' – is to identify possibilities for introducing

[39] Fagerheim (2003, 54), translated from Norwegian by the author. According to Dietz and Forfang (2003, 7) strengthening the quality of priorities in the RCN involved: 'a) more systematic future orientation, including a more long-term planning perspective, b) a more consistent use of new and interdisciplinary perspectives, c) inclusion of the European perspective, d) broader participation of external actors in strategy and budget processes, as well as e) a stronger orientation towards integrated thinking and consensus'.

> foresight analyses to detect *bold and interesting strategic priorities* in both thematic core areas and other areas the Research Council considers to be of crucial interest.[40]

The description was cautious – proposing to 'identify possibilities for introducing foresight analyses' rather than simply introducing foresight – suggesting an awareness of the organisational and political implications but also of the systematic and scientifically-oriented approach of the RCN's target audience (hence the choice of the word 'analyses'). Foresight was also to help 'detect bold and interesting strategic priorities', implying that previously undiscovered strategic priorities of crucial interest for the organisation might exist. In other words, the description of the CREATE project implied that systematic foresight analyses might also result in *unexpected effects*, thus testifying to a certain fascination with the concept of foresight on the part of RCN.

An internal document discussing the possible uses of foresight and scenario-based strategic development in the RCN stated that foresight was to address questions such as: 'How can coherent priorities be created in a complex organisation consisting of three large and potentially autonomous divisions? How can constantly increasing research grants be justified and their usefulness proved? How can the RCN arrive at the right decisions about which new research areas to invest in' (Dietz and Forfang 2003, 5)? Following these questions the authors proposed that the foresight project was not only to map the possibilities for introducing foresight in the RCN's strategy work but to go '...one step further, by proposing *concrete changes* in budget and strategy processes' (ibid, italics added).

Given the uncertainty about the possible effects of introducing foresight in the RCN, this was certainly a daring proposition. Including this objective extended the desired impact of the scenario activities from the *qualitative* side (involving social and organisational values) to the *quantitative* side, whereby budget processes determine the level of economic investment and (hopefully) return if the research activities are successful. Nevertheless, the aim of the foresight project was not to completely revamp the process of long-term planning. Rather the idea was to

[40] Fagerheim (2003,7). The original text in Norwegian states: 'Formålet med *CREATE – Framsyn og dialog om prioriteringer i forsknings- og innovasjonspolitikken* er å klarlegge mulighetene for å introdusere foresightanalyser i arbeidet med å finne fram til *spenstige og interessante strategiske prioriteringer* innenfor både tematiske satsningsområder og andre områder som Forskningsrådet finner vesentlig' (italics added).

change specific aspects of the RCN's work. As RCN employee Jan Dietz and business leader Helge Forfang (2003, 17) argued, the need for 'more systematic investment in future methods is obvious', otherwise 'there would be a risk of continuing to use traditional routines in the planning of large-scale programmes and long-term budgets. The strategic challenges related to these two instruments demand in our view a renewal of the planning processes'. Foresight was thus seen as a new approach to the future which could potentially be more systematic than existing planning procedures.

The authors underlined that there were important national issues connected to the strategy processes in the RCN. Norway needed to invest in innovation and a knowledge-intensive private sector to develop sustainable industries from which to obtain revenues once oil and gas resources were exhausted. The biggest challenge of developing large-scale programmes was how to make the right decisions about which new research areas the RCN should invest in. However, as the authors concluded, one should not overlook the problems related to introducing scenario-based strategy development in an organisation (ibid, 33):

> People who are in the process of change prefer established ways of thinking. The belief in what exists is stronger than the capacity to imagine the unknown. [...] On the other hand, if the method is successful, there is a danger that scenarios will be taken too literally. The subject-specific and method-related uncertainty might be overlooked, just because of the rhetorical power of scenarios.

This quotation illustrates the difficulty of evaluating scenarios that emerge as a result of exploring future uncertainties. While a successful application of the method could lead to influential and convincing future scenarios, these scenarios could exude a rhetorical power which might take on its own dynamic. Instead of illustrating *possible* futures they might be understood as *predicting the* future. This could lead either to devaluating the scenarios or to giving them too much influence in a balanced approach to long-term planning. Therefore the foresight method needed to be applied from a pragmatic, non-exclusive perspective:

> We propose an open, flexible approach which does not exclude other planning tools. Using scenarios to organise large-scale programmes and a long-term budget will provide us with experience to build on (ibid).

This perspective recalls the calls for flexibility and openness to new ideas of those who introduced long-term planning in the NTNF back in the 1970s. The authors of the internal discussion paper could in 2003 only express hope and a good deal of uncertainty about the potential influence of foresight on research priority-setting in their organisation. Ultimately the effects of foresight would have to be evaluated and measured in terms of whether they had helped more 'strategically prudent decisions' to be made about the future (Borup et al. 2006, 296). Expectations of an improvement in the quality of research priority-setting were thus linked to changes in ways of working in the RCN with the aim of putting it on a par with other international funding authorities in the field of research policy.

Although all five foresight projects used scenario development as their common method, the approach was organised slightly differently in each case. The term 'foresight' was chosen to cover the varying approaches to scenario development in different projects under one collective heading.[41] The general approach was explained in the self-evaluation report published by the RCN's project group (RCN 2006a, 19) and was outlined as follows:

- Discuss actors and factors which will influence the sector over the next twenty years
- Develop images/visions ('mini-scenarios') about what will happen and how actors and factors will influence developments over the next twenty years
- Develop larger scenarios based on these mini-scenarios
- Prepare contributions for strategic recommendations

The step-by-step approach to be used in all five foresight projects shows how foresight was to be applied as a system of similar activities that allowed the separate projects to be compared. This was an explicit objective of the CREATE project: the organisers of the five foresight projects were meant to learn from each other's implementation and interpretation of the general approach. Thus the organisational expectations about foresight within the RCN embraced systematic application, specific competence about how to approach the future, being forward looking and forward acting and dealing with unexpected effects. The dynamics between social

[41] The foresight project on ICT which I studied used the concept of 'driving forces' instead of actors and factors, and aimed to develop scenario models and drafts instead of mini-scenarios. The driving forces were defined as social, technological, political, economic and environmental factors that might have an impact on the issue considered. I will discuss the concept of driving forces in detail in Chapter 4.

concerns and technological possibilities were expressed in the expectations about the creation of specific knowledge in the foresight project which I will present in the following.

2.3 Expectations about knowledge production

The preceding section outlined the main organisational reasons for introducing foresight in the RCN. However, to give a sufficient picture of the context in which the foresight project was conducted we must also highlight the perspectives and expectations related to the international policy debates on so-called 'key', 'generic' or 'future' technologies. Besides organisational values, such as enabling dialogue and providing insight, the foresight project was also to generate values more closely linked with potential future research on generic technologies. Three core technologies had been earmarked as the most important areas of investment for future research: ICT, biotechnology and nanotechnology (RCN 2006a). The three foresight projects focusing on these areas were to deliver outcomes that would illustrate the assumed future importance of these particular technologies. Expectations about the CREATE project were based on a shared belief in the value of research on these key technologies:

> There is a broad consensus among Norwegian politicians that we have to invest more in innovation and a knowledge-intensive private sector, to develop industries on which Norway can live once oil and gas resources have been exhausted... There is also a consensus that research funding must be intensified to ensure Norway reaches the average OECD level by 2005. Despite some progress Norway still comes last among the Nordic countries.[42]

In a February 2004 interview the then newly appointed director of the Department for Future Technologies, which is part of the Division for Strategic Priorities at the RCN, declared that the time was ripe to invest in generic technologies that would have important and long-term effects on many areas and influence society's development in general (RCN 2004a). She declared that the EU commission had already identified ICT and biotechnology in 1994 as the two most important future technologies and that accelerating international advancements in these areas (as well as nanotechnology) would force the RCN to assess Norwegian competence in these fields.

[42] Dietz and Forfang (2003, 4–5). This argument for engaging with foresight in Norwegian research policy is characteristic of a widely held perspective on why Norway needs to invest more in innovation and a knowledge-intensive private sector. However, not all policy makers agree with this view, especially because Norway has successfully used innovation advantages in the marine sector.

Accordingly, she said, the aim of the foresight exercises led by project groups consisting of respected national and international experts in these fields should be to provide the RCN with the requisite information to decide *how* Norway should prioritise research in these fields.

'Our objective is to produce an optimal knowledge base for our users, Norwegian research policy and society's needs,' she said. Each of the foresight projects was to produce strategic recommendations to be used to develop the RCN's strategies for each technology.[43] These strategic recommendations would be central to the RCN's priority choices. She underlined that the Research Council sought to present a *coherent strategy* concerning these three areas. Therefore the foresight project had to be well embedded in and respected by the organisation and by the various programme boards.

An improved knowledge base for the three core technologies would contribute to enabling ministries and authorities to receive qualified advice concerning complex and far-reaching questions. This, the director contended, was the main reason why investment in core technologies was important now. She explained that the technologies would be evaluated from a broad social perspective, since each technology presented enormous possibilities, but also difficult dilemmas:

> Advancement should contribute to desired developments and avoid undesirable ones. Knowledge is decisive, so we have a big responsibility to gather knowledge so as to be able to influence events in the desired direction. For this reason we must develop knowledge communities within those areas; anything else would be neglecting our obligations (ibid).

The *collection of knowledge* therefore constituted a major value domain within the foresight project.[44] The director of the future technologies department evaluated foresight as an important framework for all three forthcoming key technology projects and specifically underlined two aspects of foresight that could improve knowledge production: 1) *Participation* – as an 'exciting possibility to involve the RCN's environment in a meaningful way'; and 2) *Method* – described as 'interesting possibilities to explore future uncertainty with the help of new creative techniques' (ibid).

[43] Treimo (2007, 152–3) argues that a focus on specific research areas and key technologies was nothing new in 2000. Already in 1986-87 Norwegian research policy showed an increased investment in information technology, biotechnology, material technology, off shore technology and marine industry.

[44] For a discussion of knowledge in foresight see Guimaraes Pereira, Von Schomberg and Funtowicz (2007).

If we compare these two perspectives on the foresight project, the organisational and the knowledge-related, it becomes clear that RCN employees' expectations about the results of the project differed, particularly in their view of the concrete and less definable values regarding the context of the RCN's national responsibility. As the director of the future technologies department underlined, the foresight project was seen as a new way of delivering useful knowledge to influence technological development. Useful knowledge was 'decisive' and thus given a concrete value in the future development of key technologies. The foresight project was hence expected to deliver that kind of knowledge. Seen from the perspective of strategy and decision-making, the departmental director expected *concrete value from the project in the form of knowledge*, which, in turn, could improve technological development strategies, address key technologies and map out a 'desired direction'. The director thus expressed *expectations about quantifiable results*, expecting systematic analyses from the project to result in economically valuable knowledge.

The second perspective, expressed by the senior advisor centrally involved in the foresight project on ICT, was less definite about the delivery of concrete output. Nonetheless, his expectations were comprehensive. Although, as he argued, the foresight project could not address the question of *higher quality in research,* it could deliver scenarios about possible futures in different socio-cultural settings contributing to *higher quality of research priorities*. This implied a more comprehensive strategic role for the foresight project. The senior advisor expressed *expectations about qualifiable results*, expecting a synergy of different, method-related factors, contributing to a renewal of long-term planning processes in the RCN.

Amid all the uncertainty expressed in the run-up to the foresight projects, one thing was established as absolutely certain – namely, *the future importance* of the potential of technologies already defined as key, generic or strategic.[45] Thus the foresight project about future key technologies was based on a certainty narrative that assumed the 'inevitability of the development of particular technologies' (Brown et al. 2000, 4). This underlying certainty informed both organisational and knowledge-related expectations.

[45] For a critique of using foresight in these fields see Loveridge (2009, 7).

2.4 The background to this study

In the second part of this chapter I will present the background to this study, methodological questions and the approach I used to research foresight in practice. I will concentrate on two methodical issues: 1) my approach to studying *the process* of scenario development conducted in the foresight project, and 2) the *selection of specific events* in the process, called 'collecting ethnographic moments'. My methodological starting point was, rather than approaching foresight thematically, to engage with both the 'processual' and the 'momentary' in the foresight project on ICT. I wanted to pay attention to *how scenarios are created* but also to how certain moments in this process are indicative of competing accounts and contested values.

My interest in narratives about the future dates back to my earliest university study of language and literature, psychology and education. I later resumed my engagement with literary texts when I wrote a master's thesis on science fiction (Jenssen 1996). I was inspired by science fiction texts that estrange their readers from our comfortable temporal and spatial system of coordinates, combining spatial and temporal displacement with social, historical, technological and linguistic alienation. Science fiction challenges our ideas about human existence and can be 'a laboratory for exploring alternative futures' (Rose 2000, 157). In science fiction literature and film the future becomes a vehicle for displacement, or a trading zone for ideas. It is not an object of negotiation. It is a place where stranger things can happen, such as 'The door dilated'.[46]

This kind of ordering common signifiers into unusual combinations heightens the reader's sense of a different reality and a different materiality. According to writer, critic and theorist Samuel R. Delany, the linguistic distortion used in science fiction is 'neither allegorical nor satirical in its essence', but the result of 'random combination and orderly recomplication'.[47] The literary openness of the future, while sometimes estranging, also reflects upon and refers to our existing reality. Studies of science fiction literature provided me with the necessary curiosity about how the future is created in 'real life' settings, in non-fictional co-constructions of texts

[46] Parrinder (1979). Non-human and otherworldly creatures such as androids, aliens, immortals, virtual reality riders and cyborgs present in themselves linguistic distortions which confront the reader with ideas about the possibilities and limitations of human life on this planet. They can be encountered in novels and short stories by Philipp K. Dick, Gwyneth Jones, Octavia Butler, Iain M. Banks and Ursula Le Guin, William Gibson, Pat Cadigan and Marge Piercy.

[47] Quoted in Parrinder (1979).

which become official documents testifying to the collective negotiation of interests, meaning and expectations.[48]

When I started my PhD in October of 2003 I had received funding to collaborate on a research project headed by SINTEF in cooperation with the Centre for Technology, Innovation and Culture (TIK) at the University of Oslo.[49] This project investigated user-centred methods for the development of public-sector electronic services. The PhD position was part of the project and focused on studies of scenario and foresight methods for public-sector development. [50]

Being new to the field of future studies, I made contact with several public and private organisations conducting projects using future methods.[51] Since I was interested in studying collective foresight processes I limited my search for relevant projects to organisations using foresight in combination with scenario development. The most interesting results of this first inquiry were two different accounts of what futures can mean in an organisational setting. A public service institution had used scenarios written by its employees to create a sense of community and commonly shared objectives. Here scenarios became tools used to align, at least officially, the organisational interests of the employees and 'socialise' them into a common goal and vision.[52] I did ethnographic work in this organisation, following the discussion of different scenarios in meetings, analysing scenario texts and conducting interviews. This was a valuable introduction to the field of foresight in public policy. However, the project was less interesting in terms of studying collective processes, since no external participants were invited. A second encounter with a private company working in a highly competitive area of telecommunications resulted in my contact's polite, but firm refusal to let me participate as an observer in their work on technological scenarios on the grounds that these needed to be kept secret from the competition. I would have been considered an intruder who could potentially pass on information about scenarios to outsiders.

[48] The semiotic combinations and 'recomplications' of thought-provoking science fiction literature have much in common with the material-semiotic approach of actor-network theory and in a broader sense science and technology studies. Haraway (1985, 1997) has created explicit relations between feminist studies of science and (especially feminist) science fiction. Latour (2005) talks about the influence of literature on actor-network theory.

[49] The SINTEF group is the largest independent research organisation in Scandinavia. More information at http://www.sintef.no/Home/About-us/

[50] See Effin (2002–2007).

[51] I chose these cases from a comprehensive report on ongoing foresight activities in Norway, Fagerheim (2003).

[52] On employing foresight to create a sense of commonly shared objectives in an organisation see Bood (2002).

These two examples highlight approaches to the future that were both different from the case I eventually chose to study. In both cases the focus was on internal organisational development, in the first instance, to strengthen the organisation itself, in the second to develop high-tech products which could compete on the market. The texts eventually produced by these collective processes aimed in the first case to shape organisational consensus and in the second case to present innovative technological ideas. As the second example illustrates, texts about the future can be highly volatile, contested objects, involving profitable and therefore competitive ideas. The foresight project I studied in the Research Council of Norway differs from these examples in two important ways: Firstly, the foresight project was designed to be participatory, inviting outside researchers and industry representatives not associated with the Research Council; secondly, the development of scenarios was meant to create alternative stories about the future of ICT research rather than marketable technology.

2.5 Fieldwork practice in the RCN

My thesis is based on an ethnographic study of foresight practice within a research funding institution, including non-participatory observations, interviews and document analysis. While doing fieldwork I was not involved in day-to-day operations at the Research Council over a longer period, as is often the case in ethnographic studies.[53] Usually the researcher takes part in the daily activities, rituals, interactions and events of a group of people as a means of learning the explicit and tacit aspects of their life routines and their culture (De Walt and De Walt, 2001, 1). Yet I wanted to study a foresight project, and not the RCN as an organisation. The foresight project CREATE started in 2002 and was officially concluded in 2005 (RCN 2005a). I conducted fieldwork at the RCN between early November 2003 and late October 2004. When I made contact with those at the RCN responsible for the foresight project CREATE in the autumn of 2003, the project had already completed the phases of design and recruitment (Popper 2008, 45). I was invited to observe the participatory workshops dedicated to the different future research areas.

[53] For ethnographic studies of organisations over a longer period of time see for example Law (1994).

My original research plan had been to conduct a comparative study of foresight activities in different projects under the umbrella of the CREATE project. First I took part in the workshops on the marine industry, which took place between November 2003 and April 2004.[54] Here I followed the four participatory workshops, involving forty-five external participants from universities, research institutes and various business areas related to aquaculture and the marine industry. Although I was able to collect a considerable amount of material during these observations, I did not follow up the writing work on the different scenarios in between workshops. The reasons for this were threefold: First, at that stage I did not realise that the meetings in between those participatory events were crucial to the development of scenarios at the workshops. Second, I was not sure whether after only a few meetings before the actual workshops my presence in the internal meetings was justified. Third, this being my very first meeting with foresight in a research policy and key technology context, my attention was focussed on understanding what was going on during the participatory workshops.

The remaining four foresight projects were conducted almost simultaneously during the autumn of 2004. While I had followed the foresight project on biotechnology during the major part of the scenario development phase, the biotechnology foresight workshops eventually coincided with the workshops on ICT foresight, making it impossible for me to follow both.[55] Since my most recent professional background was in the field of ICT I decided to focus on the ICT project conducted between September and November 2004.[56]

This time I asked to attend the meetings between the participatory workshops in which the scenario ideas were transformed into narratives. It was while attending these meetings on writing scenarios that I decided to conduct a single case study of the foresight project on ICT, because I realised that observing the coordinating activities involved in writing scenarios offered richer material for an analysis of foresight practice than just following the participatory workshops.

Thus this time I managed to gain a better idea of developments than in the foresight project on marine industry, even though there were a few meetings that I did not ask to be invited to. The

[54] For an account of the foresight project on aquaculture (marine industry) see RCN (2005c).

[55] This has been highlighted as a problem of capacity and resources in the RCN in the internal report on foresight initiatives (RCN, 2006a, 18). Since foresight had just been introduced in the RCN there was not enough experience when these projects started simultaneously to predict the amount of work the chosen scenario method would demand from those involved.

[56] I had worked as a senior engineer in educational software management and as an advisor on digital learning from 2000 to 2003.

reason for this was that in some cases these meetings involved only two people and I therefore felt uncomfortable about being a passive observer at a meeting with only two active discussants. This also had to do with coming from an academic background in which studying texts was a much more customary way of doing research than 'face-to-face interaction'.[57] Sometimes I was not informed about meetings at which certain developments took place. Thus I made choices – or in some cases the choices were made for me – about when to attend and when not. However, I had access to all the written material produced in these meetings and kept in continuous contact with the organisers of the project about the discussions which had continued outside the meeting rooms.

My fieldwork is thus situated within the field of 'multi-sited ethnography'.[58] The sites observed varied between participatory workshops involving 30-40 participants and meetings for different purposes and with varying numbers of participants (3-12). The activities ranged from collecting scenario ideas to writing scenarios, evaluating them and discussing research strategy to developing a new large-scale ICT research programme.[59] My observations were conducted on an individual basis.[60] Especially during the workshops involving 30–40 people my observations necessarily became limited to the different groups I focused on consecutively. The method of non-participatory observation (Wadel 1991, 48) allowed me to maintain a position as an outsider to the process even when observing relatively small groups engaged in discussion.[61] I collected the material by continuously recording (in writing) the dialogues and events going on in the different settings. Like other researchers interested in following processes, I wrote down almost all the conversations, trying to 'put as much as possible on paper, uncensored'.[62]

[57] On the limitations produced by reducing fieldwork accounts to the importance of face-to-face interactions, see Latour (2005, 201–3).

[58] See Marcus (1995, 95–117) on the notion of 'multi-sited ethnography' as a research programme for ethnographic research into the complexity of modern society. See also Hobbs and Wright (2006) on contemporary fieldwork and Hine (2007) on multi-sited ethnography as methodology for STS.

[59] See appendix 9.1 for an overview of the meetings and workshops I attended.

[60] I was accompanied to some of the meetings by a Master's student. However, I did not use the notes taken by the student in my analysis.

[61] During the first foresight project on marine industry, my position was unclear, oscillating between active participation and passive observation. First, I was included as a participant expected to contribute to the process with knowledge about science fiction. Only gradually I became a more passive observer based on an increasing mutual understanding about the purpose of my study.

[62] See Thygesen (2009, 61) for a similar approach. Eventually, over 250 pages of written material were reduced to 80 addressing the main areas of my study. I used the same approach when following a vision project in a Norwegian municipality in 2006, which I originally intended to compare with the ICT project at the RCN. I discuss the vision project in Jenssen (2007, 2009, and 2010).

I conducted relatively few structured interviews during the process, although I did use coffee and lunch breaks to talk to the participants about their views on it. I conducted several in-depth interviews with the two RCN employees central to the foresight project on ICT research, who either informed the process with a particular perspective or held responsibility as project leader.[63] The interviews conducted a year after the project had been concluded were especially important to understand the value of the project in relation to research programme development. At this point I was also provided with all the written material concerning meetings in which research programme development had been discussed and which I had been unable to attend for personal reasons. Thus while observations represent the main analytical material, the interviews and written material, such as scenario texts, meeting reports, discussion papers, email exchanges, as well as all official documents regarding the CREATE project contributed to a triangulation of the research data allowing this study to be characterised as a holistic, qualitative single case study.[64]

2.6 Process, patterns and ethnographic moments

The question, however, remains how an in-depth study of a scenario creation process conducted over the short time-span of two-and-a-half months can enable the researcher to detect important issues in processes? Underlying this question is an uneasy commitment to a reflexive perspective on research methods within the STS tradition. Uneasy in the sense that however reflexive a researcher attempts to be about her own approach and methods there is always the question of whether this approach produces a study that is relevant enough outside the text itself, whether the questions and discussions produced by the researcher resonate with a broader reality.[65]

In an appendix to her dissertation on 'Road Traffic Accidents: The Ordering of Subjects, Bodies and Disability' sociologist and STS scholar Ingunn Moser (2003, 307–308) discusses the challenge of ensuring research's validity by applying methods and theories to data and conclusions:

[63] I also interviewed or had unstructured talks with organisers of the CREATE project not directly involved in the foresight project on ICT. These interviews were not, however, used as fieldwork material in this study.

[64] Beaulieu, Scharnhorst and Wouters (2007) and Flyvbjerg (2006) discuss the validity and limitations of in-depth or single case study research.

[65] See, for example, Law's (1994, 16–18) discussion of reflexivity as one of the principles of a modest sociology developed by Bloor (1974).

> Method is often treated as a pre-given recipe or formula that prescribes a set of techniques and procedures to secure such things as the neutrality of the research, a connection between the research questions and the data collected, the representativity of the data, and so a correspondence between the data, the final account and reality out there.

However, she argues: 'realities, such as bacteria, illnesses and bodies – are being enacted together with our representations of them, and with our instruments and techniques for gaining knowledge of them. The realities cannot be separated from our ways of knowing them and our representations of them' (ibid). From this she concludes that methods and theories are not neutral but productive and performative.

While I think this is an important perspective on research, especially research including ethnographic approaches, I also want to highlight that an account of research methods needs to deal with the local circumstances under which fieldwork is at all possible. This includes issues such as when and how fieldwork is conducted, depending on the project to be studied, and on the academic background brought into the research process. Within the work of STS scholars committed to reflexivity this does not mean deconstructing one's own writing, but rather aims to pinpoint some of the uncertainties that accompany any attempt to study collective processes, be it in organisational contexts, among social groups or, as in this case, in a participatory project.[66]

John Law (1994) in his study of the Daresbury Laboratory provides several reflections on the problems of not belonging inside a meeting room at a meeting of top managers (ibid, 145–151) and discusses the problem of missing important meetings (ibid, 43–7).[67] By pointing at similar experiences, my short account of the realities of doing fieldwork presented above is meant to show the interdependencies of research interests and approaches with the possibilities and practicalities of the local context in which the researcher tries to apply herself. Thus I try to show the situated conditions of doing fieldwork rather than presenting my study as linear and without limitations.

How then can the researcher discuss a process meaningfully and develop an analysis of specific issues and concerns within a short-term project? Here I have been inspired by

[66] For earlier discussions of reflexivity in STS see Woolgar (1988).

[67] Law emphasises that the first rule of fieldwork states that the most interesting events always happen where you are not.

discussions in organisation studies which address the problem of studying process. Management scholar Ann Langley (1999) discusses different approaches to process data in social studies of organisations and identifies the 'detection of patterns in processes' (ibid, 692) as one strategy for making sense of processes. The detection of patterns in processes is however linked to the problem of how to distinguish between different events. Events in process data can be: 'a bad year, a merger, a decision, a meeting, a conversation, a handshake' (ibid, 693). Thus there are different themes, different contexts and especially different durations to events. Detecting patterns in processes can be especially problematic when the story intends to follow the process, as Langley observes: '...simultaneously telling the complete story while setting the plot is a tall order' (ibid, 697).[68] I therefore argue for a different strategy that makes sense of a process not by following certain patterns, but by 'collecting ethnographic moments' (Van't Klooster and van Asselt 2006). Collecting ethnographic moments is not about setting the plot with the help of recurring patterns. It is rather about singling out moments in a process which address the emerging issues and concerns.

Studies of foresight using ethnographic approaches have been conducted by researchers with interdisciplinary backgrounds combining science and technology studies (STS), culture studies, technology assessment (TA) and policy studies. Two recent ethnographic studies of foresight in public policy have been conducted by cultural scientists Elisabeth Dobbinga (2001) and Susan Van't Klooster (2007). Dobbinga conducted an anthropological study of a scenario process in which the researcher was for 2 years part of a scenario project team at the Dutch Ministry of Traffic and Water Affairs. Van't Klooster investigated the ambitions and practices of foresight practitioners at the Netherlands' Institute for Spatial Research.[69] These fieldwork studies differ from mine in the sense that they were conducted over a longer period of time. My approach corresponds to some extent to foresight and risk scholar Marjolein Van Asselt and van't Klooster's (2006, 16) who describe their ethnographic study as 'following a group of professional futurists involved in a qualitative scenario project':

> It is possible to observe a foresight culture full time for a long period, see for example the ethnographic research of Dobbinga [...] However, instead we have

[68] This focus on patterns resonates with the work of ANT scholars such as Law (1994) and Moser (2003). See for example Law (1994, 19) on the relation between stories and patterns.

[69] Both studies are published in Dutch. See also van Notten (2005) and Dobbinga and van Notten (2002) on foresight processes and organisational issues.

> chosen to select ethnographic moments during the project, which provided us with […] the opportunity to observe more than one culture of foresight at different foresight institutes […]. It also prevented us from 'going native', i.e. the pitfall that the researcher becomes over-socialised and thereby loosing 'objectivity'. Ideally, the researcher becomes an insider while remaining an outsider.

The ethnographic moments I collected were not of established foresight cultures at different foresight institutes, but they represent the qualities which, according to social anthropologist Kaori O'Connor (2004), distinguish ethnographic moments: '[These moments] are often indicative of dissonance, as between competing accounts, contesting values or problematic social changes of some kind'. In foresight these ethnographic moments are often rendered irrelevant in retrospect, since evaluations and foresight reports tend to produce linear accounts (Van Asselt, 2007).

The ethnographic moments collected here represent negotiations concerning different, sometimes competing perspectives on the value of foresight across groups of actors (organisers, participants, decision-makers) within one project who are contributing to, organising and evaluating the process. To collect these moments I focused eventually not on the long and topic-rich dialogues among participants about possible *scenario content* but on the negotiations about *scenario value* between individuals or groups with different responsibilities.

At the same time, the foresight project is also a story of certain orderings that happened through the coordination of scenario methods, actors' interests, participants' perspectives and the distribution of responsibility. These orderings followed the prescribed step-by-step approach of foresight based on four main events: 1) the discussion of driving forces, 2) developing mini-scenarios, or scenario models based on driving forces, 3) developing scenarios based on these models, and 4) discussing the scenarios related to research strategy.[70]

This is the process I followed in my study, which structures the empirical chapters of this thesis: four different stages of scenario production ordered by following a specific approach, with each stage characterised by a specific method, association of actors and underlying frames of reference. In this respect every situation in the creation process was different from the preceding one. This underlines my argument favouring an approach based on collecting

[70] See the description of the foresight project CREATE at the RCN in this chapter, subchapter 2.2 (RCN 2006a).

ethnographic moments, rather than detecting and imputing patterns.[71] My activities as observer were shaped by what I encountered during observations and what I gradually became aware of. While at the beginning each encounter could potentially become an ethnographic moment to be collected and selected to be re-presented, I started increasingly to focus on ethnographic moments related to participation and relevance as well as the emerging issues uncertainty, responsibility and value. [72]

My approach thus resonates with Langley's (1999) suggestion to use a narrative strategy in the descriptions of processes.[73] As Langley argues, 'because of its focus on contextual detail, this approach works best for one or a few cases' (ibid, 695). Also, 'this sensemaking strategy has the great advantage of reproducing in all its subtlety the ambiguity that exists in the situations observed'(ibid). However, accurate representations have to be pushed beyond authenticity to 'make readers feel that they learned something of wider value' (ibid, 697).

Her final remark addresses the validity of single case studies. There has been much debate about the value of single case studies, summed up by for example Flyvbjerg (2006) and Beaulieu et al. (2007). In contrast to Langley (1999) who argues that narratives need to push beyond authenticity to obtain 'wider value', economic geographer and urban planner Bent Flyvbjerg (2006, 239) warns about erasing 'phenomenological detail in favour of conceptual closure'. In his view, good case narratives have an 'irreducible quality' and 'narrative inquiries do not–indeed, cannot–start from explicit theoretical assumptions. Instead, they begin with an interest in a particular phenomenon that is best understood narratively' (ibid, 240). Seeing value in both arguments, my approach has been to meet fieldwork with (almost no) preconceptions except for my background in science fiction and science and technology studies. When conducting fieldwork and writing the thesis, issues began to take shape and theories could be tested as to

[71] Ordering a process is related to the concept of 'modes of orderings' developed by Law (1994, 95ff). I do not use this concept in my thesis, however, since it belongs to a different level of analysis which I do not address here. Modes of ordering address thematic issues, like for example the normalisation of the subject (Moser 2003). My approach is processual, following the creation of scenarios while highlighting ethnographic moments.

[72] As ethno-methodologist Garfinkel (1967, 77–78) wrote: '…the investigator […] does not and cannot 'know' what he is doing prior to or while he is doing it' (quoted in Law 1994, 49). According to ethnographers Hilden and Middlethon (2002, 2474) ethnographic research is holistic in the sense that 'human experiences are meaningful in systematic, although not necessarily coherent ways' (quoted in Thygesen 2009, 57).

[73] Langley develops seven strategies for sensemaking as blueprints for theorising from process data. She draws on Thorngate's (1976) and Weick's (1979) categories of *accuracy*, *generality* and *simplicity* as points of reference for each strategy.

whether they could provide a certain conceptual understanding of the case. In this respect I have tried to avoid conceptual closure while at the same time following my analytical interest in the dynamics between opening and shaping the future with the help of foresight. In writing this text, I re-enact the foresight project on ICT research once more, several years after its completion, and by presenting it in the chosen context I hope to make my study relevant both within the field of foresight and within STS investigations of collective agency.

Yet this thesis does not attempt to describe the complete socio-material reality observed. At times it will appear overpopulated by humans and dialogues. However, in arguing that foresight and scenario development belong to a range of political technologies I place the emphasis on interactions between people, texts, and 'ways of knowing the future' (Fuller and de Smedt 2008) as not only social, but also socio-technical and material-semiotic interaction.[74] Or as sociologist, STS scholar and foresight researcher Cynthia Lea Horn[75] (2000, 4) argues:

> The 'new' economy's raw materials are [...] ideas, intelligences, intangible skills and tacit knowledges. *Perceptual technologies*, such as scenario planning emerge to order, build, construct, filter, categorize and interpret such raw materials. […] These new technologies, like industrial age technologies, are not innocent, which is to say that they cannot be understood stripped from their context or solely in terms of their use.

In this respect it is even more important to frame these processes as materially heterogeneous and as collective, not only including people, but also texts, methods, models, and routines.

[74] Material-semiotic includes not only humans, non-humans and technical artifacts (material), but also 'ideas, organisations, inequalities, scale and sizes'(Law 2007, 2), in other words concepts (semiotic).

[75] Now Cynthia Selin. See, for example, Selin (2008).

3 VALUE, CONVENTIONS AND EXPECTATIONS

This thesis is based on research using an ethnographic, non-participant observational approach informed by theoretical work. The latter, in turn, inspired and shaped a specific understanding of the foresight project on the future of ICT research and the ethnographic moments collected while observing the project. In the following I would like to discuss in more depth the theoretical approach of this thesis outlined in Chapter 1 and highlight the relevance of the concepts employed in Chapters 4–7 to studying foresight in the making.

Studying foresight in research policy allows new insights into the governance of public funding resources in science and technology. As discussed in Chapter 2, research policy on ICT is based on a prevailing certainty about the future importance of specific information and communication technologies. This raises questions about the relationship between society and technology at large. Science and technology studies have contributed to this discussion by establishing science and technology not as 'privileged forms of rationality outside of or transcending the social' but as 'social practices that are shaped by and entangled with the complexities that make up our societies' (Thygesen 2009, 20). Thus science and technology are 'inseparable parts of a tightly woven web of social, political, economic, legal and ethical relations' (ibid). Neither society nor technology dominates this relationship. Socio-technical change is at the same time conditioned and coincidental, in other words contingent.

In the following I will introduce the sociology of expectations, which has explored the role of *future orientation* in this contingent socio-technical change. I will raise specific issues emerging from the sociology of expectations that informed my understanding of the case study I conducted. I will then go on to relate value, uncertainty and coordination to my study of foresight in practice. Finally, I will explain how convention theory informed my study and how I use the concept of non-calculation to describe coordinating activities in foresight.

3.1 The sociology of expectations

As Brown et al. (2005, 2) argue, the sociology of expectations is related and associated with STS in its constructivist approach, which considers expectations as constitutive in 'defining roles, attracting interest and building mutually binding obligations', particularly in the early stages of innovation. Thus expectations are not considered as separate from technological development but must be studied in terms of how they take on substance in 'texts, actions, bodies, material, objects and machines' (Borup et al. 2006, 292).

This is a rather different take on expectations from that to be found in earlier work, specifically in the economic literature of the 1960s. According to Brown et al. (2005, 3) a 'realist line or distinction' was drawn 'between people's expectations on the one hand and the "real" underlying fundamentals or worth of something on the other'. In the sociology of expectations which underlines the collective, heterogeneous emergence of socio-technical change, expectations are 'constitutive of value', that is ' we cannot differentiate between our expectations of things (biotechnologies, stem cells, nanotechnologies, etc) and what in reality those things in fact are, both in the present and in the future ... [Value] cannot be calculated independently from our expectations'(ibid).

Expectations thus play a distinctive role in the evaluation and calculation of future possibilities and values. These expectations can, if played out in an advantageous context, become social, technical and cultural reality. In his studies on cord blood banking sociologist and STS scholar Nik Brown (2005, Brown and Kraft 2006) has identified expectations relating to stem cells and genetics. Concerned with unstable future technologies, Brown's studies of bodies, medicine and biotechnology have brought the future dimension into STS work on values and ethics.[76] Rather than attaching any essential materiality to future expectations and imaginations, he has highlighted a shift in thinking about scientific possibilities from *present facts* to *future values*. Brown describes future values such as healthy children and presently unknown cures for deadly diseases as 'regimes of hope', which have both economic and emotional dimensions. He argues that these regimes of hope emerge in biotechnical innovations increasingly driven by a

[76] STS scholars' interest in the place of values, especially in the area of health and ethics, has increased over the last decade (Squier 1996, Mol 2002, Moser 2003, Law 2004b, Thygesen 2009).

'language drawn from values and aesthetics with its connections to desire, longing, the imagination and authenticity' (2005, 7).

Expectations can thus drive technical and scientific activities and form regimes of hope, but they are also important for actors other than scientists and engineers. According to Borup et al. (2006, 286) they play 'a central role in mobilising resources on the macro-level, for example in national policy through regulation and research patronage'. Borup et al. connect this role of expectations to the 'strategic turn' in science and technology, arguing that 'technological and scientific investment has increasingly been tied to strategic rather than say serendipitous innovation'. This strategic turn is visible in the development of 'explicit research and innovation policies and in changes in research and education systems and their funding structures' (ibid).

The RCN's expectations about the future importance of key technologies can be seen as such a mobilising effect, which provided an open space for activities within the foresight project. Expectations about 'increased quality in research priorities' were an important argument used by RCN officials to justify starting a foresight project in key technology areas.

Within this particular area of sociological research expectations are thus seen as drivers of technical and scientific activities, because of their connection with future values, and as mobilisers of resources in strategy and policy-making. Borup et al. argue that 'analysing the dynamics of expectations is a key element in understanding scientific and technological change' (2006, 287). Studies have shown the 'decisive role of expectations in establishing new scientific and technological fields' as diverse as membrane technology, gene therapy or nanotechnology (ibid) and they are hence defined as prominent factors in promising areas of science, technology and innovation (Deuten and Rip 2000, Borup et al. 2006, Selin 2008).

3.2 Expectations, materiality and obduracy

Besides the explicit connection between expectations and scientific and technological development, several scholars have studied the material production of the future substantiated 'on paper, verbally, on the screen, or pictorially' (Michael 2000, Deuten and Rip 2000). Verbal and textual representations of a non-existent future emerge in an 'unstable field of language,

practice and materiality' in which the uncertainty and complexity of the future provide rhetorical spaces for all kinds of actors (Brown et al. 2000, 5).

STS scholar and sociologist Mike Michael (2000, 33–35) draws on various perspectives, including those of mathematician and philosopher Alfred North Whitehead (1964) and Latour (1999), when he shifts the focus from *representations* of the future to the *textualisation of futures*. This approach emphasises studying the *process of producing future texts* as a necessary precondition for analysing their resulting rhetoric and material effects. In this respect my study of the creation of future scenarios in a foresight project follows a specific textualisation of the future. My concern, therefore, is not just with the 'paper, screen, image' materiality of a text, but also with the various other materialities, such as approaches, methods, participation, coordination and organisational context which lead to its creation.

Expectations as textualisations of the future and as drivers and mediators in scientific and technological development have become analytical objects and are related to a multitude of technological and scientific contexts. As such, they affect and are affected by developments in the context they are located in. This agency-determined perspective on expectations, however, means that the sociology of expectations rarely deals with the organisational setting of public institutions, distributed responsibility and the resistance and obduracy of administrative and political structures in public organisations.[77]

Social scientist Barbara Adam (2005) has highlighted some of the problems connected with agency and materiality in the sociology of expectations in her work on the sociology of the future.[78] She argues that the contemporary approach to expectations is 'cast in the active mode, as performing the future by mobilising it into the present, in the hope of facilitating its materialisation' (2005, 3). This can be contrasted with earlier work (Kern 1983, 89–90) which distinguished between an *active, performative mode* in which 'the individual goes towards the future, driving into the surroundings in control of events' and expectations *cast in the passive mode* in which 'the future comes towards the individual'(ibid). This latter mode of relating to the future is rarely voiced in the sociology of expectations, which singles out the active,

[77] This concern, however, is addressed in Brown et al. (2000), the precursor to an emerging sociology of expectations. See especially Ling (2000) and Sanz-Menéndez and Cabello (2000). Responsibility is mentioned in relation to health and ethical issues. See Brown and Kraft (2006) and Koch (2006). On resistance in administrative and political organisations in STS see Law (2003b) and Barry (2002).

[78] Adam (2005) refers to Michael (2000), Brown et al (2000), Brown (2003) and Brown et al (2005).

performative mode of expectations. Studying foresight practice in policy-making rather than in scientific and technological innovation must therefore be accompanied by a heightened sensitivity to passive modes of expectation about the future. This involves the question of how people relate to the future in the context of organisational identities and how individuals follow rules and procedures (Sanz-Menéndez and Cabello 2000).

This underlines the importance not only of studying the agency-determined construction of futures, but of highlighting the less visible and under-researched areas of organisational routines and social conventions in future orientation. Thus the main difference between my discussion and analyses of the technological and scientific futures within the sociology of expectations is my focus on future orientation as an expression of *policy-making* rather than of negotiating *specific technological developments*. Michael (2000, 22) highlights this difference by arguing that in technological innovation the future is *produced*, while in policy-making the future gets *organised*. I argue that foresight practice in research policy and programme development is tightly linked to everyday organisational issues and the established politics of public research funding, in other words, the ongoing *coordination* and *organisation* of the future. By studying value, uncertainty and responsibility I want to draw in this interdependence between organisational procedures and future expectations. This is further explained in my choice of perspective informed by convention theory, which I will discuss below.

3.3 From values to evaluation

To follow these interests I sought inspiration in scholarship that discusses the relationship between the social and the technological from perspectives on economic value and social values as well as evaluation and conventions. Before I present this scholarship, however, I will outline my approach to values more broadly. Here I draw specifically on sociologist Pjotr Sztompka (2007) and his discussion of the relationship between facts and values throughout the history of sociology.

Sztompka argues that sociology has only recently readdressed values as an 'integral, legitimate component' of sociological work. During the twentieth century positivism aspired to 'safeguard the legitimate position' of sociology in academic institutions, allowing values only as 'data of social consciousness disclosed by value surveys and opinion polls, and treating them

with descriptive attitude' (Sztompka 2007, 247–8). He distinguishes three ways in which values have been treated in sociology: a) as a bias, b) as an ideology, and c) as a part of meaning.

The first position treats values as personal and subjective biases that sociologists have to avoid because they interfere in research. They are seen as an obstacle to 'objective knowledge'. Here the most important influence is Max Weber's famous doctrine of *Wertfreiheit*, which claims that values can be studied in a value-free, scientific mode. Whereas values are important for the selection of problems and the shaping of hypotheses, the solving of problems must be entirely value-free; a 'rigorous distinction between empirical knowledge and value judgments' must be maintained (Weber 1949, 54).

Sztompka contrasts this with the perspective on values as ideology. Here values are seen as 'cognitively beneficial and enlightening collective perspectives'. Social knowledge is therefore always perspectivistic and reflects interests and values, but only certain ideologies can produce the best cognitive results (ibid, 249). According to Marx and Engels (1848) and Lukacs (1971), true socialists should therefore adopt the perspective of the proletariat. Radical sociology emerging during the late 1960s and early 1970s, on the other hand, called for the adoption of minority perspectives (Etzkowitz 1989) to enlighten the collective.

These two opposing views on values as bias or as ideology have several common characteristics, which according to Sztompka (2007, 250–1) are based on some underlying assumptions about the dichotomy of facts and values and 'categorical statements and value judgments' – for example, the assertion that no facts can ever imply values and no values can imply facts[79] and the belief that the research process should be strictly separated from the subject of research.

Without following the entire argument made by Sztompka, I would like to point out that several of his observations about how more recent tendencies in sociology have sought to overcome this dichotomy relate to issues in this thesis.[80] First of all, instead of perceiving society as a stable system, recent sociology has turned its focus to individual and collective action as the

[79] Here it is necessary to modify Sztompka's argument concerning values as ideology. Socialist realism in Eastern Europe before 1989, rather than establishing a dichotomy between values and facts, selected facts to confirm the 'right' values while the proclaimed infallibility of ideology-based values cemented particular views of the world as facts.

[80] Sztompka was already arguing for this movement back in the 1960s at the time of the subjectivist turn drawing on, among others, on Goffman and Garfinkel. This was followed by the culturalist turn and what was later called 'the second sociology' (Dawe 1970), the humanistic sociology. For an STS position on this distinction, see Moser (2003, 307–8) where she argues that methods and theories are not neutral but productive and performative.

'driving force of all social processes, with every stage seen as construction'.[81] Second, as Sztompka argues, reflexiveness has become a pervasive topic in sociology, as it states that 'knowledge about society feeds back on its subject matter, directly influencing people's beliefs, their motivations and consequently their actions'.[82] Third, the attention of sociologists has shifted from studying macro structures to addressing agency at the micro-processual level, with the proclamation of the 'performative turn' (Alexander et al. 2006).[83]

According to Sztompka, sociology's more recent turn towards a constructivist, reflexive engagement in and with society has once again highlighted the importance of the value debate – both those values studied and those assumed by the researcher.[84] Values enter my discussion of foresight in research policy and the approach I have chosen both as an empirical issue and as my academic intervention.[85] Values inevitably inform research in its choice of topics, analyses, theories and methods (Ericson 2005, 368). My combination of theoretical and methodical underpinnings did both form and were shaped by the intervention this study seeks to make.[86]

First, intervention in this case study means my focus on the micro-processes of creating scenarios, as in the negotiations between organisers and participants during the stages of collecting ideas, writing scenarios and ensuring their relevance. Second, it seeks to give insight into the values of those involved in the foresight process. Here the approach towards values expressed and performed by those studied is informed by what Sztompka has called the 'new approach towards values in sociology', which terms valuations as 'construction of meaning'

[81] Sztompka (2007, 251) mentions particularly Giddens' idea of structuration rather than structure, Elias' concept of figurations rather than forms and Bordieu's focus on practice. This coincides, for example, with the STS focus on *organising* instead of organisation and *modes of ordering* (Law 1994) as 'an invitation to study how ordering is done, generated, embodied, expressed and represented in different material forms' (Moser 2003, 137).

[82] For work within foresight studies related to reflexiveness and reflexivity see, for example, Salo, Könnölä, and Hjelt (2004), Grunwald (2004), Grin, Felix and Bos (2004), Voß, Bauknecht and Kemp (eds) (2006), Grin (2006), Konrad and Voß (2006), Stirling (2006). The discussion about foresight and reflexivity has not been included in this thesis, but see Jenssen (2010).

[83] Actor-network theory intervenes in the distinction between macro-structure and micro-level. Instead of assuming two separate spheres, it raises questions about this division. See, for example, Law and Hassard (1999).

[84] See, for example, discussions about modest approaches to research within STS (Bruun Jensen 2005, Cañellas-Boltà and Strand 2006) which have been inspired by feminist science studies, especially Haraway (1988, 1997).

[85] Research here refers to my own research and not 'research policy' as the object of my study.

[86] As already argued above within ethnography (Garfinkel 1967, 77–78) and the study of process data (Langley 1999), selecting an approach and relevant theory is a process *accompanying research* and *not a choice made prior to all other research activity*, such as observation and analysis. Thus intervention is not necessarily a predetermined intention but is shaped gradually throughout a research process and becomes finally materialised in the finished text of the thesis.

(2007, 255). From the point of view of humanist, anti-positivist sociology, 'people endow their actions, situations, institutions with meaning'. This meaning is 'drawn from various sources, such as tradition, religion, mass media, etc'. Sztompka argues that meaning is shaped during dialogue, both directly through conversation and indirectly through, for example, the influence of media. This perspective sees values as a way for people to make sense of and impute meaning to their actions. Based on how meaning is constructed Sztompka reasons that there are several important roles sociology should play in modern society (ibid).

I will not follow Sztompka's argument here and discuss normative aspects in sociology such as how sociologists should engage with the world and with the future based on the question: What is desirable? This question has been taken up within foresight and the sociology of the future (Loveridge and Street 2005, Adam 2005). Rather I will adopt this third perspective on values as a way to construct meaning as my basic understanding of how values are involved and negotiated in foresight. However, my study does not seek to classify the activities, expressions and decisions observed into specific categories of valuational content such as equality or progress.[87] Much more relevant for studying the negotiation of values is to study *evaluation* as an activity.[88] What is more, meaning is not seen as 'drawn from various sources', as Sztompka (ibid) argues, but as constructed in real time through the ordering of values, which can be social, cultural, economic or individual, but do not have stable origins like 'sources'. This is not to say that people do not rely on specific references to newspaper articles, reports, communications, or scientific findings when evaluating. Rather I draw here on the argument made by Latour (1993) about the construction of systems that mix politics, science, technology, and nature, so-called 'hybrids'.[89] Sources are many, economic value and social values mingle, and in the process of instant evaluation the source of a value is not always clear.

Thus I see the emergence of values via the construction of meaning as also dependent on the present moment – represented in the specific constellations of the ethnographic moments studied.

[87] But see, for example, Van Lente (2000) on the use of ideographs such as 'progress' in the coordination of technological expectations.

[88] Instead of studying values as stable entities, I study how people evaluate, following the idea of a 'sociology of verbs' as argued for in Law (1994, 15).

[89] The ozone debate is such a hybrid, as are the debates on global warming, deforestation and even the idea of black holes (Latour 1993). The same happens in processes of evaluation, in the ordering of values. This is also an argument against 'pure relations' in evaluation and calculation. It is an argument for 'impure relations' (Callon and Law 2005).

Present realities become part of the evaluation of future possibilities. Foresight is thus not about 'making facts' that in turn 'make values' (Law 2004b, 2); rather it employs evaluations and expectations about the future based on how people consider present facts.

Drawing on these theoretical tools I study the creation of scenarios in foresight as a coordinating practice in which evaluations of present facts and future expectations are conducted simultaneously. In this respect meaning is constructed through various evaluatory activities which become materialised into written future scenarios. The value of this process is closely linked to the value of the scenarios for subsequent processes such as research programme development. By creating written scenarios the involved participants and project organisers imbue their understanding of foresight and the context in which foresight is conducted with meaning.

3.4 Evaluation and uncertainty

This basic understanding of values and evaluation processes as a way to construct meaning must be connected to the orientation towards the longer-term future and the uncertainties related to it. Although foresight is here not seen as 'making facts' which, in turn, 'make values' (Law 2004b, ibid) foresight nevertheless makes realities, and influences realities in specific ways.

According to economic sociologist David Stark (2000), neoclassical economics has defined values as counterpoised, outside and distant from calculated value: '... if values are the embeddings for value that somehow makes calculation possible, it is precisely because values are a kind of anti-matter to calculation' (2000, 4). Values are often regarded as purely social, expressing normative perspectives developed in specific cultural contexts (like family, business, public organisations, etc.). Economic value, on the other hand, can be gained from knowledge, technologies and strategies. Stark argues that the traditional boundary between the study of value as part of economics and the study of values as a subject of sociology has been crossed by the French convention school, especially Boltanski and Thévenot's (2006) 'sociological theory of value'. They propose that modern economics comprises multiple principles of evaluation, or 'orders of worth'. As Stark (2000, 4) argues:

> Orders of worth are not values counterpoised to value but are constitutive of value; they are the very fabric of calculation, of rationality, of value. As principles of evaluation they involve *systematic associations of ideas* – and thus have some similarity to culturalist notions – but they go beyond that similarity to show how each of the multiple principles of evaluation entails discrete metrics, measuring 'instruments,' and proof of worth objectified in artifacts and objects in the material world [italics added].

STS and ANT scholar Michel Callon and sociologist Fabian Muniesa (2005, 1231) follow this line of thinking by questioning the distinction between calculation and judgment. [90] They advocate a broad definition of calculation which is not limited to performing mathematical or numerical operations, but proceeds from:

> ... establishing distinctions between things or states of the world, and by *imagining and estimating courses of action associated with things or with those states as well as their consequences.* By starting with this type of definition (wide, but usual) of the notion of calculation, we try to avoid the distinction (also conventional, but too sharp) between judgment and calculation [italics added].

Here calculation and judgment become interrelated; one cannot be performed without the other. Imagining and estimating courses of action and their consequences imply both calculations of risk and an acceptance of a prevailing uncertainty about which of these courses of action might prove to be worthwhile. This approach thus questions the customary distinction between *value* and *values*.

An orientation towards the long-term future complicates calculative processes, whether they are directed more towards economic considerations or social implications. Stark (2000, 3) argues that uncertainty and risk are two different aspects of an unknowable future.[91] To ground evaluations on the value of existing material artifacts and objects can be a way to reduce or

[90] These writers draw on concepts within STS and actor-network theory like, for example, the notion of distributed calculative agencies. Calculative agencies are 'collective hybrids' which are 'equipped with instruments: the calculation does not take place only in human minds; it is distributed among humans and non-humans' (Callon and Muniesa 2005, 1236).

[91] Beck's (1992) *The Risk Society* has been one of the most influential works on how modern society organises in response to risk. Stirling (2006, 239) argues that risk and uncertainty are not different understandings of an unknowable future but 'degrees of incertitude'.

transform uncertainty into risk. Risk is thus *calculated future*, whereas uncertainty cannot be expressed in quantified statements:

> In circumstances of risk, chances are calculable, that is the distribution of outcomes can be expressed in some probabilistic terms. Uncertainty, however, lacks calculation [...]. Neoclassical economics reduces all cases of uncertainty to risk, because theirs is a world of calculation, not of judgment.

However, as Stark continues, multiple principles of evaluation, or orders of worth cannot eliminate uncertainty either: 'In particular, they cannot eliminate the possibility of uncertainty about which order of worth [...] is operative in a given situation' (ibid).[92]

In cases of uncertainty, Stark argues, different orders of worth or principles of evaluation need to coexist (2000, 12). Using the example of a Silicon Valley start-up firm designing websites he shows how the acceptance of uncertainty produces creative interactions between different communities of practice, such as programmers, designers, merchandisers, etc. In order to stay at the forefront of website development, the project members have to accept disagreements about possible courses of action as everyday reality, and not end disputation 'so much as suspend it' (ibid). According to Stark, economic value is created when organisations manage to 'keep multiple orders of worth in play'. He applies this description first and foremost to entrepreneurial new media organisations and global investment banks, which need to be capable of maintaining competition between 'coexisting principles of evaluation'. Thus to keep multiple orders of worth in play simultaneously and achieve creativity, uncertainty needs to be sustained rather than resolved.

The question about which order of worth is most valuable in a situation of uncertainty is part of the complex problem of calculating and evaluating values and value in future orientation.[93] In scenario development these 'orders of worth' are reflected in imagined possible and plausible futures. Thus even though scenarios are meant to illustrate possible futures without predicting or giving preference to one or the other, they are still based on the interplay between calculation and judgment.

[92] On the importance of addressing future uncertainty, complexity and values together see Guimarães Pereira, Vaz and Tognetti (2006, 11).

[93] See also Van Asselt, Mesman and van't Klooster (2007) on dealing with prognostic uncertainty.

The Research Council of Norway is not a market-based firm, but a public organisation which produces policies and research programmes. These are products in their own right, but they are also one step removed from economic production. Nevertheless, the introduction of a new approach to strategy development and priority-setting, like the foresight project CREATE, represents an attempt to accept and employ the creative potential of uncertainty, rather than trying to eliminate it. As I will show in the following chapters, foresight is coordinated through interplay between evaluation and uncertainty as well as in recourse to conventions appropriate to conducting projects. Sociologist Laurent Thévenot provides here an important perspective on the coordination of collective evaluations as poised between uncertainty and conventions.

3.5 Coordination and conventions

In his work on complex political and moral ordering Thévenot (2002a) looks at the evaluation of objects such as the upgrading of a road through the French Pyrénées discussing the question: 'What is a good road?' He argues for the moral complexity of that question by highlighting several ways in which the value of this road was ordered. The road was justified as an industrial and efficient infrastructure for the future, as promoting local, domestic tourism, as a green, scenic route through a beautiful landscape, and so on. Each of these orderings of worth was built on negotiations, compromises and public engagement.

According to Thévenot the evaluation of different values and their consequent ordering is based on 'how people and things are treated and shaped to qualify for evaluation' (2002a, 57). To qualify for evaluation Thévenot argues that we work to 'create equivalences' between people, objects or processes. This work he calls an 'investment in forms' such as 'statistical categories, job evaluation scales or occupational names' (ibid, 56). These investments in form are 'procedures that treat people and objects in homogeneous ways across contexts' (ibid). The simultaneous investment in local practices and trans-national definitions of foresight is such an attempt to create equivalences and standards between ways of conducting foresight across countries, organisations and interest groups. This work needs to be coordinated through procedures and events, such as national foresight programmes, international projects and conferences.

Thévenot connects the question of how objects like a road are evaluated in multiple ways – i.e., draw on multiple orders of worth – to the notion of *coordination*, not as a 'lawlike process' already determined by 'forces, constraints and rules', but rather 'the undetermined, dynamic and creative aspects of coordination'. These dynamic and creative forms of coordination arise from 'operations of evaluation which actors depend on for the conduct of their actions and their selective access to reality. This is the point at which objects [...] get deeply connected with morals and politics' (ibid, 57). This description of operations of evaluation by Thévenot as moral and political performances can be related to Brown's (2005) discussion of future values. It also resonates with Sztompka's perspective on value creation by constructing meaning and with Stark's description of how to create economic value by keeping multiple orders of worth in play, suspend disagreement or consensus and sustain uncertainty to allow for 'coexisting principles of evaluation'.

I want to borrow Thévenot's notion of coordination as a means to order values in practice when talking about the different ways values and evaluations were ordered in the scenario process. Thus while I consider evaluations as collective 'constructions of meaning', the way this is done in practice is dependent on what Thévenot calls 'coordination'. In the process I studied, however, coordination depended on instant operations of evaluation *and* on already-made agreements. These explicit or implicit agreements precede the process as well as accompanying it; they include things like accepting an invitation to a foresight project based on specific preconditions or following an explicit method and suggested approach to the future. Coordinating a foresight process is thus *acting with values* which can rest on social, economic, political and moral evaluations *both preceding and emerging in the process of* scenario creation.

When I refer to agreements preceding the scenario process, I do not mean that these agreements were not coordinated, or that they exist 'out there' as already established, stabilised results of coordination. It is for the sake of discussing a single project that I suggest seeing coordination not only as something that happens through instant or emerging evaluation, but also as based on implicit agreements not necessarily discussed during the process. These agreements have their own history of coordination.[94]

[94] I started studying the case of foresight in ICT research after the design and recruitment phases had been completed. However, I discuss documents and materials related to these phases inasmuch they were relevant to my fieldwork observations.

Thus I presume that in collective coordinated processes both evaluations made instantly during the process and evaluations preceding the process work together to produce specific dynamics and results. In foresight, evaluations preceding the collective process of scenario development can be associated with certain stages of the process, such as design and recruitment (Popper 2008). Instant evaluations as undetermined and creative aspects of coordination emerge during the collective phase of generating 'new visions and images of the future' (ibid, 48). How these forms of evaluation interact in practice can yield answers to my questions about how future stories are produced between the ideal of authentic stakeholder involvement and the need for a result useful to the organisation, and to what degree participants' contributions become an effect of organising.

This interaction is both given and politically charged. As Thévenot argues, dynamic, undetermined and creative forms of coordination arise from operations of evaluation which connect objects with morals and politics, just as evaluations made ex ante influence instant forms of coordination. To capture this interaction between different forms of evaluation I draw on Thévenot's specific perspective on conventions. Rather than employing a broad variety of perspectives within convention theory, I concentrate on Thévenot's development of convention theory as an alternative approach to existing theories of convention and coordination.[95] According to Thévenot (2006) convention theory differs from two contrasting views on coordination. The sociological one, based on the 'structuralist assumptions of Bourdieu's critical sociology of domination' (Vandenberghe 2006, 72), assumes that 'powerful collective forces determine coordination, either externally through fixed constraints, or internally through stable dispositions' (Thévenot 2006, 111). The second is 'more favoured by economists and opposes the collective thrust of the first approach' (ibid). Thévenot argues that the economist's view of coordination reduces conventions to individual preferences, such as shown in the philosophical study of conventions by David Lewis (1969).

Convention theory is, according to Thévenot, an alternative to both perspectives, since it is 'primarily concerned with the uncertain, pluralist and dynamical production of coordination' and thus opposes the idea of fixed constraints. In addition, 'by contrast to the second [the economist approach], it pays much attention to the common forms of cognition and evaluation which

[95] See also Thévenot (2001) and (2007).

support conventions of coordination and cannot be reduced to individual preferences' (ibid).[96] Yet Thévenot's concept of conventions differs from that of other French conventionalists. As he argues (2002a, 83) most convention theorists define conventions as agreements which lead to consensus, whether explicit or implicit. This, as Thévenot argues, is not necessarily so:

> Instead of considering conventions as mere collective agreements that bring the convergence of expectancies, whether explicit in contracts or tacit in customs, I would rather look at conventions as more complex coordinating devices that deal with the limits of more localized engagements, when there is a need for third-party assessment. A convention is not a broad convergence of shared knowledge. It is nothing more than a limited agreement about selected features people use to control events and entities (ibid).

Conventions are thus agreements about 'selected features' which help to control events and entities. This perspective on conventions which sees them not as an instrument for converging expectations, but as *limited agreements about selected features* to control events and entities, is useful because it leads back to the question of how to understand foresight as a collective effort. Thévenot (ibid) suggests:

> What is most important in the convention is not only a rather negative agreement about what is inconvenient but the common acceptance of what is left aside as *irrelevant*. This acceptance is grounded on the *common knowledge that there is no hope for a more complete alignment* (which is assumed in classical group collectives) [italics added].

This aspect of convention is interesting because it underlines that there are issues which do not become objects of coordination or evaluation because they are collectively considered irrelevant, i.e. not worthy of being calculated or evaluated. This leads to the question of which conventions are at work when specific issues, values or responsibilities are *collectively* considered irrelevant in foresight. Irrelevance is thus also a question of ordering, or ranking. In collective processes towards a 'common good' (Thévenot 2002a, 54) there is seldom a

[96] The relationship between uncertainty and conventions has been discussed widely in economics, and specifically political economy, based on the works of British economist John Maynard Keynes (1883-1946). A convention is here the projection of the existing situation (sales, production, etc.) into the near future which reinforces the convention itself. While a convention is thus a 'real world response to uncertainty' (Dequech, 1999, 71) there is less discussion on *how these conventions are coordinated among actors*, which I see as a third contribution of Thévenot's perspective, alongside the focus on the collective and the dynamic and undetermined aspects of coordination. This is also an important topic in my thesis.

completely irrelevant issue, any more than there is an issue which is equally important to everyone.[97] Conventions are thus forms of coordination which become useful in contexts of 'pervasive uncertainty':

> Within a context of pervasive uncertainty with respect to the interpretation of actions and expectations of actors, conventions merely channel uncertainty through a conventional formatting of events (Thévenot 2006, 111).

I regard this as a second perspective on the concept of convention which creates a tension between an understanding of convention as 'uncertain, pluralist and dynamical forms of coordination' and the perspective on conventions as channelling uncertainty through a 'conventional formatting of events'. How should we understand collective processes both as uncertain and pluralist while also drawing on conventional formatting?

I choose to see what Thévenot (2002a, 2006) calls the 'common forms of evaluation' as an important link between uncertain and pluralist coordination and conventional formatting. Here the word 'common' signals both something that is shared among people, such as convictions, repertoires or resources, as something they *have* 'in common', but also to '*act* in common' under specific circumstances, limited conditions, etc. This acting in common does not necessarily have to be steered by conventions, but can also be expressions of creativity, of doing something different and in a different way.

These common forms of evaluation can be instant coordinating operations, but can simultaneously rely on established conventions within an organisation or within a project. They can include rational approaches or negotiations of power and interests, but they are also, and this is my main point, directed by perspectives on what is considered relevant and what irrelevant.

In his work on organising and ordering in formal organisations such as the Daresbury Laboratory, John Law writes that 'the capacity to make decisions is a *necessary* privilege for the manager' (1994, 65). What works in a laboratory producing scientific facts is not so far away from organising a participatory scenario process. The process must be managed, organised and

[97] Collective processes towards a 'common good' thus operate with a notion of degrees of relevance and irrelevance. This is different for stabilised conventional structures such as Star (1991) describes in 'Power, technology and the phenomenology of conventions: on *being allergic to onions'*. She defines conventions (such as the almost inevitable onions in fast food) as technological regimes excluding others: 'the sets of conventions are never stable for non-members' (ibid, 41).

brought to a result by those responsible and accountable for the project. Both laboratory science and foresight rest on the common acceptance of the uncertainty of the future and the need for imperfect decisions in the present. Participatory foresight, however, is carried out involving stakeholders from many strata of society in the 'laboratory of scenarios' (Van der Heijden 2005) and thus includes multiple voices and perspectives about the uncertainty of the future and possible strategic solutions. On the one hand, the coordination conducted by an organiser or facilitator of foresight becomes here even more important than the coordinating operations of a manager, because he or she needs to define the 'limits of localised engagements' in which the contributions of stakeholders as a 'third party' become relevant. On the other hand, the relevance of contributions is also shaped by the pre-concluded agreement about *who is relevant* in this future negotiation process, i.e. the Research Council, the representatives of research institutes, universities, private businesses and the authorities. The stories that emerge in collective future negotiations are thus based on values that can be personal, organisational or collective and affect political decisions. This thesis, however, is not an assessment of those values but a study of coordinating and evaluating which addresses values, responsibility and uncertainty in foresight as they became empirically relevant.

In the following chapters the application of the scenario method, the coordination of the writing process and the evaluations of the project and the scenarios themselves are presented as effects with consequences both for the content of the scenario narratives and their final application. Having argued for using convention concepts as shaping the future in collective foresight processes, I will finally introduce a concept of coordination which I found inspiring when analysing the ethnographic moments in which the future was opened through methods employed to evoke collective imagination and creativity.

3.6 Investment in non-calculation

Evaluations, calculations and conventions in foresight processes work in complex ways; attempts are made to create situations intended to inspire imagination and creativity and open up perspectives on the future to wider horizons. Callon and Muniesa (2003, 197) extend their argument on what they call qualculation (simultaneous calculation and qualitative judgment) to describe what might be seen as situations devoid of calculation or judgement:

> It [qualculation] also enables us to understand how *situations of non-calculation* can be constructed, for instance by *preventing the closure of the list of entities to take into account*, by facilitating the proliferation of relations between those entities, or by paralyzing any attempt at classification. This explains why *obtaining non-calculability* (i.e. the *production of situations in which calculation is rendered impossible or highly complex*) requires *heavy investments* [italics added].[98]

This is an interesting argument when applied to the empirical study of collective foresight. Here a receptive approach towards the future requires opening up existing lists of entities, or priorities, to regard anew established relationships between science, technology and society and to suspend classifications or consensus for the sake of creativity. Creating situations in which calculation is rendered impossible or highly complex is thus one way of coordinating the production of future scenarios without resorting to consensus and converging expectations.[99]

According to Callon and Muniesa (2003), to create these situations of non-calculation requires heavy investment; they are constructed and they have to be achieved. Thévenot (2002a, 56) speaks about 'investment in forms' as a way to create equivalences between people, objects or processes, such as 'statistical categories, job evaluation scales or occupational names'. These investments in form are 'procedures that treat people and objects in homogeneous ways across contexts' (ibid). Creating future scenarios based not on forecasting or predicting but on imagining possible futures collectively and openly requires us to re-think conventional – i.e. already agreed upon – priority lists, relations between society and technology and commonly accepted classifications of objects, people and collectives. Participants are discouraged from estimating and calculating futures. They are rather asked to imagine multiple futures and come up with new associations between possible developments. This requires initially an open list of entities to take into account, proliferating relations between these entities and thus avoiding classification. It is a way to suspend evaluation and to keep multiple orders of worth in play. It is thus an *investment in non-calculation.*

[98] This text is currently (March 2010) only available in French. The translation presented here is obtained from a formerly available English version of the article which has been checked against the French version published online.

[99] On the question of reaching consensus in scenario development see also Van't Klooster and Van Asselt (2006).

Callon and Law (2005, 217) further refine Callon and Muniesa's (2003) argument when they suggest that creating such situations of non-calculation, or as they call it 'incalculabilities', takes at least as much effort as making calculabilities. They argue that situations of non-calculation can be created in two contrasting strategies which they call 'rarefaction' and 'proliferation':

> […] we suggest that rarefaction works by removing the resources or relations needed for calculability. Then, with the help of two further examples […] we argue that proliferation works the other way round to impede calculation by providing an overload of calculative resources.

Rarefaction is thus a strategy to avoid classification, while proliferation, i.e. providing an overload of calculative resources, increases uncertainty. In the following discussion of the foresight project on ICT research I will use the theoretical concepts and perspective presented in this chapter to inquire into the ways futures are opened and shaped in foresight. I will show how convention, coordination, evaluation and non-calculation work in practice and are linked to issues of value, responsibility and uncertainty.

4 COLLECTIVE SCENARIO CREATION

The core activity of participatory foresight is to generate alternative images of the future collectively, often in a longer-term perspective (Popper 2008). These images can include possible, plausible, desirable or undesirable images of the future. The main differentiation between future images or narratives is between 'probable' and 'preferable' futures.[100] Probable, possible or unlikely futures are often called 'scenarios'. They are created to increase understanding of future risks and possibilities.

According to policy analyst Tom Ling (2002, 127) policy-makers in public-sector planning are mostly interested in exploring different possible futures and understanding future risks. Scenarios can imply a variety of social and cultural values, but basically none of them is created to represent a preferred version of the future. Rather they are meant to stimulate reflection and initiate strategic thinking by dealing with the challenges emerging from uncertainty and from the complexity of specific issues. Yet the uncertainty of different scenarios can also be seen as 'politically weak and administratively untidy' as they 'rarely point unequivocally to one course of action' (ibid). Preferable futures, on the other hand, are often labelled as 'visions' and are meant to increase collective engagement towards one shared and desired image of the future. This approach is frequently used in regional, communal or urban planning processes, under the label of 'visioning'.[101]

[100] On normative distinctions in foresight and scenario development see, for example, Weber (2006, 197–8) and van Notten et al (2003). Van Notten et al (2003) provide a scenario typology whereas Bishop, Hines and Collins (2007) present an overview of current scenario development. On preferred futures see May (2006).

[101] On visioning in communal planning processes see Shipley and Newkirk (1999), Shipley (2002), Shipley, Hall, Feick and Earley (2004) and Jenssen (2009). Again, as with approaches distinguishing between forecasting/prediction and foresight/exploration, here too the terms are sometimes used interchangeably. Visions can be used to describe alternative, possible future developments, while scenarios can be the term for preferable or desirable futures. Mostly, however, practitioners and theorists use 'visions' to describe the final results of scenario processes, in which visions become the guiding images for corporate or public strategy development, based on a preceding discussion of probable, inherently different scenarios, see Godet and Roubelat (1996) and Boaventura and Fischmann (2008). For a Norwegian study in the field of STS exploring scientific and technological visions and future images in the development of natural gass technologies see Gjøen (2001).

Scenario development has evolved as the most widely applied method in foresight.[102] Scenarios can be more convincing than detailed checklists of possible outcomes because they tell stories about what kind of world we might live in some day. Foresight and scenario scholar Philip van Notten (2005, 7) writes:

> Scenarios are coherent descriptions of alternative hypothetical futures that reflect different perspectives on past, present and future developments, which can serve as a basis for action. Scenario development aims to combine analytical knowledge with creative thinking in an effort to capture a wide range of possible future developments in a limited number of outlooks.

These quality demands associated with scenario development echo the ambitions regarding foresight as a whole. They underline the prescriptive pressure on those producing scenarios, for not only must they ensure that the scenarios meet certain essential criteria within a limited number of short and accessible texts, they must also make the created stories relevant to the foresight process they are meant to inform. In this respect, one can think of scenario development in literary theory terms as a 'mirror image' or reflection of foresight in a smaller frame, which simultaneously highlights and continually repeats the features and political ambitions of foresight as well as the 'complexities of its practical implementation' (Brown et al. 1999, 3).[103]

As with foresight, in the more than fifty-year history of scenario development many juxtaposed definitions of it have arisen.[104] The different names given to scenario approaches highlight the diversity of applications and contexts: 'Scenario planning, scenario analysis,

[102] According to a report on future-oriented activities in Norway (Fagerheim 2003) and commissioned by the RCN, by 2003 three out of four of the 72 projects used scenarios to create perspectives on the future. Ministries and public bodies were the exclusive funding bodies for 43 out of 72 activities. The RCN itself was the central funding authority, having funded 20 of the 72 projects in full, in addition to other projects funded in part by the Council together with other actors. Only a few of them, however, were evaluated as being innovative in terms of the scenario methods applied. For an updated overview over scenario development in Norway see RCN (2009c).

[103] The 'mirror image' or 'mise en abyme' is supposed to 'mirror' the larger issues raised by a work of art. The classic example is the 'play-within-a-play' in *Hamlet*.

[104] In the early 1950s, Herman Kahn at RAND Corporation, then the US Air Force's non-profit research institute, developed scenarios for strategic military alternatives in the U.S.-Soviet conflict. Later Pierre Wack at Shell, who had worked with Kahn, developed scenarios for the future of energy technologies and oil fields, again in a very uncertain environment. The scenario group at Shell produced scenarios which anticipated developments during the 1970s oil crisis. Oft-cited examples of successful scenario processes are the scenario-based strategic planning at Royal Dutch Shell and the Mont Fleur scenario exercises undertaken in South Africa during 1991–92. See van Notten (2005), Schwartz (1996) and Beery, Eidinow and Murphy (1992).

scenario thinking, and scenario learning'.[105] Scenario planning and analysis are more frequent in corporate decision-making, whereas scenario learning is used in organisational, networking and policy-making contexts (Ringland 1998, Neumann and Øverland 2004). Van Notten (2005, 24) notes that the educational function of scenarios has 'gained importance in relation to its function as a planning tool of earlier years'. Today, organisational learning and strategic planning coexist in scenario project descriptions. In my analysis of the foresight project at the Research Council of Norway, I will use the general term 'scenario development' to describe the specific process I observed.

Scenarios are not meant to provide a single answer to the unknown yet-to-be. Foresight expert Gill Ringland (2002, 2–5) explains that scenarios do not predict the future, 'but illuminate the drivers of change'. Drivers of change, also called 'driving forces', can be already existing actors and factors, or emerging ones who or which might gain importance over time and have considerable influence on future developments. Building scenarios with the help of driving forces can enable managers to 'question their everyday assumptions, adjust their mental maps, and truly think "outside the box" in a cohesive fashion' (ibid). Scenarios in strategy development are thus possible views of the world providing a context 'in which managers can make decisions'. A range of possible worlds will enable managers to be better informed and 'a strategy based on this knowledge and insight will be more likely to succeed' (ibid). Ringland thus argues for a direct relationship between scenario narratives and the ability to make better decisions. The choice of driving forces seems decisive in this relationship. I will discuss the concept of driving forces and its practical implications further on in this chapter.

An ongoing debate addresses the question of whether scenario creation should be seen more as an art or more as science. Peter Schwartz, author of *The Art of The Long View* (1996) and one of the most influential writers on scenario development, proposes scenario development as an art; foresight expert van Notten (2005) sees it as a creative practice; while scenario planning experts van der Heijden et al. (2002) insist that scenario planning is a scientific approach. Van der Heijden et al. (2002) and Cairns et al. (2004) argue that scenarios are an 'experimental laboratory, where strategic decision options can be tested for their robustness in a variety of

[105] For an overview of scenario diversity see van Notten (2005), Chapter 2.

plausible worlds'.[106] They criticise open and constructivist scenario approaches as 'simple unstructured models' and contrast these unstructured designs with 'sophisticated highly quantified scenario-modelling techniques'. [107] These writers define scenarios not as texts, but as 'models', 'experiments' or 'laboratories', which are there to help people test certain strategies for their 'robustness'.[108]

Yet according to management scholar Alex Wright (2005), this approach ignores the 'subjective element of scenarios'. He argues that 'scenarios are not discovered, they are created; their very existence is a construction' and due to the fact that they are most of the time written by more than one person, they are also 'social constructions' (ibid, 2-7).[109] According to Wright, seeing scenarios as constructed narratives can contribute to studying how language and authorship influence strategic stories:

> The construction of scenarios is not an innocent practice. Scenarios are not developed in isolation, but are fashioned against a backdrop of competing and shared understandings and history, and geopolitical and cultural practices. The role of text and language in the creation of scenarios is under-researched, but is recognised as of central importance in the formation of constructions.[110]

Wright's critique provides a starting point for an analysis of scenario development at the Research Council of Norway. Asdal (2004, 80–1) argues that a text is 'never a neutral representation of a given issue' but 'is defined by the social context in which it exists as well as working to define that context'.[111] This argument is made for completed texts. Yet it can also be made for the production of a specific text or, as is the case in scenario development, several texts. Indeed, I want to argue that whereas completed texts co-produce realities, studying the production of specific texts provides insights into realities in the making.[112] It is here that the two questions raised in the introduction become empirically relevant, because stakeholder

[106] Quoted in Wright (2005, 2).
[107] Cairns et al (2004, 231) quoted in Wright (2005, 2).
[108] Cairns et al (2004, 233).
[109] See also Slaughter (2002) on scenarios and social construction.
[110] Here Wright (2005) draws on Barry and Elmes (1997), Burr (1995), Schwandt (2000) and Greene (2000). Analysing scenarios as social constructions has become an important area of study of late. Both van Notten (2005) and van Asselt and van't Klooster (2006) discuss from different perspectives how these social constructions are achieved.
[111] Original in Norwegian, translated by the author.
[112] See also Callon's (1991) work on texts as networks and Dugdale's (1999) account of text production as evading closure. Callon (2002) follows the production of text in the context of management. I will discuss his approach to collective writing further in Chapter 5.

involvement and the responsibility of the organisers to produce a useful result are most visible in the process of producing scenarios. In this chapter I will discuss the practice of scenario construction and address responsibility, value and uncertainty as empirical issues emerging from my study. Issues of responsibility and value have so far received little attention in ethnographic studies of foresight, or (as in the case of uncertainty) have been studied in the context of prognosis and forecasting rather than participatory foresight.[113]

4.1 Inviting and coordinating

In July 2004, two months before the first workshop meeting, the organisers of the foresight project sent out an invitation to about forty potential participants: 'Invitation to participate in UTSIKT – an ICT Foresight exercise directed by the Research Council.' The invitation posed the questions the foresight exercise intended to address:

> How ambitious should we be regarding Norwegian ICT research, and which main research areas should the RCN support in the years to come? How can the Research Council contribute to closer cooperation between actors in ICT research? How should the new programme VERDIKT be organised? To further an open and constructive debate about these questions, the Research Council will employ a dialogue-based approach consisting of a Foresight exercise based on the scenario method. The project UTSIKT (possibilities for development and strategic choice for ICT) is designed to provide us with better insight into the challenges facing Norwegian ICT research. [114]

The invitation implied that the foresight project was not directly about 'technology foresight', involving anticipating the development of certain areas like artificial intelligence or virtual reality (Bibel 2005). Its aim was to help *define the research priorities* to be included in the new ICT research programme 'placing Norway at the forefront of ICT development and the application of ICT-based knowledge to innovation and interaction' (ibid). Rather than requesting 'expert' contributions[115] the project organisers used broader terms like 'competency and creativity' to illicit the participants' expertise.[116] In other words, participants were asked not only

[113] See van Asselt, Mesman and van't Klooster (2007).
[114] Letter of invitation sent out by the UTSIKT scenario project leader to potential participants, July 8th, 2004.
[115] On expert knowledge in foresight processes, see for example Loveridge (2004).
[116] Letter of invitation.

to talk about ICT but also about their broader aspirations and their evaluation of research issues in general. Accordingly, the agenda included a number of strategic topics, including issues like which research areas should receive funding and how the new ICT programme could be organised.

The invitation was sent out to representatives of public and private research institutes, university professors, business leaders, ministry officials and representatives of public institutions, such as the central tax office, the post office and hospitals.[117] Although there was a broad mixture of different areas of ICT-related research, only a few professionals from corporate businesses participated in the 'scenario group', as the project organisers called it. The majority were representatives of private and public research institutes. The invited researchers would consider the questions posed in the invitation – about national research ambitions, funding and cooperation – to be relevant to their vocation and their professional future since ambitions and cooperation between researchers were central to their daily work life.[118]

I want to argue that the invitation to this process was part of the specific collective assembled in the scenario process. It described the form of coordination the process was to take as a 'dialogue-based way of working consisting of a foresight exercise based on the scenario method'. It asked potential participants (who were in this case defined as possessing relevant expertise) specific questions. By asking specific questions and presenting the chosen method, the invitation delineated participation and specified how the invitees were expected to contribute to this process as knowledgeable subjects possessing relevant expertise.[119] If they accepted the invitation, they would accept becoming part of the specific process, procedures, agreements and evaluations entailed in the foresight approach. In other words they would agree to participate in the scenario method and to pursue the project's objective of providing '*us*' with better insight. In this way they became *engaged* in the process. This also meant that the responsibility and credibility associated with the process was extended to them.

In this sense the invitation itself produced coordination. It worked as a coordinating device defining the boundaries for localised engagement. Instead of dealing with the issue of priority-

[117] See list of participants in the UTSIKT project RCN (2004b) under the link 'Scenariegruppen'.

[118] See Latour and Woolgar (1986, 187–233) for a detailed ethnographic study of motivation, cooperation and credibility in scientists' daily life.

[119] See also Law (2000, 15) on the issue of being 'interpellated' into a situation: 'that the subject instantly recognises itself when it is addressed'.

setting and defining ambitions *within the organisation of the RCN itself*, the project organisers asked for 'third-party assessment', inviting ICT experts and professionals as stakeholders to a dialogue on national research development. By inviting them, the organisers also wished to create a spatially and temporally limited agreement about following the specific approach they had chosen to conduct the event: the foresight and scenario method. In this respect the invitation contributed to coordinating the process while also functioning as a convention in the sense of limiting the engagement of stakeholders to one particular event where they were asked to follow specific methods and engage in particular activities.[120]

4.2 Ranking and representation

An invitation is thus a way of setting up a convention – the agreement that those invited would accept the proposed agenda (here in the form of open questions designated by 'what' 'how' and 'who'), and adopt the particular approach those inviting had chosen to discuss that agenda. Accepting an invitation seldom entails questioning the process, unless both agenda and approach involve highly controversial issues. However, in this case the invitation not only asked participants to agree on an agenda and an approach (dialogue-based) but also stipulated *how* the participants were to contribute to the process.

> The process is intensive and demanding, but will hopefully also be informative, fun and a place to foster new and existing networks. Participation in the scenario group requires active commitment and the intent to contribute to an open and constructive dialogue. *We want to specify that the participants of UTSIKT should not be regarded as official representatives of certain economic or sectoral interests. The participants are there by virtue of their own competency and creativity.* We plan to arrange a process with 30–40 external participants in addition to employees of the Research Council [italics added].[121]

The invitations were addressed to individual professionals – not institutions or organisations – who were invited on the basis of their personal experience and knowledge and asked to use their 'competency and creativity' outside the context of their daily professional life, in other words to

[120] See Thévenot's (2002a, 83) definition of conventions as 'complex coordinating devices that deal with the limits of more localized engagements, when there is a need for third-party assessment'.

[121] Letter of invitation sent out by the UTSIKT scenario project leader to invited participants, 8 July 2004. Unpublished.

separate their own individual interests and competencies from those of the organisations they were a part of and to simply represent 'themselves'. This specific request by the project organisers thus attached a certain social and moral value to the invited experts, implying that the participants would contribute value to the foresight process *if* they behaved as non-representational experts and professionals engaging with each other in an 'open and constructive dialogue'.

Why would such a request be necessary? It was no doubt made with the aim of ensuring an 'open and constructive debate'. Was it to ensure equality, to make sure each contribution was considered to be of equal value? Was it to *purify* the participants' knowledge about ICT as technology from their social context? Was it to control individual participants' possible influence or power to shape the resulting scenario narratives and their evaluation? Were the experts' and professionals' sectoral and economic associations irrelevant – or, as Thévenot puts it – 'inconvenient'?

Innovation researcher J.P. Salmenkaita and risk management scholar Ahti Salo (2004) describe a foresight process resulting from the Wireless Strategic Initiative (WSI), a project sponsored by the European Commission in the Information Society Technologies (IST) area of the Fifth Framework Programme. This project began with an open call for contributions, and more than 250 experts participated in the ensuing workshop, divided into five workshop groups (ibid, 901).[122] Here a contrasting strategy was used to deal with participants' interests and potential influence on the process. The participants were asked to 'actively promote their interests and viewpoints to identify matching or complementarily interested parties' (ibid, 902). The authors argue that active networking 'helps in the gradual transformation of initially independent lists of research proposals into larger and more coherent research agendas' (ibid). The process was thus 'fundamentally meritocratic, based on attracting attention' (ibid). Instead of levelling participants by making their organisational and sectoral ties irrelevant, issues that 'lack credibility receive less attention, making it difficult for those who do not receive sufficient attention to mobilise resources from others' (ibid). The authors admit that such a meritocratic process allows only certain actors to make their voices heard in the creation of research agendas.

[122] The article does not provide more details on the process of selecting and inviting these experts, apart from stating that 'interested parties were invited to produce short papers on any important issue beyond third generation wireless communication' (ibid, 901). For a similar approach based on a combination of individually held and socially shared expectations see Truffer et al (2008).

Because of the problems attached to the dominance of representatives from powerful organisations, who may 'push for their own interests', this kind of foresight process should 'not be ascribed a dominant role in public policy' (ibid, 906). The invitation sent out by the RCN was thus an attempt to avoid the interference of powerful interests in a process designed to inform public research programme development.

Yet in sending an invitation to a *limited number of people* the organisers of the process implicitly ranked and evaluated the invitees in terms of their institutional esteem. There are several ways of compiling such lists in foresight projects. In a European Commission publication called 'A Practical Guide to Regional Foresight in the United Kingdom' the authors suggest a 'reputational approach', which is based on 'asking known experts to nominate others who they believe to be particularly knowledgeable in specified areas of expertise' (Miles et al. 2002, 180). Here esteem is produced by nominating particular people as experts, whether on a list or in a questionnaire. In 'co-nomination' the '*frequency with which particular people are named as experts* in particular fields is used for guidance' (ibid, 194). Their esteem is thus measured by the frequency with which they are named, an action which includes *calculation* by counting the frequency of their naming and thus helps them to get *nominated*. Coordinating by estimating who is *more of an expert and who is less* also carries political implications.[123] People's expertise, competency or creativity is evaluated and compared so as to rank them in a 'convenient order'. This shows how calculation and judgement work together in coordinating collective processes in which a limited number of people are considered representative participants.

People representing organisations, authorities or economic sectors hence contribute to social ordering both in the way in which they 'show their worth' (Thévenot 2002a, 70) and in how objects (expertise, consumerism, political authority) are represented through them. The better a reputation an employee gains, the higher the rank he or she will achieve and the more suitable he or she will be deemed to represent the organisation. Ranking is thus also used in the context of 'an interest in prediction and control', whereby high ranking and esteem allow people to wield influence in organisations.[124] Thus status in an organisation leads to ranking – here in the form of

[123] In a different foresight exercise on what was considered a future key technology, I observed this process of co-nomination in a meeting with invited experts who were to help the organisers find additional candidates for the process. At the end of the meeting the organisers and experts reflected upon the result which showed that of 40 potential participants, they had only managed to come up with 6 female experts.

[124] See also Law (1994, 142–3) on the material conditions of ranking within an organisation.

a limited list of about forty people judged to be relevant participants in the ICT foresight project – based, in turn, on how they are ranked within their respective organisations. The project organisers, however, wanted to ensure that the 'open and constructive dialogue' would not become predictable or controlled by certain interests following from this status or organisational ranking.[125] In this respect the request in the invitation can be seen as an attempt to suspend and prevent social ordering and ranking *during the scenario process* and thereby to open the process for unexpected outcomes.

The request was therefore an attempt to 'create equivalences' (Thévenot 2002a, 56) between the invited participants, their representational ranking and the scenario process underway. The organisers invested in an *equally valid representation* describing the participants as 'not to be regarded as official representatives of certain economic or sectoral interests, but present because of their own competence and creativity'. This is quite a different type of investment than Thévenot's 'investment in form', which makes it possible to 'treat people and objects in homogeneous ways across contexts' (ibid). Thévenot mentions occupational names, statistical categories, or job evaluation scales as investments in form which are 'costly and demand negotiation'. The return can be the '*extension of the investment's domain* within which it is accepted'. The project organisers here invested in creating equivalences between invited participants by *removing achieved standards*, or rankings, within an area of expertise and professionalism. The point here was not to *extend* the domain of a certain norm, but to agree on this kind of standardisation in the *limited context* of the scenario workshops.

This can also be seen as a situation of non-calculation achieved by rarefying calculative resources. Rarefaction works 'by removing the resources or relations needed for calculability' (Callon and Law 2005, 217). Coordinating the process in this manner was thus an agreement limited to this specific event and the local and temporal engagement of interested parties. This artificially created equivalence between participants allowed coordination during the process to become more 'undetermined, dynamic and creative' (Thévenot 2002a, 57). Closing off certain possibilities, such as the representation of specific interests, was intended to enable the range of possible ideas about the future to become more open. However, these aspects of coordination

[125] See also Cuhls and Georghiou (2004, 150) who recommend policing 'attempts at self-interested lobbying because such foresight processes could give research communities the impression that they can have a "significant impact" on funding decisions'.

were not based on a *common or shared acceptance* that the participants' economic, sectoral or self-interest was irrelevant. Rather the participants' interests were *made irrelevant* by the organisers' request. Controlling and enabling, opening and shaping thus emerged simultaneously.

The request to represent only their own competency and creativity also applied to the ten employees of the Research Council itself listed as participants in the scenario group which according to the RCN's website comprised a total of fifty people (RCN 2004b). Since, however, these participants were partly or fully responsible for the success of the foresight project, they were always implicitly motivated to serve their own organisation. I will return later to the issue of responsibility and how this contributed to the ordering of values in the scenario development.

Prior to the participatory foresight process certain conventions had thus been established which were intended to be in operation during the collective creation of scenarios about the future of ICT research. Through the invitation the project organisers had expressed values they wanted to prioritise during the process. The participants should behave in a non-representational way and should look beyond mere technological advances by contributing ideas about concrete organisational issues in the new ICT programme and envisioning new levels of ambition for research on ICT. The coordination of foresight through this invitation thus not only showed 'techniques of domination' (Asdal, Borch and Moser 2008, 6) but was also an attempt to use foresight as a 'tool for public involvement, for democratization, or deliberation, as well' (ibid).

In the following discussion I will show how collective contributions to the scenarios were produced. I will discuss the use of scenario-creation tools, such as driving forces and scenario axes models, how ideas expressed by the participants materialised into contributions, and how value, responsibility and uncertainty interacted in the process. Based on this discussion of representation, ranking and evaluation, the question arises whether and how the request for participants to be non-representational stakeholders influenced the scenario-creation process. This, in turn, will shed light on how scenarios are produced between stakeholder involvement and the need for a result useful to the organisation and to what degree participants' contributions to scenarios are an effect of organising.

4.3 What are driving forces?

On 16 September 2004 the invited participants gathered for the first workshop at Hotel Sundvollen, a quiet country resort twenty-five miles outside Oslo. Here they were to spend two days discussing the future of ICT research and creating scenarios intended to increase the quality of priority-setting in research policy and inform the new large ICT research programme. The letter sent to them prior to the event, which explained all the practical details of the workshop, had stated that there would be no fixed agenda at the workshop. The two days would consist of plenary sessions, group work and some external contributions. The RCN had hired an experienced foresight practitioner to lead the workshops and the scenario writing activities. The entire proceedings, the letter said, would be led by the appointed facilitator in one big room with all participants present.[126]

Two weeks before the workshop, the foresight project group had invited all potential participants to a 'kick-off meeting' at the Research Council's premises in Oslo. Here the participants had been given an introduction to planning under conditions of uncertainty and told how a specific way of thinking about the future could renew traditional planning processes. During the detailed presentation the participants had been informed about how the facilitator intended to use 'scenario thinking' in the process.[127] Some doubts had been raised in the audience about the usefulness of foresight for this particular process. The RCN employee who was the appointed leader of the foresight project had assured the sceptics that these issues would be kept in mind and incorporated into the process.[128] Thus upon arrival at Hotel Sundvollen the participants were well informed about the formal approach chosen by the facilitator and the project group: Now it was time to see how this approach would generate the effects hoped for by the organisers in practice.

The two-day workshop was conducted with thirty-seven participants. Twenty-eight of them were external participants representing areas of ICT research and business, and nine were Research Council employees. The first day of the workshop was dedicated to collecting 'driving

[126] 'UTSIKT- Samlingen 16–17 September på Sundvolden Hotell, Krokkleiva', email sent by the scenario project leader to all participants on 8 September 2004. Unpublished.

[127] Term used by the scenario project leader in her PowerPoint presentation at the kick-off meeting, 3 September 2004. Published by the Research Council of Norway (2004b) under the link: 'prosessen i korthet'.

[128] The official documents concerning the foresight project on ICT refer to the group responsible for the project as the 'project group', in Norwegian: 'Prosjektgruppen' (RCN 2004b).

forces', evaluating and sorting them and creating the first scenario drafts. The participants had been divided into six groups consisting of about five or six members and asked to decide within the group who would collect ideas and who would steer discussions and report to the plenum. The project organisers thus created the conditions for a multitude of ideas to be expressed.

At the beginning of the first day the workshop facilitator announced the rules of the workshop and repeated the request set forth in the invitation:

> This is not about gazing into the crystal ball; we are not interested here in forecasting or strategies. Please leave your own agendas at home; we do not want them here at the workshop.[129]

The facilitator thus ruled out three different ways of achieving future stories. 'Gazing into the crystal ball' as a phantasmagorical way of imagining the future, detached from reality, could be seen as prophesying. Forecasting, on the other hand, was not regarded as sensitive enough to the pluralities of possible futures and was also seen as 'speaking in place' of the future, something not to be encouraged in the open and democratic approach pursued by the project organisers. Hence this was also ruled out. Finally, according to the step-by-step approach designed by the organisers, strategic thinking was to follow the creation of scenarios, but not accompany them.[130]

The facilitator hence underlined that this workshop was based on certain perspectives that did not allow for prophecies, predictions or ready-made solutions. In this way, he directed the participants' way of thinking about the future towards the scenario method the project organisers had announced in the invitation to the foresight process. He indirectly underlined the particular features of foresight as a systematic way of thinking about the future. At the same time, his request accentuated his role as facilitator and coordinator, requiring the participants to regard him as having the competence and knowledge to approach the future.

On the first day the participants were asked to collect what in the scenario method is called 'driving forces'. Peter Schwartz has called driving forces 'the elements that move the plot of a scenario' (1996, 101). Driving forces are considered by most foresighters and facilitators to be a central component in scenario development. Yet what constitutes a driving force, or a driver, and how such forces are employed varies between projects. Driving forces are thus open to

[129] All quotations are from the author's notes compiled during the workshops on 16 and 17 September 2004.
[130] See Chapter 2, subchapter 2.2.

considerable interpretation and dependent on the context they are used in. To understand their meaning and use in this foresight process I will briefly introduce a few representative perspectives on the concept.

Basically, driving forces are described as the 'underlying forces' which push developments in certain directions or which can determine certain trends. For example, both migration and the birth rate will have an impact on the size of the future working population. In this respect these are driving forces related to the future working population. However, the direction these driving forces take (whether they increase, decrease or remain constant) is uncertain: Therefore, in the example cited, the size of the working population may vary depending on what direction the driving forces take.

Many of those writing about or using the concept of driving forces see them as acting outside the direct control of those who perceive them.[131] For example, the consequences of environmental damage are often perceived as outside the individual's control. However, collective actions may nevertheless regain control over the direction some of these environmental problems might take. What is perceived as 'beyond control', 'uncertain', 'predetermined', 'highly plausible' or 'influential' depends on the perspectives of those employing the concept and the context in which the scenarios are created.

Driving forces are thus used to provide underlying conditions for various plausible future scenarios. Strong driving forces, for example, are seen as highly probable and as having a substantial impact on future developments. Political scientist and social anthropologist Iver B. Neumann and social scientist Erik Øverland define driving forces as being on the dividing line between 'intentional forces' and 'elements of a clearly non-intentional character' (Neumann and Øverland, 2004, 267). Terms describing these forces can vary. The foresight method following the 'actor/factor approach' defines actors as 'intentional subjects', but factors such as 'legislation', 'gender' or 'business ethics' as non-intentional (ibid). Writing about scenario planning and strategy in business development, management scholars Liam Fahey and Robert M. Randall (1998, 10) divide driving forces into 'environmental forces' and the 'actions of institutions'. Environmental forces can be economic, social, cultural, ecological or technological, but they lack intention, while the actions of institutions refer to 'different types of business

[131] Van der Heijden (2005), Fahey and Randall (1998), Ringland (2002) and Schwartz (1996).

organizations, political parties, governmental agencies and regional and international bodies' (ibid). Here organisations are defined as intentional actors.

Thus writers on the subject of driving forces locate *intentionality and agency* in various phenomena of the 'outside world'. Whereas Neumann and Øverland emphasise the intentionality and agency of individual subjects, Fahey and Randall see intentionality as also residing in organisational collectives. This distinction between intentional and non-intentional thus presumes that there are also 'blind' forces at work which can influence the future, such as the 'unintended side-effects' of scientific and technological developments. Yet whether they are classified as 'intentional' or 'non-intentional', 'environmental' or 'institutional', driving forces are generally perceived as forces that act independently of what we might wish for the future.

According to these approaches driving forces act 'out there', in the 'real world'. These notions are based on the particular approach in scenario planning which divides the world 'out there' into three layers, consisting of fundamental 'structures' (social, technological, environmental, economic and political – STEEP), 'trends and patterns', which overlay structures, and finally 'events' as the top layer (van der Heijden 1996/2005). The metaphor for this order is the 'iceberg', based on the argument that while we can only see the tip of the iceberg (the events) we must also relate to and understand the structures underneath to navigate the future safely.

Trends are slightly different building blocks for scenarios than driving forces. Management scholar Franz Liebl (2004, 11) sees the roots of trends not in 'objective facts' or 'causal mechanisms'. He argues that trends should be understood as 'social constructions' and 'mental worlds' rather than objective facts.[132] This does not mean, however, that 'facts are irrelevant and emerging trends are pure inventions; the economic and technological basis may also play an important role. ... to a large extent trends represent *mental worlds*, attitudes and fantasies shared by customers and stakeholder groups' (ibid).

Driving forces, trends and events are thus ambiguous concepts. What is regarded as an external driving force or as a mental world is dependent on the perspective of the project owners as well as the participants. What is regarded as an intentional actor, or a non-intentional factor can be defined from a broader or more limited perspective on agency and intentionality. How the

[132] See also Fuller and Loogma (2009) who discuss foresight methodology from a social constructionist perspective.

collection of driving forces is used in the creation of scenarios is thus 'flexible to accommodate the desires of those involved in the processes' (Horn 2000, 37–8).

4.4 Coordinating openness

In the foresight project on ICT research held at Sundvollen in September 2004, the initial approach towards driving forces was not predefined by any of the perspectives discussed above. The facilitator announced how the participants were to collect driving forces by focusing on quantity instead of preconceived definitions:

> Which forces do we think will influence the future? Please take ten minutes to come up with as many driving forces as you can. Driving forces can be trends, events, factors, big actors, etc. *Anything that might influence the future* [italics added].

In his task announcement the facilitator listed not only actors, factors and events – i.e. forces defined as acting 'out there' – but also 'trends', which according to Liebl (2004) are social constructions. The facilitator thus included both forces considered as acting independently of people's perceptions as well as mental worlds and attitudes in the domain of future [driving] forces. In this respect the facilitator deliberately opened the future to a wide range of possible ideas, allowing anything and everything to be collected as equally valued contributions.

During this first phase nothing was evaluated regarding its probable importance, so participants could come up with anything they thought might have an impact on the future. Their evaluation concerned only 'whether' and not 'how' the collected idea was related to the future. However, by being written down, and therefore materialised, any phenomenon a participant thought important could become a potential building block for a future scenario. 'Anything that might influence the future' changed thus from being *anything* into *something that got written down*. Immaterial thoughts became materialised words on paper and thus valued and classified as contributions. In this way these ideas reached a new classifying stage they were not part of before. They became part of the scenario process and could hence become crucial to the narratives about to be produced.

These are examples written down on post-it notes in one of the groups I observed during the task:

> Fear of technology; international cooperation either increasing or decreasing; governmental intervention; fear of terror induces more R&D; pressure coming from China and India; less oil profit, Asian influence on digital game industry; positioning by patents; increasing demand for efficiency; competence society; always online...

The driving forces written down on the post-it notes reflected economic, social, cultural and political issues the participants thought important in their immediate present. India, China and Asia in general were evaluated as constituting growing global competition. The participants also mentioned fear of terror and technology, as well as the constant pressure on the individual citizen in the form of an increasing demand for competence, efficiency and permanent accessibility. These driving forces, examples of many contributions, did not express ideas about the future. Rather they were phenomena existing in the present, but which in line with the idea of driving forces might become more influential in the years to come. Materialising these ideas on paper shows that foresight does not produce facts but can influence present realities by expressing certain values and expectations.

The instruction to write down 'anything that might influence the future' allowed for a wide perspective on possible driving forces. The perspective expressed in these examples was clearly both global and national, combining perceptions of global processes with national concerns, expressed for example by 'less oil profit' and 'pressure coming from China and India'. Some of the forces assumed to influence the future were unrelated phenomena, such as 'fear of technology' or 'an increasing demand for efficiency'. Others expressed certain causal connections between events, such as 'fear of terror induces more R&D'. In this respect the participants expressed their values and attitudes by writing down phenomena they evaluated as existing independently of their own intentions, but which were assumed to influence present and future developments.

However, the projected openness of the contributions was shaped by certain conditions that prepared the ground for ideas preferred by the project owners and organisers. Driving forces listed on paper were informed by the facilitator's initial instruction to forget about the 'crystal ball', not to engage in forecasting or strategies and to leave all 'agendas' at home. The

participants were thus asked to think of driving forces based on global socio-technological issues rather than on expected scientific or technological innovations that might be connected to their own area of professional activity. The contributions did not constitute expectations about technological or scientific developments, but rather were engendered by the participants' knowledge of and views on political, social or cultural issues, such as 'governmental intervention', 'positioning by patents' or 'the demand for efficiency'. By writing down ideas related to global and national issues, the participants responded to the invitation's initial request not to act as 'official representatives of certain economic or sectoral interests'. Thus the collected ideas were also shaped by participants' distancing themselves from their organisational or sectoral – i.e. representational – competency. This contrasts with the very open approach announced by the facilitator whereby the scope of driving forces could include actors, factors, events or trends. It shows how the participants were to a certain degree aware of the initial requests they had received and were willing to follow the proposed agreement limited to this particular process. Thus the wide-open future announced when participants were given the task of collecting driving forces was at the same time shaped by the requests made in the invitation.

What Thévenot (2002a) calls 'dynamic and creative aspects of coordination' are in these ethnographic moments always linked to limited agreements which contribute to controlling events, people's engagement and the outcome of creative and dynamic processes. Any sectoral driving forces that might have a stronger and more direct impact on the participants' futures were here commonly deemed irrelevant, or in the perspective of the project organisers as 'inconvenient' to the process. In this respect, the collected driving forces were not conceived from the participants' interest-based visions and expectations.

4.5 Future certainty and non-calculation

After they had written down as many driving forces as possible the facilitator asked the participants to sort out the contributions collectively within the groups:

> Collect post-it notes which all entail the same idea! Look at cause and effect and rearrange the information! Clean up your notes, synthesize, look for cause-effect relationships and rewrite.

The group I observed sorted their notes into the following categories:

> **Technology**: Wireless, ubiquitous and free of charge, e-ID card, always on
> **Humans**: the cell phone generation grows up, population stops increasing, women take over, people retain image of a young person until they are 50
> **Attitudes and values**: indifferent youth, people focused on self-realisation
> **Security**: all children under surveillance, Fidel Castro dies, criminal organisations
> **Individual**: Fear of death, seeking experience, increased focus on 'the best', time becomes a currency...

The ordered list of driving forces started out with technology as the first heading, ranking wireless and ubiquitous access first on the list, followed by the familiar idea about universal electronic identification cards and the ability to be permanently engaged in electronic communication. Similarly the focus on youth, individualisation, self-realisation, expertise and lack of time are well established cultural outlooks on society as it exists today. Finally, participants included the widespread idea of security through omnipresent surveillance on the list of expected driving forces which could influence the future. The participants thus collected trends, actors or factors already at work in the present. Among these ordered ideas, now rearranged under specific headings, certain ideas were more likely to be usable as driving forces because they implied a movement, a development, such as 'increased focus on the best' or 'time becomes a currency'. Others were less reflected ideas not clearly perceivable as having an influence on future developments such as 'Fidel Castro dies' or 'criminal organisations'. [133]

These contributions were made following the request to collect 'anything that might influence the future'. The underlying assumption ensuing from the participants' competency and creativity was that every contribution was equally valid. This approach allowed contributions like 'all children under surveillance', 'Fidel Castro dies' and 'criminal organisation' to be collected under one heading called 'security'. In attempting to order the contributions, the participants abandoned the initial criterion of national and global concerns, allowing single items like e-ID cards to be mixed with the death of politicians as well as generational or individual phenomena.

[133] For a discussion systematising the quality of ideas in scenario creation see Uotila and Melkas (2007), who rank collected contributions either as simple 'data', as 'information' (which should at least show a causal connection between two ideas) or as 'knowledge'(the highest quality of contributions), which would show causal connections and give reasons for specific developments.

How valuable were these initially collected and ordered driving forces for scenarios about the future of ICT research? A systematic approach to the future carries with it a claim to be able to justify the results of a scenario process, whether at the end or at any stage in between. So how can these contributions be characterised?

In the face-to-face, creativity-oriented workshop at Sundvollen, the participants arranged their ideas into categories reflecting their understanding of political and social reality at this point in time. The list of driving forces and the way they were ordered were effects of different elements working together, such as the requests expressed in the invitation, the open approach provided by the facilitator, group dynamics and the work of collecting and writing down ideas. This ordering of collected driving forces thus represents a miniature example of the messiness of reality.[134]

Within the context of foresight the activity discussed is described as brainstorming or 'brain writing' (van Notten 2005). Brain writing is also coordinated through *time*, both as *real time* within the workshop, and as the *perspective on time and continuity* reflected in the contributions collected in the workshop groups. I argue that these contributions are examples of a certain randomness of thought, which emerges in collective settings framed by real-time conditions. Faced with the pressure to solve this first task within the time limit set by the facilitator, the participants in the group I observed were obliged to write down *something*. This was part of the limited agreement, namely, the convention of being participants in this scenario workshop.[135] The ability to reflect on their contributions was limited by time and by 'the working of the mind'. Sociologist and systems theorist Niklas Luhmann (1994, 377) writes on the working of the mind:

> The mind thinks what it thinks and nothing else. From the perspective of an observer – either another mind or a communication system that communicates about the observed mind – the mind can be seen as a medium that may accept and transmit a myriad of conditions.

Luhmann's assertion about how thinking cannot be seen separated from the situation, from the particular moment and place it happens in, includes the innumerable possible things the mind might produce at a specific point in time. Once ideas are written down, they may reflect the

[134] In his introduction to 'Making a Mess with Method' Law (2003a, 3) underlines that 'the world is largely messy… It is also the case that contemporary social science methods are hopelessly bad at knowing that mess. Indeed, dominant approaches to method work with some success to repress the very possibility of mess.'

[135] During my observations, I also encountered a breach of this contract, a participant who had come to the conclusion that the workshop was a waste of time and stopped contributing. His argument was that foresight exercises for ICT research would only render results if they concentrated purely on technological extrapolation.

messiness of reality and hence remain random until they become systematised into lists, categories or models.

The point here is not to declare these first contributions to the scenario workshop as *purely random* ideas, which they clearly were not. Rather I want to draw attention to the temporal aspects of the situation in which these contributions were produced. The face-to-face interactions in the groups happened within a limited timespan, while the participants were at the same time asked to think as broadly and openly as possible, writing down 'anything that might influence the future'. Their contributions were produced under prescribed conditions yet were open to numerous possibilities. Their particular ideas then became part of the collective material produced in the process.

Under the conditions described above the participants assumed the existence of a 'certainty narrative', so that the ideas collected reflected their assumptions about temporal development as an *elongated present*, including future developments regarded as certain, such as the future importance of ICT. In other words, all uncertainties about the future exist in the wider context of a 'certainty narrative' which leaves no doubt about the future importance of 'generic enabling technologies' (Brown et al. 2000, 11).[136]

If we view this as the underlying condition for the workshop, we can discuss the collection of these driving forces in terms of 'the present unfolding' (Risan 2006). Drawing on Whitehead (1925) anthropologist and STS scholar Lars Risan argues that *the present is not a moment*, but 'duration', a larger 'chunk of time'. The present has a certain length of time in which events unfold. Risan uses the relatively short example of a train ride in Switzerland, lasting about an hour, to speak about the inevitability of the present:

> This present is not a given. It is an achievement, an achievement of the Swiss railway system. (In Britain it is not the same kind of achievement, and the present is a different thing when travelling by train in the UK.) Doing the trip from Lausanne to Geneva was an unfolding of a present. And the present has to unfold, as it is not a moment, but a duration...If then, we want to criticise technological determinism, we should not criticise descriptions when they describe an unfolding of the present, even when that present consists of a large

[136] The specific approach chosen here can also be seen in the wider context of a discussion about continuity and discontinuity in scenario development. As van Notten (2005) argues, explicit requests to come up with ideas about unexpected driving forces which disrupt certain developments can create interesting and insightful scenarios.

> chunk of time, such as, say, twenty years ('cars and roads will still be the dominant means of transportation in twenty years time').

If we follow Risan's argument we may describe the real time interactions in the workshop as an *ordering of values* based on the perception of an unfolding of the present. The collected driving forces were based on a 'certainty narrative' about technological and social conditions that will still pertain in ten to twenty years. In this respect the collected driving forces reflected both collective values and random thought.

This first activity during the two-day workshop provided the basic material for the scenarios intended to increase the quality of priority-setting in research policy and inform the new large research programme on ICT. At the same time the number of possible resources for the creation of scenarios was increased by asking for 'as many driving forces as possible'. Removing resources to distinguish between driving forces made it difficult for participants to decide which driving forces could be considered most important owing to the sheer number and variety of forces – both in terms of scale and type – which could be written down.

This kind of coordination can again be seen as a way to remove 'resources or relations needed for calculability' and thus create a 'situation of non-calculation' through rarefaction (Law and Callon 2005, 217). Following Thévenot (2002a, 54–5) this first activity was also already a 'complex moral and political ordering' which expressed values implied both in the organisers' approach and in the participants' instant evaluations of possible driving forces and their future importance. This complex ordering created a link between 'the good' and 'the real'. At this early point in the process, almost any of the contributions written down had the potential to become important driving forces, provided they were put in a meaningful context – what Thévenot calls 'a common good or the fulfilment of a planned action' (ibid). Thus meaningful and 'good' contributions would be those which helped to fulfil the aspirations of the project owners to come up with scenarios relevant for research policy development.

The 'real' is what happens when such aspirations are transformed into practice. As discussed above, the real was produced by coordinated engagement through certain limited agreements. However, as Thévenot argues, qualification for worth needs to be tested (ibid, 61). These contributions were to undergo evaluation in the following activities, which reordered participants, organisers, texts, methods, approaches and task descriptions. Depending on the

outcome of the participants' and the facilitator's further interactions, some of the driving forces written down at that stage could potentially influence which areas of ICT research might get funding in the new major programme to last until 2015.

4.6 Employing the scenario axes tool

In the previous subchapters I have discussed the collection of driving forces in the first phase of the scenario workshop. As I argued above, preconditions and elements of interaction were at work that led to a specific ordering of values through this particular collection of contributions. Within this ordering the future as the point of reference for these contributions emerged as both open and shaped at the same time. Now the process had to evolve by systematising and utilising the contributed ideas to a greater extent. New elements had to be introduced into the process to ensure the relevance of the results for scenario creation. Some of these elements were tools for scenario creation intended to help the participants evaluate and use their collected ideas. However, this increasingly focused approach did not only involve scenario tools. The participants were also asked to consider specific topics deemed important to the foresight project.

On the first day of the workshop the facilitator reminded the participants at 3pm:

> Do not forget the scope of these driving forces! Think technology, society and how research is conducted! How is research conducted to support ICT development? We are still talking about driving forces here!

The facilitator thus reminded the participants that notwithstanding the open approach to driving forces there were certain topics to which these forces were supposed to be relevant. The three most important areas the participants were to address were technology, society and research. However, by asking participants to focus on *how research is conducted to support ICT development* the facilitator was implying that research had a *certain function* and should be seen as *directly related* to ICT development. By reminding them not only to think about the areas of technology, society and research, but also to tell a *story* about 'how research is conducted' he asked for specific plot-thinking. Thus not only were certain topics highlighted as relevant, but these topics were also arranged by the facilitator in order of importance. Research was deemed to be the most important element, supporting the development of ICT.

After being reminded of the topics to focus on and the plot in which these topics were to be used, the groups were asked to place the driving forces they had collected in scenario models. The facilitator presented the participants with a choice of three different models they could use to create a first scenario draft. The group I observed during this task chose the 'scenario axes model' because this was a model most of them had seen before and which some of them had had experience using.

According to van't Klooster and van Asselt (2006) who have conducted several ethnographic studies in foresight practice, using scenario axes is often recommended as 'a useful and straightforward tool to construct images of the future in a coherent and systematic way' (ibid, 17). Scenario axes can help identify the two most important driving forces in scenario construction, that is 'those developments that are both very uncertain (and therefore can develop in different directions) and may have a decisive impact for the region, the subject, the company, etc. In other words, driving forces which serve as scenario axes are those developments that score high on both the 'uncertainty' and 'impact' indicators (ibid).

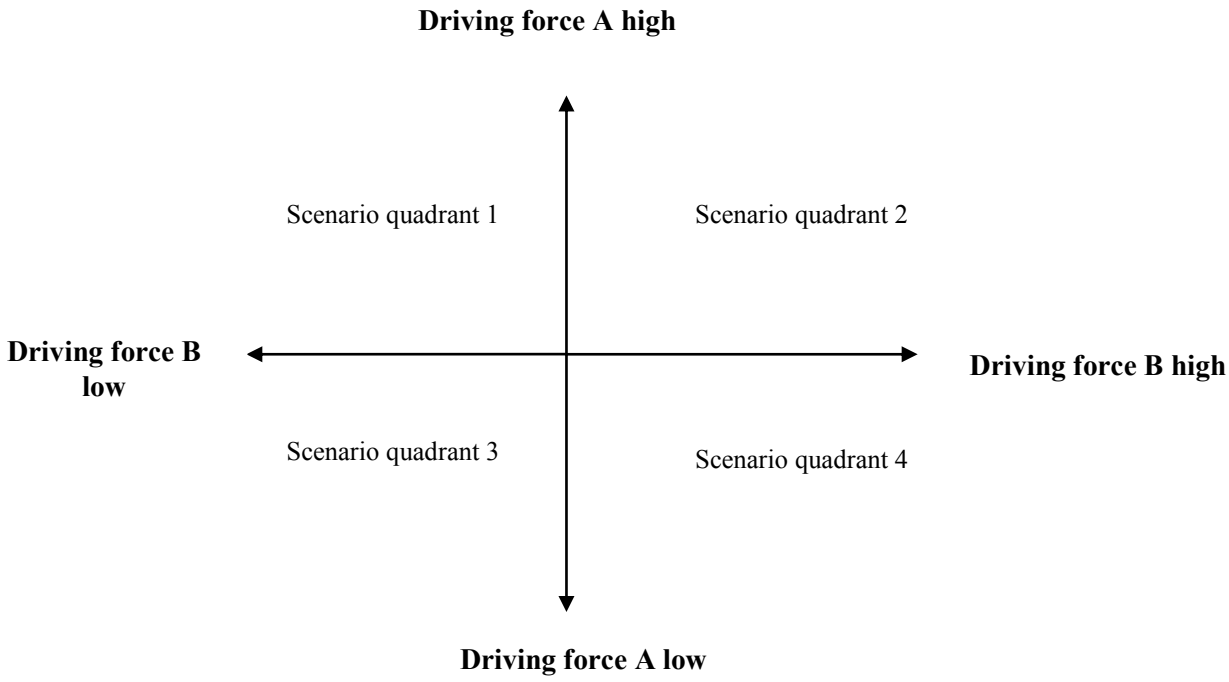

Figure 1: 'Scenario axes as a starting point for scenarios' as described by van't Klooster and van Asselt (2006, 18).

In van't Klooster and van Asselt's description the development of driving forces is represented using *comparative indicators* (ibid, 21). For example, a driving force called 'climate change' can develop into 'little climate change' or 'strong climate change'. Equally the economy as a driving force may take the form of 'economic growth' or 'economic decline', thus also turning quantitative elements into qualitative change.

In this study of how scenario axes are applied in practice, the driving forces finally chosen to serve as scenario axes were generated following a long and structured debate between scenario process participants, involving several expert consultations (ibid). This lengthy and systematic process of reaching a consensus about what driving forces to use was thus based not only on which driving forces were relevant for the particular scenario process, but also on which driving forces were evaluated as the most important forces 'out there in the real world' by the majority of participants in that study.

Thus a systematic approach is dependent on consensus among participants about which driving forces should be considered most important. Van't Klooster and van Asselt, however, point out that literature on the use of scenario axes assumes there is 'an ultimate rationale behind the construction and application of the scenario axes... [and] because the scenario axes approach is assumed to be a kind of standard method, the choice of the two axes and the actual usage is hardly explained in foresight studies' (ibid). This, however, obscures any understanding of the methodologies used by practitioners, and often hides a 'discrepancy between formal rhetoric and actual performance' (ibid, 19). Nevertheless, they conclude that scenario axes help people to think about the future in a systematic way. According to the authors, consensus about the content of these scenario axes is not always necessary or possible, but participants involved in scenario creation can reach compromises on these issues so that scenarios can actually be produced. Finally, combining two driving forces deemed important in such a scenario model is described by scenario theorists as an advantage because 'seemingly unrelated data can be made operationally useful' (ibid, 18).[137] Thus creating scenario models based on specific driving forces is mainly a systematic but also a flexible and undetermined process which depends on the context and interests of the creators.

[137] The authors draw upon, among others, Ringland (2002), Schwartz (1996) and van der Heijden (1996/2005) to argue this point.

4.7 Research as a driving force: value-based scenario axes

Compared with the systematic and consensus-driven approach to scenario axes described above, the project organisers at the RCN were not asking for agreement among all participants about which driving forces should be used collectively. Choices about scenario models and the driving forces to be used were left to the six groups. In this way the number of possible results of this activity was increased.

However, the participants had been reminded by the facilitator to focus on the three topics: society, technology and research, and to consider a certain plot in which research supports the development of ICT. Again, as with the simultaneous opening and shaping of the future conducted in the collection of driving forces, a similar movement was unfolding. Providing space for different choices made it possible to conceive of many different scenario models which could be chosen for further development. At the same time, the topics announced by the facilitator and the request for specific plot-thinking made it clear that the participants were to focus on specific topics for their scenario models.

When I decided to observe group five they had already settled on using the scenario axes model and were about to discuss which driving forces should be used to illustrate uncertain but important developments. One member of the group, an RCN employee, asked for research to be included as a driving force in the scenario axes. He argued that research would be one of the most uncertain driving forces and reasoned: 'What is most uncertain is most interesting.'

A second participant suggested assigning 'values and attitudes' to the second axis. Another RCN employee claimed that 'individuals' and 'values' are connected, and everybody agreed on this. [138] This conclusion was based not on assumptions about whether these elements could be seen as decisive for future developments but rather constituted a limited agreement within the group that 'research' together with 'values and attitudes' could create an interesting combination. Thus, this was less a systematic process of eliminating the other driving forces collected, or else an assumption that these two forces could have an important future influence 'out there'. The

[138] From the author's notes 16 September 2004.

participants of this group were more interested in the creative possibilities of this combination of 'seemingly unrelated data'.

The suggestion to use research as a driving force because its outcome was uncertain was made by an RCN employee. His suggestion made research a central subject in the creation of scenario models within this particular group. In this respect he shaped the content of the discussion for this group, while at the same time carrying out his responsibility as an employee of the project owning organisation to ensure the relevance of the participants' contributions.

Group five drew this preliminary scenario model:

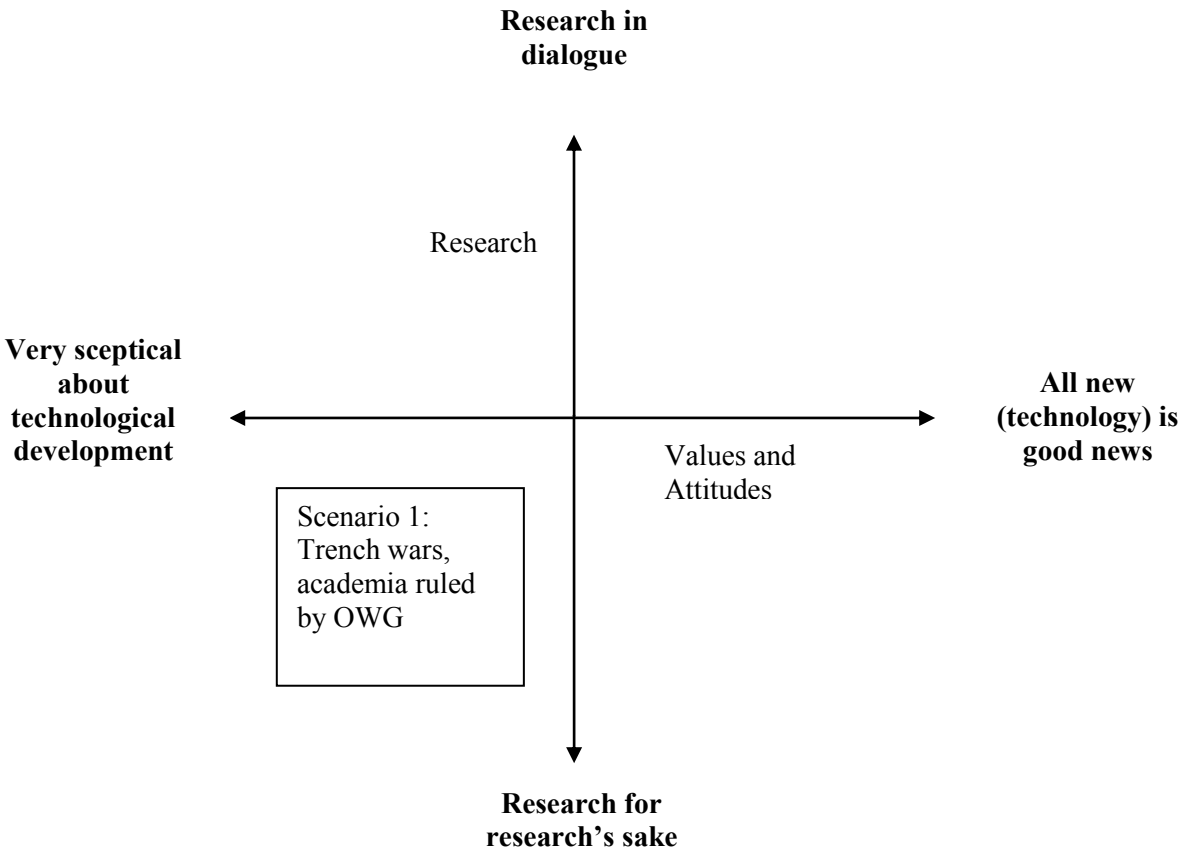

Figure 2: Scenario axes developed by group 5 during the exercise. From author's notes 16 September 2004.

While they were creating the model the group discussed the scenario axes related to surveys about scepticism regarding research and public understanding of science and technology: 'The more knowledge people acquire about science, the greater the scepticism,' one group member explained. The horizontal axis 'Values and attitudes' was meant to describe people's feelings about technological development. On the left, the most extreme attitude was being sceptical about every new technological development. On the right, all innovations were embraced simply because they represented something new. Both attitudes represented possible directions the driving force 'values and attitudes' could take in a research/value scenario.

Research was defined as a driving force that could develop in two possible directions: 'Research in dialogue' described a reality in which interdisciplinary environments thrive and a continuous dialogue is maintained between society, researchers and industry. 'Research for research's sake' described an endpoint at which research is conducted in isolation, separated and aloof from society. This was a first possible mini-scenario combining two driving forces causally and temporally. Following an intense discussion the group managed to fill one of the four scenario quadrants with content before they ran out of time. In the lower left quadrant they inserted two phrases: 'trench wars', and 'academia ruled by Old White Guys' (OWG). The group reasoned that if research were to become increasingly fragmented and applied research lost funding, at the same time as society became increasingly sceptical about technological development and research in general, then research groups would start a trench war against each other. The research population would diminish into a homogeneous group of privileged professors guarding their own fields and excluding others.

'But what kind of research are we talking about here?' one group member asked: 'This scenario model is not about ICT anymore, I'd say.' The RCN employee who had proposed research as a driving force for the scenario axes asked: 'How dependent is ICT development on this development in research at all? Is there an obvious connection?'

Following the collection of driving forces described as 'anything that might influence the future', the facilitator had asked participants to connect driving forces to technology, society and research. He had also asked them to accept a given relationship between research and ICT by asking them to imagine possible futures based on the question: How is research conducted to support ICT development? As I have shown, group five worked to combine research, technology

and social values in a scenario axes model. They linked ICT development with people's values and attitudes and connected research to the question of how visible research could be in a society dominated by such values, and what might happen if research and social development drifted further apart. Yet in creating this scenario axes model, the participants found it difficult to adhere to the facilitator's requests. There was no obvious connection between research and ICT development in the model, and so the question emerged what research they were actually talking about. Technology, as one participant observed, disappeared completely, thus highlighting the question about the role research was to play in this scenario model.

There was no time left to further discuss the relationship between these factors and their potential as driving forces, since at that point the facilitator asked them to start on the next, and final task of the day.

4.8 Ascribing collective responsibility

As the participants were trying to understand what they had created, the facilitator gave them the next task, which required them to develop a *scenario narrative draft* based on the scenario models they had created. The six groups were now asked to develop two drafts each, based on the driving forces they had chosen. The drafts were supposed to match a range of criteria all deemed indispensable for a 'good' scenario – they were to be 'believable, plausible, internally coherent, entail some surprise and be strategically relevant'.

The assignment of this final task led to discussion among the groups and in the plenary. One participant asked the facilitator to explain again the final use of the scenarios to be developed. Another participant wondered aloud how to develop scenarios from the models which could match *all* these criteria. A third group member questioned the previously accepted requirement to write scenarios covering the topics society, technology and research. He asked the facilitator: 'How can you so easily connect social development with ICT research? This connection does not seem obvious to me.' One of the other participants affirmed the validity of this question, while another nodded. 'Then why did you use them in your scenario axes?' replied the facilitator.

The prevailing uncertainty among the participants about what they were about to create was addressed by the facilitator in his final response. The participants had focused on research,

technology and social development because they had been asked to do so. The group I observed had expressed interest in creating scenario axes which combined research as a driving force with people's values and attitudes. The facilitator's final reply stated that although accepting an invitation to this foresight project had implied agreement with the chosen approach and process, it was up to the participants to decide on the limits of this agreement. He thus asserted that they had been free not to follow the requests and task descriptions. The fact that they did so was their own responsibility.

Based on the initial agreement expressed in the invitation to this scenario process the participants were accommodating to the convention of listening to those organising and steering the process. The request to include research as a driving force in a scenario model was therefore considered as part of this agreement by the participants. Since tasks and requests contributed to coordinating the process, they could render other possible perspectives less relevant. This did not mean that the participants' interests had to be congruous with those organising the process. Yet they shared responsibility for the outcome *collectively*, even if their interests were different from those inviting them. Thus the facilitator implied that it was the participants who were now shaping the future scenarios. Using elements he had proposed meant agreeing with the organisers about the importance of these issues. If they expressed uncertainty, it was not the organisers' responsibility to convince them of the value of their work. Thus responsibility for the quality of the scenario models and the implications for scenarios narratives was transferred to the participants.

The characteristics the facilitator presented as constituting a good scenario draft demanded a high level of narrative competence. The scenario drafts to be produced had to comply with a certain standard format that foresight professionals had invested in and had thus made part of the scenario method the participants had agreed to follow. However, the uncertainty expressed by the participants about the coherence and relevance of their scenario models for the scenarios to be created was not alleviated by stipulating more criteria for their activities. This proliferation of scenario criteria to be followed by the participants was rather an overload of resources to be used and thus increased uncertainty about how to create good scenarios.[139]

[139] See Callon and Law (2005, 217) and this thesis, Chapter 3, subchapter 3.6, on proliferation as a strategy to impede calculation by providing an overload of calculative resources.

4.9 Conclusion

In this chapter I have discussed ethnographic moments observed during the first participatory workshop in which driving forces were collected and ordered and scenario models and drafts created by about forty participants, among them nine Research Council employees. My argument is that opening and shaping the future happens simultaneously, through the social and spatial ordering of heterogeneous materials as well as through temporal conditions such as real time, randomness of thought and the perspective on time as elongated present. These coordinating activities raise issues linked to responsibility, value and uncertainty.

Ranking and representation were coordinated through the invitation to the participatory workshop. As I argue above, the invitation was part of the specific collective assembled in this process, working as a coordinating device which defined the preconditions for engagement by stating *with whom*, *why* and *how* the foresight project would be conducted. People representing the interests of their professional organisations were selected for invitation via *ranking* based on the esteem they had aggregated. However, in order to create equivalence between participants those invited were asked to represent only themselves, so that their contributions could be ordered as equally valid during the process and thus produce 'undetermined, dynamic and creative' interaction.

The collection of driving forces was based on an open approach, asking for actors, factors, events and trends, and thus combining forces deemed to act 'out there' with the individual perspectives of the participants. Here I have argued that this is an ordering of values based on dynamic and creative coordination during the process but also on agreements made prior to and limited to this specific process. Later, however, the participants were reminded that they were supposed to use research, technology and social development as important elements in scenario models and drafts. In agreeing to contribute to the process, the participants accepted that they would incorporate the organisers' perspective in their engagement. Uncertainty about the assumed connection between these elements was evaluated by the facilitator as an issue of responsibility, and he reminded the participants that it had been up to them to employ these topics, i.e. that they were basically free to use what they wanted. Uncertainty about the assumed coherence of ideas and about the value of the scenarios to be created did not lead to increased

creativity and engagement but was turned into an issue of responsibility. As I have shown in this chapter, notwithstanding the dynamic 'working of the mind' in brain storming activities and the multiple perspectives on possible driving forces in scenario creation, here the participants' contributions emerged, though not exclusively, as an effect of coordination.

5 WRITING SCENARIOS

This chapter discusses the writing process in a foresight project, focusing on collective writing as an important stage of scenario development. It is here that the collective work on scenarios moves from a relatively open approach, mostly conducted through coordination, and enters the phase in which concrete results have to be produced in order to achieve an outcome. Thus the process increasingly involves negotiating different scenario ideas, ordering them and incorporating them in the final texts. The first research question I asked in the introduction is especially important here: How does the interaction between stakeholder involvement and the need for a result useful to the organisation produce future stories?

When writing scenarios actors deal directly or indirectly with the features of foresight which identify it as an emerging political technology. They are faced with having to address the future in a *systematic* way, to use *competence* in their approach to the future and to ensure the relevance of the scenarios for further or parallel processes, connecting thus forward-looking to forward-acting. Furthermore they need to be attentive to emerging *unintended effects* of collective scenario development which could be potentially useful as well as defining the relationship between *technology and society* in the scenarios. Attending to all these features in scenario development is part of the process of ensuring that foresight constitutes a legitimate approach to the future under conditions of uncertainty. The requirement to produce coherence by limiting scenarios to a specific number, form and content (van Notten 2005) underlines the complex challenges of writing scenarios.

According to Wright (2005, 7) the role of text and language in the creation of scenarios is an area which still receives insufficient attention within social studies of future-oriented processes. In the conclusion to his thesis on discontinuity in scenario creation van Notten (2005) proposes the writing phase of scenario creation as an issue for further research (ibid, 171). The focus in his thesis is on the usefulness of different methods for discontinuity-oriented scenarios. In his detailed and comprehensive analysis he defines language, ideas and texts as products of applied methods (ibid, 126). The more refined and focused the method applied to the task of creating

discontinuity-rich scenarios, the more successful the outcome. Writing scenarios, however, is seen as an undetermined and dynamic activity with unforeseeable effects. According to van Notten the process of negotiating and writing might have 'inspiring or impairing effects, depending on other factors' (ibid, 124–5). Hence the process of writing future stories remains open to opposing interpretations. Since his study was not able to determine whether the writing process 'diluted' the ideas collected in earlier stages or made them more 'sophisticated', he concluded: 'It is unclear exactly what the nature of the writing and negotiating process was and so we categorise it as a double-edged factor' (ibid). However, as I will show in this chapter, it is especially during the phase of scenario writing that the potential of a foresight process and its relevance to other strategic processes is determined.

It would appear from my overview of the relevant literature that there has been no qualitative case study concerned with the production of scenario texts including the stage at which the writing process is negotiated.[140] The literature addressing the writing stage of scenarios is mainly prescriptive and discusses possible or optimal approaches depending on which areas these scenarios are meant to inform, i.e. strategic planning, research policy or public debates on future technologies.[141] Negotiating the writing of scenarios is clearly situated in the concrete context of each scenario process. Therefore generic knowledge about this particular stage of scenario creation is often only distributed within the organisations concerned and does not reach the wider professional and academic research arena.[142] The contribution of my study is to open those moments to investigation.

Owing to the lack of studies addressing collective writing in scenario development as highlighted by van Notten (2005) I have sought inspiration in work analysing processes of organising and managing information emerging from ethnographic studies of collective and organised writing. The issue of collective writing was addressed by Callon (2002) in his study of management tools in tourist and business service organisations. The collective writing and rewriting of management tools such as questionnaires and handbooks involves both company employees and their customers responding to services. Callon argues that firms today are 'faced with a tension between greater complexity and simplification' (ibid, 192). He states that

[140] For ethnographic studies of foresight in public policy see Dobbinga (2001) and van't Klooster (2007).
[141] Van der Heijden (1996/2005), Ringland (1998, 2002), Gaβner and Steinmüller (2005).
[142] See the RCN's evaluation report on the foresight process (RCN 2006a).

encouraging the 'exchange of information among increasing numbers of actors', 'facilitating negotiations that lead to compromises' and allowing 'the possibility of mobilising novel resources' are all part of what he calls a demand directed at the service sector to 'allow complexity to proliferate' (ibid). In Callon's account complexity needs to be 'managed and controlled', ensuring that 'actors can be supervised and controlled'. He argues that the complexity of market and customer demands is met by collective writing and rewriting of texts which simplify complex demands through 'successive adjustment' (ibid). Thus while customer service needs to be more complex – i.e. more responsive – these complex demands need to be simplified by writing devices.[143]

In the case of foresight about ICT research at the RCN the requirement for a more complex approach towards research policy development was expressed in the suggestion to allow a 'wider than normal debate about priorities, empowering more parts of society in relation to the national research agenda'(Arnold et al. 2001, 118). Yet the scenarios in the ICT foresight project were to be produced as specific texts within a short timespan (about four weeks between September and October 2004). Writing scenarios in a group involved both individual and collective action and specific coordination. Callon's analysis of complexity in collective writing processes is relevant here because, like Thévenot, he addresses the 'tension between the collective and the particular' (Thévenot 2002a, 55), what Callon (2002, 193) calls the 'conventional dichotomy between collective and individual action'. Callon's focus on the work of writing itself, 'highlighting the collective, negotiated, and distributed nature of the work' (ibid), can offer a perspective on how and by whom a scenario text is produced.

While the process of writing future narratives has received little focus in ethnographic studies of foresight, several authors within the sociology of expectations have addressed how promising stories about the future, powerful 'ideographs' such as 'technological progress' as well as 'breakthrough motifs' drive investments in R&D and new product developments (Deuten and Rip 2000, van Lente 2000, Brown 2000). These studies address expectations and promises in

[143] In the introduction to *Complexities: social studies of knowledge practices,* political philosopher and STS scholar Annemarie Mol and John Law (2002) contend that there is a long history of reducing complexity by simplification. However, they argue, complexity and simplicity are not necessarily opposites, but relate to each other in different ways. The main point it that we should not reduce complexity to a single order, but study how multiple orders, or 'orderings' exist alongside each other. This is also an argument made by Thévenot when he talks about multiple orders of worth justifying for example different solutions for a road.

both written and oral form and are not concerned with the concrete textual products resulting from these interactions. What makes Callon's perspective interesting for the analysis at hand is his focus on the *transformations and adjustments of specific texts* instead of dispersed negotiations of both written and verbal expectations. Thus his perspective contributes to studying the shifting allocations of responsibility in a writing process concerned with creating bounded and coherent textual material.

The scenarios had to be relevant for subsequent processes and hence needed to be texts useful for organising 'action that is both framed and open' (Callon 2002, 201). *Complexity* emerged here as the requirement for creating collective scenarios representing the perspectives of the project's many participants. Complex scenarios were required in order to reflect the participatory activities involved in scenario creation, as well as possible socio-technological changes to be met in the future. *Simplification* in this process, on the other hand, was needed to relate the scenarios to strategic research development and make them readable and relevant for potential users outside the foresight project. Simplification can thus be related to the question of the scenarios' relevance for subsequent processes such as research programme and strategic development. Still, the question about how to ensure strategic relevance of the scenarios was in itself a complex issue. In this respect, this particular differentiation between complexity and simplification is one way of showing how the future is opened and shaped during the scenario writing process. However, particular issues of uncertainty, responsibility and value distinguish these processes from the collective writing and rewriting of management tools as described by Callon.

5.1 Collective writing and authorship

In the preceding chapter I discussed how driving forces and scenario models were created collectively in a participatory process involving about forty invited research and industry representatives as well as employees of the Research Council of Norway. The process involved specific coordination, which created a broad variety of contributions but also specific moments of uncertainty. In this respect the two-day workshop was a specific way of performing collective foresight. Now, transferring the collected ideas, post-it notes, scenario models and digital texts to the writing stage included a reduction of the collective from forty to ten people. This also included new ways of coordinating, negotiating and producing scenarios.

The new process emphasises the activity of writing rather than collective brain-storming, ranking and discussing ideas. Organisation theorist Barbara Czarniawska-Joerges (1992) has studied the collective writing of municipal budgets. She suggests distinguishing actors involved in collective writing in the public sector from the romanticised view of the author as the powerful creator of a work and suggests calling them 'writers of texts' rather than 'authors' (ibid, 227). In her view, calling public sector employees involved in collective writing authors 'blinds us to the fact that the world is full of "writers", who, in writing their "texts" *reproduce social reality* rather than *creating* it' (italics added). Collective writing is teamwork, uniting people in an 'organised effort' (ibid).

Czarniawska-Joerges thus proceeds from the assumption that a writer in a public institution does not create something new even though he or she is an autonomous actor. I want to argue that these distinctions are not quite as clear as that. Assuming responsibility for certain writing tasks, such as meeting reports for instance, allows the writer to order information in certain ways differing from the report of the same meeting written by someone else. Writers can thus also be considered creators, whether they act collectively or individually.

Callon (2002) does not draw this distinction between the writer and the author. In the collective writing of stewards' handbooks (ibid, 206–7) both employees and customers contribute to the text; the customers by evaluating services and suggesting improvements. As Callon argues, it is precisely because the customers write that their responses can be taken into account (ibid). Therefore no company employee or managing director would claim single authorship of the texts.

When discussing the activity of writing in a group of about ten people at the RCN, I want to reopen the question of author versus writer in scenario development. My main argument here is that the formal challenge of scenario creation is to avoid reproducing social reality as it is and instead to materialise alternative future realities on paper and screen. These collective efforts are informed by the workshop material and all the perspectives which enter the discussions on the production of alternative scenarios. How different futures are created depends on how the scenario writers coordinate and evaluate the collected material and on the different possibilities for ordering this material into narratives. Scenario creation thus includes both writing and authoring. Re-introducing the notion of the author in scenario writing I want to draw attention to

the particular activity of scenario writing, which includes narrative competence, yet which produces neither science fiction nor municipal budgets nor service handbooks.

In the scenario writing process at the RCN the starting point for the creation of a small set of coherent narratives was the textual material gathered in the participatory workshop. When workshop material was transferred to a writing group the stories to be developed were still meant to reflect the collected ideas in a justifiable manner. However, the members of the writing group were, if not the source of the texts, actors in their own right. They were transforming drafts into stories and shaping the scenario material as they saw fit. Transferring workshop material to a writing group thus simultaneously transforms and redefines collective authorship.

In the scenario process the writing of scenarios was assigned to a core group including RCN employees responsible for the success of the project as well as invited participants, some of whom had attended the preceding workshop activities. Transferring collective authorship to a limited number of scenario writers brought back issues of *representation* which had to some extent been controlled during the workshop by asking the participants not to represent any organisational or sectoral interests. This request was not a premise for the writing process. Whether the writer here was a RCN employee, a former workshop participant, an external consultant or a facilitator was not regarded as an issue for either coordination or negotiation. Authorship within the writing group thus implied representation, since requests to disregard representative agendas and interests were not made.

A reason for this disregard of questions of representation and specific influence in the writing process could be the assumed value of writing as reflecting *ownership* (Callon 2002, 207). In any respect the Research Council of Norway was the rightful owner of the results of the foresight project. This ownership, however, had to be negotiated throughout the writing process to reflect the foresight project's ambition of including many perspectives and receiving support from external stakeholders.

Callon (ibid) suggests calling writing '*a contract that binds three types of actors together*: the firm, its employees, and its customers'. He argues that this contract is never complete, but that it is a device for coordinating different actors. The idea of an incomplete contract binding different actors together is useful when addressing the writing work in the foresight project on ICT research. There was a common yet not explicit understanding among all participants about the

fact that the scenario drafts collected from the six workshop groups had to undergo revision and transformation by a limited number of actors to become fully-fledged scenarios. However, this understanding worked only in the context of this novel undertaking, a foresight project organised by the RCN focusing on the future of ICT research. In a different context, such as, for example, evaluating the strategic relevance of a specific ICT research area, the same actors might have resisted or rejected this specific way of coordinating textual production.

This perspective on collective writing as a contract that is never complete reflects Thévenot's concept of coordination and convention as a 'limited agreement about selected features people use to control events and entities' (2002a, 83).Within this limited contract specific scenario tools, such as important scenario criteria and preferred plots, would become not only writing devices but also ensure that the participants contributed to the process, i.e. enrol them in the process (Callon and Law 1982). The idea about writing as a limited agreement or incomplete contract between different actors can thus serve as an underlying perspective on the ethnographic moments I will discuss in this chapter. The discussion will show how competence, responsibility and engagement within the writing group were negotiated accompanied by a prevailing uncertainty about how to produce relevant scenarios.

5.2 The shift towards different competencies and responsibilities

On 27 September 2004 eleven people gathered in a meeting room at the Research Council's headquarters in Oslo. Most of them had participated in the first two-day workshop two weeks earlier. Some workshop participants who were not members of the RCN's project group had been invited specifically after the workshop to help write the scenarios. Present were the project leader, the external facilitator and the RCN's senior advisor, who had played an important role in organising the process. Three more RCN employees represented the areas of ICT research, innovation and media and communications. Two workshop participants were present: a representative from the Business Association of Norwegian Knowledge- and Technology-based Enterprises (Abelia) and a consultant working at ECON, now Econ Pöyry, part of the global consulting and engineering company Pöyry Plc. I was present, having been invited to observe the writing process following the participatory workshop events. Finally, two new external

consultants had joined the project. The facilitator introduced them as ‘the production personnel from the factory’ who had been asked to help write the scenarios.

This was a new constellation of people in the foresight project. The participatory workshop group of about forty people had been called the ‘scenario group’. The group responsible for the process of ensuring results was called the ‘project group’. The creation of a third group within the process of the foresight project implied that now different competencies were sought than those that had played a role in the ‘open and creative dialogue’ between the RCN and invited ICT experts. Among the ten people present (excluding the observer), five were RCN representatives who were responsible for the success of the project and/or the development of the new large ICT research programme. Some of these employees were involved in existing ICT programmes or projects within the RCN. The two workshop participants invited to the meeting could potentially verify the legitimacy of the writing process and vouch for the continuity of the dialogue between those who had contributed ideas at the workshop and those about to start employing these ideas in narratives. The two external consultants introduced at this stage by the facilitator were to help create texts from the material collected at the workshop. In the course of several meetings during the following weeks, this group was to develop the scenario drafts into stories which were to be used at the second workshop in late October 2004.

This was not only a new stage in the process of creating scenarios but also a new combination of competencies. This combination was a result of the need to produce coherent narratives which could be used at the second and final workshop where all participants were asked to discuss and suggest strategic possibilities based on the scenarios. Now it was important to combine the ideas collected at the first workshop into a few scenario suggestions which could be developed into finished scenarios, i.e. to move from a complexity of ideas towards a few narratives. Each of these texts would be limited to a certain number of pages in which a coherent and relevant scenario had to be created. This new collective, responsible for the writing process, would decide about scenario content and form and deliver results. Although the project organisers never referred to this combination of specific competences as a group different from the scenario group or the project group, I have chosen to call this new collective constellation the ‘writing group’.

5.3 Ordering scenarios

The facilitator together with the project leader and the senior RCN advisor had had two meetings prior to the present meeting in which they had analysed the existing material and tried to synthesise the collected scenario ideas. Now the facilitator, leading the meeting, introduced the day's work: 'Today we are going to produce scenarios. We are going to create products!'

One external workshop participant asked: 'How are these scenarios meant to be used? Who is the target audience for these scenarios?'

Both the facilitator and the project leader answered that these scenarios were supposed to inform the new large ICT research programme, VERDIKT. They should address the future of ICT research, focusing especially on the question: 'How will research be conducted?' The scenario process should provide general strategic recommendations. The scenarios were supposed to be 'strategic scenarios for ICT research'. As another RCN employee confirmed, the target group was the RCN organisation, and the scenarios were intended to support 'better and more long-term decision-making'. [144]

Assigning this distinct role to the scenarios as tools in strategic research programme development shows that the ambitions of the project group were focused on a specific project result. The members of the writing group responsible for the success of the project, especially the project leader and the process facilitator, declared the RCN their primary target audience. Yet the scenarios were not intended to be read just by RCN employees to influence existing ways of working within the organisation, but also to contribute visibly to strategic planning and programme development. Indeed, the facilitator underlined that the writing of scenarios was not as open, creative and process-oriented as collecting ideas had been during the participatory workshops, but instead clearly directed towards producing results, creating 'products'.

The facilitator presented the result of two previous meetings with the project leader and the RCN senior advisor in which they had condensed the ideas proposed by the six workshop groups. The three project group members had identified five themes from the collection of ideas and scenario drafts. Groups 1 and 6 had been evaluated as coming up with the same main idea about 'surveillance' and a 'warden society' in which the need for security leads to new ICT

[144] All quotes and data from author's notes at the first meeting of the writing group at the RCN on 27 September 2004.

solutions. Group 2 was identified as having contributed the idea of a ‘user society’ in which ICT research is completely user-driven and geared towards entertainment. Group 3 had contributed the idea of a ‘competence society’ in which research priorities are made on a national basis geared towards improving competence among all citizens. Group 4 had focused on the regional aspects of social and technological development. Finally, Group 5 had concentrated on developing their idea about researchers being out of sync with the rest of society and living in an ivory tower, indifferent to social developments around them. In addition to these main themes, ideas representing discontinuity had been assembled under the heading ‘Wild cards/other ideas’. These were, according to the three project members who had systematised the ideas, not relevant enough for the creation of scenarios (see Figure 3).

The scenario drafts developed within the six groups during the workshop were clearly shaped around distinctive themes. However, the selection of the main ideas in each scenario draft had been made by the three group members centrally responsible for the outcome of the foresight project. They had further reduced complexity by merging the ideas from two groups into one topic. They not only presented the five main ideas derived from the scenario drafts, but also suggested possible ways of combining these five ideas into three scenarios. Thus ideas expressed in the participatory workshop by six groups had now been ordered. The main ordering into three scenarios was presented on one PowerPoint slide and presented to the group by the facilitator.

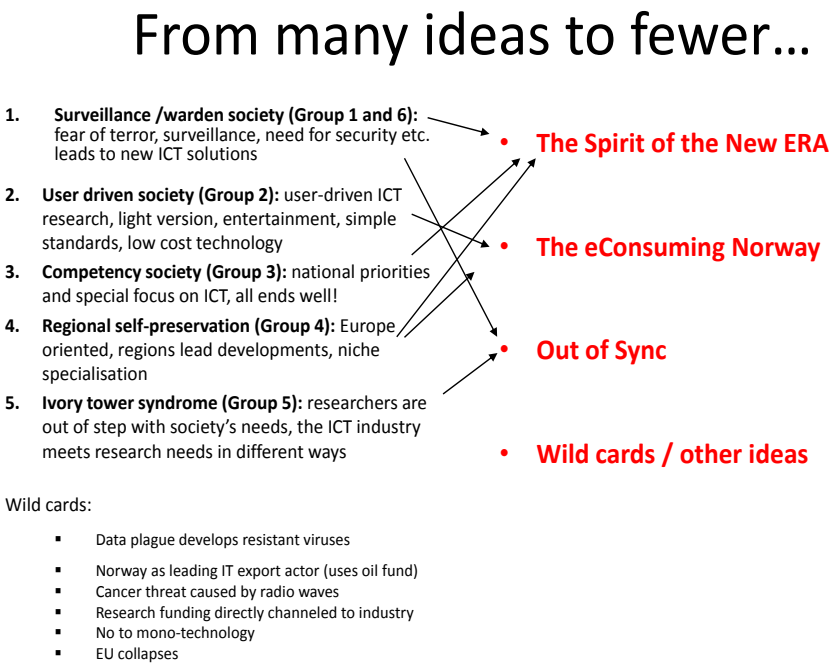

Figure 3: The synthetisation of six scenarios into three, figure developed by facilitator.

The facilitator presenting this ordering of ideas argued that the five scenario drafts could easily be compacted into fewer scenarios. His suggestion was to combine the existing scenario drafts into three scenarios, called 1) 'The Spirit of the New ERA', 2) 'Infosumption' and 3) 'Out of Sync.'[145]

Elements from scenario ideas 1, 3 and 4 could be combined to create a first scenario called 'The Spirit of the New ERA'.[146] This was a title the facilitator had come up with in the preceding meetings with the project leader and the RCN senior advisor. In this scenario, ICT development would become part of a state-governed strategy giving priority to national research. He argued that the title of this scenario would create a 'marketing effect' for the RCN. He called it the 'wet dream' of ICT research policy.

[145] Figure 3 was part of a PowerPoint presentation presented to the writing group on 27 September 2004. Unpublished.

[146] The use of the abbreviation ERA was a word play denoting both the beginning of a new epoch in Norway and the European Research Area (ERA) founded by the EU in 2000 – hence the capitalisation. See also http://ec.europa.eu/research/era/index_en.html (accessed February 2010). Böhle (2002) argued that foresight can help to define research priorities at the European level and inform the development of ERA.

Elements from ideas 2 and 4 could be combined into a scenario focusing on consumerism, short-term solutions and applied ICT research. Finally, the facilitator reasoned, elements from scenario drafts 1 and 5 could form the basis for a scenario showing the entire ICT research community as out of step with social developments and concentrating entirely on basic research without considering societal needs. Thus the five workshop scenario drafts were now ordered into stories that were assigned different roles in a larger story about ICT research policy. By condensing them into three scenario drafts the project leader, the facilitator and the RCN senior advisor had given the contributions of the workshop a specific value within the further process. Reducing the number of scenarios from the original six into three could thus be seen as a mechanism of simplification.[147]

This successive adjustment of a broad range of scenario ideas and drafts thus shows a simplification mechanism (Callon 2002, 193) necessary to create products. However, simplification and complexification emerged at the same time as the writing group became aware of the need to create scenarios that would support better and more long-term decision-making and inform the new large ICT research programme, VERDIKT. The three group members thus also made the original scenario drafts the workshop participants had contributed more complex. Even without having observed the meeting in which the three group members conducted this work it is still possible to show the underlying understanding which helped produce these three scenario suggestions. Making the original scenario drafts more complex entailed creating meaning from a spectrum of ideas which would only *produce relevance* for policy processes outside the foresight project in *specific combinations*. The six original drafts already contained elements of well-known policy approaches to socio-technological futures, such as the 'competence society', the 'user-driven society' and the 'security society'. Yet by combining these ideas into three scenarios the texts to be created were given specific value in the overall coordination of the foresight project. In this respect Callon (ibid) argues that 'the process of

[147] The development of three scenarios in foresight is disputed in foresight literature. Whereas some authors argue that only a sufficient number of scenarios, at least four, can adequately represent the uncertainty of the future, others doubt that more than three or four scenarios can actually provide relevant input to strategic discussions because of the sheer volume of ideas included. Futurist and scenario practitioner Joseph Coates (2000, 117) suggests working with 4 or 6 scenarios to avoid the 'temptation to choose a middle one'. Policy analyst and strategic scenario planner Riel Miller (2007, 344) argues that an ordering of scenario ideas into *three* different scenarios is one of the most popular and widely used approaches in scenario creation. He proposes different rationales for such triangulations and discusses whether we can see archetypes of value ordering behind them. One of the three archetypes he suggests could also illustrate the differentiation used in the RCN's scenario project group. Miller calls it: 'The good, the bad and the ugly' (ibid).

complexification and the multiplication of narratives is at least partly a strategy of power that cannot be fully understood without exploring the mechanisms of simplification on which it depends'. As I will show in the following discussions, rather than seeing the shaping of scenarios as strategies of power I work from the assumption that simplifying and complexifying scenario texts are also strategies of responsibility and engagement.

5.4 Negotiating competence, technology and uncertainty

The three group members' suggestion about the ordering and content of potential scenarios had to be evaluated by the rest of the group. None of the workshop scenarios was originally thought to represent either positive or negative developments. This, however, now seemed to be an emerging issue.

The external participant from the consulting company questioned the central role of the state in scenario one:

> Now I am not a technical person and am not qualified to talk too much about this. But there is this one scenario that seems too positive – the state intervenes and tidies up. Isn't this a bit too optimistic?

The participant expressed his uncertainty in contrasting ways. On the one hand he doubted he was competent enough to challenge this scenario, i.e. possessing enough competence in foresight and scenario development. Yet he also expressed his uncertainty about the idea which proposed a research policy with one strong actor, the state, as the preferred one. He evaluated it as too positive and too optimistic, thus questioning its plausibility. His remark was not discussed further, however. The facilitator asked the group to respond to the remaining two scenarios. These were eventually evaluated by the group as being 'too similar'. Yet they did not question the number of scenarios in relation to their content. Instead, they agreed to work on differentiating the two scenarios.

This was also part of the result- rather than process-oriented coordination of writing work which the facilitator had asked for at the start of the meeting. The ordering and combining of the workshop scenario drafts into three scenarios with distinct titles clearly indicated which values should be visible in the three scenarios and thus reduced the number of alternative arrangements

of the ideas collected. The scenario suggestions reflected the interest of the central actors in the project group in steering the strategic discussions following the scenario process in specific directions.

The first scenario called 'The Spirit of the new ERA' suggested positive policy solutions. This was expressed by the facilitator's remark about a possible marketing effect for the RCN, clearly targeting ICT research policy. This scenario received the most resources, incorporating ideas from three scenario drafts, while the other two scenarios received ideas from only two drafts (see Figure 3). Indeed, having received the most resources and having presented first with a clear idea about *why* this scenario was important 'The Spirit of the New ERA' emerged here as the favourite. In this respect, the writing group was asked to approach scenario development as 'not only forward thinking but also forward acting' within a given order of value materialised in the suggested order of the three scenarios.

The forward-acting feature of foresight was clearly present here. Directed activity, such as the suggestion of specific scenario titles and contents, could not be achieved in a collective setting involving forty participants. This had to be conducted in a smaller setting in which organisational and project interests were more clearly represented. Issues of people's ranking and representation, such as those addressed in the invitation to the workshop, were rendered irrelevant here by the collective yet limited agreement to create products. Thus ideas about the future of ICT and ICT research were now being shaped in a certain way. The following ethnographic moments show how this initial ordering of scenario ranking, content and number was interspersed with prevailing uncertainty about competence, responsibility and engagement during the meeting.

At the start of the writing process, the facilitator had managed to reach agreement about concentrating on three scenarios and channelling the resources of the writing group into developing these. Nevertheless, various members of the group continued to express uncertainty about the writing group's competence to create these scenarios as well as about how to represent technology in them. Throughout the meeting the group kept coming back to the fact that scenarios 2 and 3 were still too similar to be useful as distinct scenarios for alternative future developments. One participant suggested producing a new and entirely technology-driven scenario. Another asked whether the group should consider the possibility of ICT disappearing

completely? The facilitator responded by challenging them to be even more creative: 'We need ideas which transcend boundaries here. We still have not identified the real changes.' The project leader wondered: 'Maybe we do not have enough imagination? Maybe we need to go out and find other people to gather more exciting ideas? Maybe all this isn't really technology-driven?'

Although the group had initially agreed to work on three scenarios, two group members now suggested *new scenarios* – one entirely technology-driven scenario, and one in which ICT had 'disappeared'. Apparently, the participants were still unsure about the role of technology in the scenarios presented, implying that it should either become an issue in its own right in a technology-driven scenario, or that a technology-free scenario for the future should be contrasted with our socio-technological present. The facilitator, although acknowledging these questions, replied that they should work towards improving the quality of the existing scenario drafts. In this respect, he redirected the work ahead towards the already established scenario suggestions, instead of opening up the process for new and additional scenarios. At the same time he expected the writing group to transcend the boundaries of what had already been suggested and enrich the present material with ideas 'capturing the real changes'. Although the three scenarios were already shaped by certain ideas of relevance, the content of the scenarios was thus still regarded as open with the potential for surprises.

The project leader, on the other hand, expressed uncertainty about the group's competence and creativity and about whether technology should play a role at all. Most significant here is her question about whether they should go out and find 'other people' to capture 'exciting ideas'. Here she even expressed uncertainty about the entire scenario process, wondering whether they actually needed a completely different approach with different people. In this respect the project leader doubted the *investment already made* in the process. The group did not discuss the remark any further, just as they had accepted without comment the question about the overly positive outlook of the first scenario.

A possible perspective on the lack of discussion of issues such as future competence or the need for additional, technology-related scenarios is to see it in terms of responsibility and engagement in the project. The project leader's doubt about the competence of the writing group was received without further comment because the scenario facilitator provided all the premises for the process during this meeting. By taking charge of the process and *engaging the group*

members in producing results, the facilitator guaranteed steady progress towards scenarios already agreed upon *prior to this meeting.* Responsibility for securing the process was enacted by the facilitator. Therefore basic uncertainty could be expressed by the project leader without causing confusion among the group members about the value of the process underway.

Another RCN employee kept wondering about the status of technology in these three scenarios:

> What is the cause of technological advancement? War is the father of all technologies. We have to search for this connection: 'What drives people's decisions about making a choice between technologies?

Again the question about the status of technology in the scenarios came up but was not discussed any further. The facilitator instead reminded the group to use their creativity: 'Use your imagination. We need more focus on user needs'. He asked them to work in groups using different meeting rooms to accomplish their tasks: 'We have some work to do here. Try to identify the main tendencies and work on them. Some of these ideas are going in the same direction.' The project leader concluded the session by saying: 'If nobody has any major objections, then let's all agree that we will work on these scenarios now.'

Clearly, this meeting was based on a limited contract about achieving specific results within the context of the RCN's foresight project. All the members of the writing group were aware of their responsibility to help this project achieve a successful outcome. Still, various uncertainties were expressed here. The consensus to concentrate on three narratives was interspersed with expressions of uncertainty about the group members' competence and about the number and content of the suggested scenarios. Also, technology as an important ingredient in all three scenarios was felt to be missing, and the participants expressed uncertainty about whether the scenarios would be relevant enough to help develop an ICT research programme. These uncertainties were dealt with by the facilitator, who assumed responsibility for ensuring the continuation of the writing process and whose main focus was on producing results.

What happened to authorship in these ethnographic moments? The facilitator's request to contribute 'ideas which transcend boundaries', to 'capture the real changes, use imagination, identify the main tendencies, focus on user needs' all underlined that the uncertainties voiced would disappear once the writing group had made progress in developing narratives which

transcended established boundaries. Thus the facilitator assigned responsibility to the remaining group members as equally valued contributors to the scenario texts *as long as* they agreed on the suggested number and content of the scenarios. This contract was temporally limited to the four weeks between the first and the second participatory workshop. Yet the agreement between the members of this group was incomplete because responsibility for the process was constantly realigned and redistributed among the group members. In order to come up with the final results the writing group members were expected to be forward-acting and to write themselves out of their uncertainties.

5.5 Proliferating scenario criteria

The ten group members were now divided into three groups, each working in different meeting rooms on the development of one of the scenario drafts. The group I observed consisted of three RCN employees who were asked to work on scenario number 2 called 'Infosumption'. The draft presented in Figure 3 had described this scenario as 'user-driven', where 'big consumer groups' rule the market and industry focuses on short-term user needs.

The group discussed three main user needs: entertainment, self-realisation and health-related services. They exchanged several ideas about the potential users and their needs, but they did not write them down. The facilitator eventually entered the room and reformulated the task to help them produce the story: 'What will 2015 look like? How will we get there? Write this down on this white paper roll; remember we need something for the next workshop on 20 October!'

Here the focus on creating products was underlined. 'Something' would have to be presented to the researchers and business representatives three weeks later in the final workshop when the scenarios were to be evaluated by the roughly forty participants and used as a basis for strategic recommendations. The three RCN employees working on this scenario therefore had to be productive, creative and responsible.

One of the participants found the writing process very challenging. The facilitator explained that there were certain criteria for scenarios which could increase their acceptance with the workshop participants. He wrote these down on the meeting room's whiteboard:

- Concrete examples which people recognise
- Representative and known parameters
- Causality
- Parameters which can be compared (to be used in tables later)
- Use past tense when telling the story

The three RCN employees were asked to follow these guidelines when writing down their ideas on the long white paper roll. The facilitator then reflected on the task he had given them:

> Now I know that you will not be able to do this in one day. But use the white paper and write down some ideas. Then we will have a greater chance of getting some scenarios out of this. We need a supporting scenario idea; we need actors, archetypes and the actors' motivations. We need narratives which can become PowerPoint notes. The form of these scenarios is very important, but also the content. So roll out this paper and start with events, names, etc. You can either start at 2015, or describe how we got there. And we need some extra information here in a little info-box, about public needs.

One of the participants replied: 'Ok, but what do you want us to do exactly?'

The facilitator suggested: 'You could use storyboards, maybe this technique could help.'

'Yes, ok', but what should we *do*?', the participant asked again.

The facilitator replied:

> Don't you have any professional journals? You should write about what a researcher's everyday life is like, what a user's everyday life could be, etc. I don't know if this is of any help, but we need to have something on 2015, how we got there and an extra box with public needs. Are you with me on the main idea here? Then make it grand and beautiful!'[148]

On that note he left the meeting room to assist the other two groups.

This dialogue shows how the negotiation of responsibility within the writing group was closely linked to competence in writing scenarios. In order to help the RCN employees be creative the facilitator added new criteria to the production process. These scenario criteria were a proliferation of different elements such as narratives, tables, PowerPoint notes, storyboards and

[148] Grand and beautiful! – Author's translation of 'stort og flott!'

info boxes. Stories were to be produced based on actors, events, archetypes, actors' motivations and a researcher's everyday life. This proliferation of scenario criteria, however, seemed to increase the group's uncertainty about *how to produce*. The white paper roll was supposed to be filled with ideas matching the criteria laid down by the facilitator. The ideas eventually written down on the white paper roll were supposed to reflect the participants' ability to follow up on the facilitator's requests. Yet the repeated questions asked by the group members showed that they were uncertain about whether their competencies matched the requested 'future literacy' (Miller 2007).

According to Callon and Law (2005) 'situations of non-calculation' can be achieved either by rarefaction or by proliferation of calculating devices. This ethnographic moment shows that scenario development included calculating devices which were added to the process, such as representative and comparable parameters or causal narrative relationships driving a story towards a presumed outcome. Concrete material elements included PowerPoint presentation slides and a long white paper roll on which the scenario was to be presented. Yet what did the facilitator's proliferation of scenario criteria bring about? Did his suggestions and requests exceed the limited agreement among the writing group members to produce specific scenarios? The aggregation of scenario criteria was here meant to open up the scenario to new ideas and was thus an attempt to introduce undetermined, dynamic and creative forms of scenario texts. Proliferating scenario criteria in this situation eventually became an issue of responsibility which affected the group's work on the scenario.

5.6 Competence and calculation: an unfortunate coincidence

After the group had started working as the facilitator had told them to, one employee had to leave for a meeting with his department. Now there were two RCN employees left. They started by agreeing on a time line from 2004 to 2015.

They rolled out the white paper roll over the entire length of the meeting table, covering about three meters and then drew a time line across the entire paper roll. Then they noted down the dates and wrote down possible actors at the starting point:

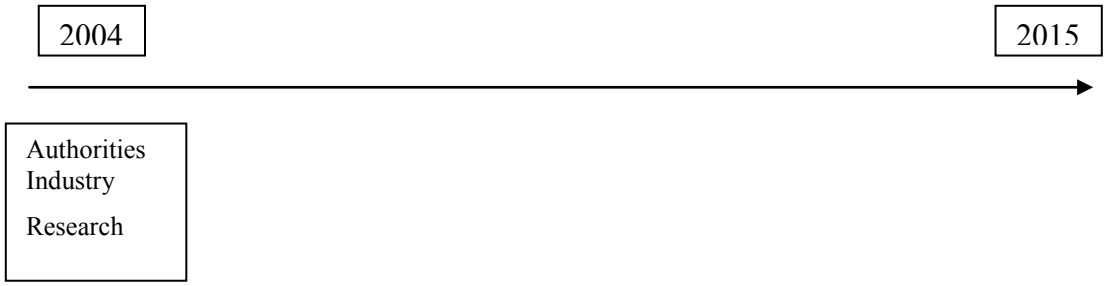

Figure 4: Original sketch on the white paper roll, based on author's notes 27 September 2004.

One participant wondered: 'Maybe we should include the user? Or maybe we don't need to.'

This started a discussion between the two RCN employees about national research policy. 'No government has ever changed research policy', the other participant argued. 'But we have become more user-oriented, have we not?' the first replied. He repeated several times that there was a user out there whom they should refer to. 'The big trend,' he said, 'is that the user wants simple solutions. ICT will become invisible; it is just meant to work.'

After a lengthy discussion about the user, and the power of users to influence technological development, the two noted down some ideas on the long white paper roll. Half an hour later one of them had to leave for another meeting. Now only one RCN employee was left with the task of writing a scenario based on the ideas discussed. They had agreed to write about three different researchers: from industry, from a university and from a research institution each of whom was asking for funding for their particular ICT research area.

The remaining RCN employee sat in the room in front of the long white roll of paper. I sat opposite him as the observer of the process, suddenly confronted with a situation in which I was no longer observing a 'collective' process of writing scenarios, but what my counterpart called 'an unfortunate coincidence'.[149]

'One should not leave two technologists talking to each other', he said to me. 'We really need someone who can tell a story.'

[149] Author's translation of 'uheldig sammentreff'.

The last RCN representative was thus left alone to continue the work of his group. He had no meeting to go to, so he continued writing down ideas on the paper roll while continuously talking to himself. I, on the other hand, tried to remain in my role as observer.

I want to argue that this 'unfortunate coincidence' was part of the collective process in which the scenarios were produced, even though it actually was unfortunate, and apparently neither deliberate nor predetermined. Yet it belongs to the undetermined and dynamic aspects of coordination which, as Thévenot (2002a, 57) states, 'arise from operations of evaluation which actors depend on for the conduct of their actions'. Several elements produced an effect – a single participant working on one of the three scenarios to be used in programme development sitting all by himself (while being observed in the name of research) and trying to materialise a given scenario story based on a plethora of criteria on a long white paper roll.

This unfortunate coincidence was an effect of the interaction between the assumed competences of the participants and the approach stipulated by the facilitator. Coordinating the work among small groups and the fact that this work was conducted in the meeting rooms of the RCN's headquarters – near the RCN employees' daily area of work – added to the calculation of responsibility conducted by the three group members. When two of them decided that their weekly departmental meetings were more important than writing a scenario on a white paper roll, they determined their subsequent actions based on their understanding of organisational responsibility.

Writing a scenario about a future 'user-driven' society, where 'big consumer groups' rule the market and industry focuses on short-term user needs, thus became less important than the departmental meeting happening simultaneously. The remaining RCN employee evaluated this problem by pointing out that they were 'technologists', with certain high-level, but bounded competences. They were in need of 'someone who could tell a story', thus expressing doubt that he would be able to develop this competence in the short span of two hours. In leaving the group, the two RCN employees followed their responsibilities *within* their organisation, thus moving into a setting which was more responsive to their *actual competence*.

Following Thévenot (2002a, 57) I want to suggest that the decision of the two RCN employees to leave the scenario work in order to attend departmental meetings can be seen as a

reaction to the 'real conditions for *effective engagement*'.[150] By presenting a long list of scenario criteria the facilitator had tried to mitigate the employees' uncertainty about writing scenarios. But this had apparently increased their uncertainty, rather than reduced it. At the same time he had questioned the group members' competence to develop creative, yet coherent ideas about the future of ICT research, an area which they would discuss routinely in familiar organisational settings. The future had been presented as open. Yet the *presentation of the future* in a scenario required a considerable number of criteria, more than the participants could relate to professionally. Thus their subsequent professional and moral decision to temporarily leave the scenario work could be seen as openly questioning the conditions for their engagement in the process. However, the fact that two of the group members had left to follow responsibilities which better matched their competencies was not made an issue of discussion within the writing group. It was considered an unfortunate coincidence.

After another twenty-five minutes, the facilitator and one of the writing consultants appeared and started discussing the ideas written down on the white paper roll with the remaining RCN employee.

The main focus of this scenario idea was to tell a story about the ICT user in 2015. The RCN employee expressed his uncertainty: 'My main doubt about this scenario is that I cannot believe the industry is really focused on the consumer. The consumer of ICT today has only limited purchasing power. But what do you think, is it possible to write a story about this?'

The facilitator explained: 'We will write short stories which illustrate a development. So we need to continue to ask ourselves: Are there any important stories we want to tell? Are there important events we should construct to communicate an idea? Keep working on your ideas, Thomas!'[151]

The facilitator countered the RCN employee's uncertainty by expressing continued faith in the scenario writing process. 'We will write, we need to continue to ask ourselves, we want to tell, keep working on your ideas' – all these expressions at once underlined the responsibility the writing group had to create these scenarios and the belief that as an RCN employee 'Thomas' would invest his individual competence in the success of this process. Thus instead of

[150] Italics in original.
[151] All real names are kept confidential.

responding to Thomas' question, he appealed to his potential engagement in the project, asking him to find the 'important events' which could be used to 'communicate an idea'.

The facilitator's request to the participants to continue asking themselves whether 'there are any important stories we want to tell' was meant to help the RCN employee overcome his doubts. However, as Thomas argued, he found it 'hard to believe' that it was possible to write a story about the idea presented by the three project organisers in the scenario called 'Infosumption'. The ideas did not match his expectations concerning the future of ICT industry and user needs. Thus his individual expectations made it difficult to imagine a scenario which to him seemed unbelievable. The RCN employee's competence, technological experience and expectations impeded his commitment to writing a story which might challenge existing ways of prioritising research areas and be considered strategically relevant by the project organisers. The facilitator's reaction to this was to shift the responsibility of the two absent participants onto Thomas' shoulders. The reduction of the group was dismissed as an unfortunate coincidence which was mentioned but not questioned by the writing group. It nevertheless highlighted the possible effects of uncertainty on individual engagement in scenario writing.

In providing this perspective on the process of writing scenarios I do not intend to transfer all responsibility for this course of events onto one or several actors, i.e. the facilitator or members of the writing group. I rather suggest that these ethnographic moments, which are indicative of certain dissonances and contested values, were effects of a combination of many elements, such as the need for coherence and relevance of the scenarios, assigned and transferred responsibilities, uncertainties about future competence as well as the relationship between the social and the technological in these scenarios. Whereas many of these elements are presented here in the form of dialogues, these ethnographic moments were nonetheless distinctively material as well. The long white paper roll representing the demand for creativity, the list of scenario criteria written on the white board representing a certain standard of scenario method and the RCN employees leaving the meeting room all influenced the collective writing process and contributed to the physical evidence of this negotiation of competence and responsibility.

5.7 Increasing credibility by creating equivalences

The ethnographic moments presented so far in this chapter show that the value of scenario work and the investment made in the process were partly but openly questioned. The situation described in the preceding subchapter was just one event in a complex writing process involving different competencies, responsibilities, interests and agendas. Yet it throws up questions about the mutual dependencies between participants' competencies and engagement in relation to scenario creation, methods and criteria used to ensure relevant results. This does not imply that the interests of the three project organisers who had ordered the scenario drafts prior to this meeting contradicted those of the rest of the group. However, by ordering the six scenario drafts created by the workshop participants into the three proposed scenarios, the question about how to ensure strategic relevance of the scenarios was largely predetermined by three people in the process.

Whereas the preceding discussion has focused on the tensions between competence and scenario writing, in the following I will focus on the question of scenario credibility. The next ethnographic moment shows that the discussion about the number and form of the scenarios was based on different perspectives on how to achieve credibility.

The writing group met again on 4 October 2004. Later the same week the project group responsible for the success of the foresight project was to be presented with the three scenarios. At the beginning of the meeting the facilitator underlined the urgency of the work in the writing group:

> We do not have much time left. So far we only have three half-finished products. We need something definite for Thursday. Maybe we should have a 4th or 5th scenario, so that the project group can identify better with the results. They should be able to choose from what we have created here.

Now it was the facilitator himself who expressed uncertainty about the three scenarios. They were only half finished, and the facilitator saw their completion as a race against time. This expression of managerial uncertainty represented quite an unusual event in the ongoing negotiation over the creation of scenarios. So far it had been the participants who had voiced their uncertainties. When the project leader expressed her uncertainty about whether they had

chosen the right process and the right people, the facilitator's focus on creating products had ensured that her uncertainty did not unsettle the project underway. Now, however, the facilitator himself questioned openly whether the number of scenarios would achieve enough credibility with the members of the project group who had not participated in the writing process. It became a question of whether they should be presented with additional choices rather than with three clearly established scenarios.

The RCN's senior advisor agreed to create more scenarios: 'Yes, that sounds reasonable, since we are producing as much as we do in advance.'

Here the importance of the writing process in relation to the first participatory workshop was underlined. The writing group was producing three scenarios which combined different ideas collected in the workshop into new narratives. These three scenarios were produced *after* the participatory workshop, but *in advance* of the upcoming meeting with the project group. The writing group was thus faced with a *double justification challenge*, facing first the foresight project group and later the participatory scenario group at the final workshop. One way of achieving acceptance might be to increase the number of written scenarios, giving the project group the choice of *more than three scenarios*. The facilitator thus wanted to keep the number of scenarios open, somewhere between the 'original' six and the 'negotiated' three. This, the facilitator argued, could enable the project group to 'identify better with the results', i.e. create equivalence between the work of the writing group and the expectations of the project group.

However, the facilitator's question was not followed up in the subsequent discussion. Again the expression of uncertainty about the relevance of the three scenarios was fully accepted as a legitimate question. Yet on no occasion did these uncertainties lead to any move to create additional scenarios.

The question of credibility did not stop at the challenge entailed in justifying the number of scenarios in the project group meeting the same week and the participatory workshop two weeks later. The writing group had to consider a third evaluator of scenario credibility, the Research Council, and specifically the people who would be expected to respond to the scenarios by including them in decision-making processes. This was negotiated as a question of *form*.

The writing group had started discussing the different formats of the three stories they were planning to present. The facilitator underlined the importance of having a visual impression of the scenarios.

The RCN's senior advisor agreed but argued that the RCN as an organisation was very much based on text. 'We need text. This will increase the status of the scenarios with the decision-makers.'

The facilitator replied: 'Well, I do not think we should write memos. That would be too boring.'

'Of course not,' the senior advisor agreed, 'we will create something quite different to any bureaucratic memo. But those who make the decisions are used to text. They need text as the base.'

'Agreed', the facilitator replied. 'But then we need both, visuals and text. Let's use pictures, text, and finally a model, something like a multiple scenario axes model to condense the ideas.'[152]

Not only were the scenarios to be evaluated as credible by the project group. The senior advisor pointed out that the RCN as the commissioning body was the ultimate evaluator of the scenarios. The process of writing scenarios had to be coordinated so that *actors outside the foresight project* could identify with the results, such as the line management of the three divisions of the RCN and the three boards overseeing the three divisions (Jenssen 2007, 411). As the senior advisor stated, the basic requirement was textual presentation. Thus in order for the scenarios to be considered as credible as any other presentations in a decision-making process, the writing group would have to invest in *textual form*. Then the scenarios could qualify for evaluation among decision-makers.

The discussion about the *presentation of scenarios* between the facilitator and the RCN senior advisor shows that opinions about what the scenarios should represent differed between members of the writing group at this point. Whereas the senior advisor was anxious to ensure the scenarios could be used as *instruments in strategy processes*, the facilitator saw them first and foremost as *condensed representations of creative ideas*. Whereas the senior advisor emphasised the need to ensure the credibility of the scenarios in relation to his organisation, the facilitator also wanted to

[152] The three scenarios were later presented as visual stories on 31 PowerPoint slides (see RCN 2004b, under the link: 'scenarier').

ensure their credibility in relation to existing scenario criteria. This also underlines the various responsibilities the two group members had to meet. In this case it was the senior advisor employed at the RCN who had to assume responsibility for creating equivalences between the presentation of the scenarios and the most commonly accepted form of presentation in the RCN.

At the same time, the text had to *conform to scenario criteria* established by the facilitator, such as recognisable examples, known parameters and discontinuity of expected developments. It was within the realm of responsibility of the foresight facilitator to ensure that the scenarios complied with a certain standard of acceptable scenario narrative. These different ways of creating scenario credibility show that there were different conventions regarding scenario relevance in the RCN and scenario credibility within the community of foresight professionals.

Having agreed to use *both text and visuals* as credible forms of scenarios the facilitator asked one of the two external consultants invited to join the writing group to contribute statistics about ICT expertise in Norway.

'We need some central parameters organised into tables which show the status for 2004.'

The senior advisor responded enthusiastically: 'Yes, that's what people would like here in the RCN.'

So the perspectives of the between RCN employees and the facilitating manager on the credibility of scenarios did not necessarily have to be different, they could also overlap. By including scenario criteria deemed necessary by the facilitator, such as 'central parameters', in the scenarios, the RCN employees would be able to 'identify better' with the result of the scenario process. Although tables do not represent linear text, the parameters included would link the scenarios to the present and serve as concrete examples which people could recognise. Parameters showing the status for 2004 could be presented as facts, current knowledge which decision-makers could relate to just as well as they could to textual form.

This discussion about the form and number of scenarios within the writing group shows the increasing complexity of negotiating the writing process and the prevailing uncertainty about the scenarios to be produced. First, there was uncertainty about the number of scenarios and whether they could achieve enough credibility with stakeholders outside the writing group, such as the project group, the workshop group and the RCN as the commissioning organisation. Second, the

writing group also had to make strategic investments in scenario form to ensure acceptance of the scenarios on the part of those who would use the scenarios in processes related to decisions on ICT programme development. Furthermore there were the ideas expressed by the workshop group of about forty people who were going to read the scenarios at the final workshop. The scenarios would have to resemble at least some of these ideas, in order to be deemed credible collective achievements. Negotiation about these issues was thus a *coordination of elements people could identify with*: recognisable ideas, known parameters, freedom to choose between several possible future developments and textual presentation. In this sense the writing group needed to create equivalences between the scenarios to be created and the assumed expectations of the RCN employees, scenario group members and workshop group participants.

5.8 Scenario content: strategy versus technology

Thus by creating equivalences which people could identify with, the scenario work done by the writing group could achieve value and credibility with stakeholders, i.e. the people directly involved in the process and the decision-makers outside the foresight project. However, deciding about the form and number of scenarios was only half of the work the writing group had to conduct. Following the discussion on the number and form of scenarios, the facilitator raised the matter of scenario content:

> The parameters should really be the central ones; like brain gain, mobility, etc. But we also need to use our imagination and not only rely on statistics. We should try to show discontinuity of trends and the like. We also need to attend to some ideas from the workshop. People need to recognise their work! So we need elements from what people did in the workshop. But we need more on research and technology. What social needs can be met by technology? The scenarios should provide us with a better basis to discuss these things.

Now the writing group was back at the issue of the relationship between ICT, research and society in the scenarios. The scenarios were meant to present coherent narratives about research, technology and social needs and provide a basis to discuss these relations. The narrative itself was supposed to inspire a discussion which could lead to better quality research priority-setting. Thus, although strategic thinking was not supposed to be part of the narrative, it was meant to *be induced by these narratives*. How could this be achieved?

The RCN senior advisor voiced his uncertainties regarding the content of the scenarios:

> I still find it difficult *to be specific* in these scenarios. How much strategy talk should be part of the scenarios? How can we direct the reader towards what we want to achieve?[153] We do not write technological foresight. But based on the specific characteristic of a scenario *we should be able to say something reasonable* about social challenges and needs. The two questions are: How should ICT research contribute to the innovation system? And how can ICT research contribute in society? For instance, how can ICT protect intellectual property, protect the weak in society and contribute to the flow of information? [italics added]

The question was now how to order the most important elements of scenario content and relate them to each other. Technology was not to play a central role in the scenarios, and if it did play a role, then only an indirect one. The challenge was to say 'something reasonable' about social needs. Thus the RCN senior advisor valued social needs as the most important elements to be included in the narrative. But these needs should not be met directly by ICT, but rather by *ICT research*. According to the senior advisor, ICT research was to have a central role in serving these social needs. He mentioned several examples, such as research on property questions, social welfare and the flow of information. In this way he tried to strengthen the focus on ICT in the scenarios without writing technological foresight.

The facilitator replied: 'We have had this discussion all along. We have decided to write policy scenarios.'

The advisor insisted on his view: 'But we should not write scenarios which sound like telephone books. We want to start a discussion about how ICT can solve problems! This should be our explanation why the RCN should have a big ICT programme!'

According to the senior advisor, the biggest problem about these scenarios was how to be 'specific', i.e. integrate specific content, specific stories into the textual form. This content was to be 'reasonable' and directive at the same time. The scenarios were meant to start a discussion about research priorities and at the same time act as a narrative justification for establishing a new and comprehensive ICT research programme.

[153] In Norwegian: 'Hvordan kan vil legge ut lokketråder?'

In the view of the senior advisor, writing 'policy scenarios' could lead to an enumeration of policy tasks, a long list of priority issues ordered as equally important and equally relevant much like reading a telephone book. Such lists rarely inspire discussion among decision-makers. The advisor was thus eager to ensure that the ordered relationship: *ICT research solving social needs and challenges* was made clear in the scenario narrative. This ordering of values would make sure that the scenarios would be considered relevant for the development of a large ICT programme.

The facilitator, however, disagreed with the focus on strategic content proposed by the senior advisor: 'That is true, but we also need to work on our technology focus. The focus on technology is weak. It needs to be clear in each scenario. Our consultants here have to help us with the technology focus.'

In the view of the facilitator, the contributions from many participants working in ICT research and industry, had not delivered enough technological focus. To amend this problem the writing group could use the hired consultants. The remark made by the facilitator about the technological expertise of the two invited consultants throws up questions about the relationship between the expertise of the approx. forty workshop participants and the expertise of the two assisting consultants in the writing process.

According to the invitation the expertise of the workshop participants derived from their sectoral affiliation had not been sought. This agreement had also ensured that the participants could not pursue their 'own agendas' based on their expert sectoral knowledge during the workshop. They had been asked to display their 'competency and creativity' while ignoring their representational status and to make *open contributions* that addressed the areas of social development and research challenges rather than technological areas. Now, however, during the writing stage, the uncertainty about the status of technology in these scenarios was to be resolved by bringing in consultants especially to improve the technology focus. They were there to 'help' the writing group. This also delineated their role in the process. To help, to *assist* would be less controversial than having *new participants ranked equally* with those involved in the process of contributing their ideas about ICT development based on their sectoral and representative interests. The three workshop participants in the writing group were stakeholders in the process on a par with RCN employees. Their technology focus was thus not to enter the scenarios

directly, since this could be interpreted as pushing their own agendas. If the scenarios needed more technology focus, the issue needed to be introduced by external consultants, not by potential users of the research strategies emerging from the scenario work. A technological focus should thus enter the scenarios *by way of consultation* and not *representation*.

Finally, there was one more important issue on content raised by the senior advisor. He pointed to the role of the scenarios as narratives which should lead to organisational insight:

> Strategically the RCN needs to find out where our competencies overlap and what we need to focus on. Can we achieve that at all? What do we need to do to stay in the game internationally? We need to understand what is going on. Right now we have 10–12 different ICT programmes. This is really frustrating. The new big programme is supposed to integrate these. How should we think holistically? We need to have an overview. We need a strategic dialogue in the field of ICT.

The facilitator replied that the role of the scenarios was not to talk about strategic issues directly. He cautioned the senior advisor:

'We should not talk about the RCN directly, only indirectly.'

The advisor, however, repeated his request: 'The RCN consists of many talented people with specialised competencies, but we are not able to work across our fields. The scenarios have to address how important interdisciplinary work is in the RCN!'

The comprehensive foresight project, consisting of five participatory projects on future key technologies, had been launched as a response to the criticism raised in the international evaluation about organisational work habits in the RCN. The scenarios thus needed to be credible in relation to this international evaluation and the subsequent proposal to use participatory foresight to renew organisational thinking. In the light of this responsibility to answer the challenges raised by the evaluation, the development of the large ICT programme VERDIKT was directly linked to questions of how work was organised in the RCN.

According to the senior advisor, integration and interdisciplinary work were two important issues the scenarios were supposed to address. This request, expressed by the senior advisor, was not discussed any further, however, since this meeting of the writing group had come to an end.

5.9 Conclusion

In this chapter I have focused on the process of writing scenarios. This is a stage in scenario development which is difficult to access ethnographically because in practical terms it is not possible and for most research purposes not interesting to watch individual people writing texts or preparing PowerPoint presentations. Here, however, I have tried out a different perspective and studied writing as a collective process. The production of a few coherent, relevant and innovative texts about the future of ICT research was the main desired outcome of a project which had to be completed within a few months. This chapter has been about the selection, ordering and transformation of written, printed or digital material that would eventually become scenarios with clearly defined boundaries, such as length of scenario text and primary target audience.

Scenario writing differs from brainstorming or 'brain writing' exercises in participatory workshops. In collective writing a large variety of unconnected ideas, preliminary models and incomplete drafts are ordered by a small group of actors chiefly responsible for the successful outcome of a foresight process. But how is the demand for more complexity in the development of research priorities met by scenario writing?

The material collected in a workshop involving about forty ICT experts from many areas of research and industry had to be transformed into scenarios relevant for the RCN as an organisation and for the development of a new large ICT research programme. The level of complexity aspired to in the creation of the scenario narratives depended on the small group of writers responsible for transforming the workshop ideas into stories.

What this chapter has shown is that the demand for complex, i.e. participatory and creative scenarios was an ongoing negotiation of responsibility and engagement within the writing group. This negotiation about how to take on responsibility and be engaged in this process raised questions about competence, representation and scenario credibility – all discussed under conditions of uncertainty about the content, form and number of scenarios.

Whereas Callon (2002, 214) argues that collective writing is partly a strategy of power, dominated by those who have access to the tools of writing, I chose to study the process using Thévenot's (2002a) ideas about responsibility and engagement. This perspective highlights the specific constellation in the writing group, whose members included not only employees of the

organisation in charge of the project but also invited participants present on a voluntary and unpaid basis, as well as hired consultants. As such there was a mutual dependency which required the RCN representatives and hired consultants to assume responsibility for the writing process, whereas the invited, unpaid experts were expected show engagement in the creation of scenarios. Yet responsibility and engagement were not always evenly distributed. As the discussion of the 'unfortunate coincidence' involving competence and scenario credibility showed, the RCN employees involved in the project may also refuse to take on this level of responsibility and engagement. In other words, being involved in the project simply by virtue of being employed by the commissioning organisation did not necessarily entail using power to shape the scenarios in accordance with organisational interests.

In other words, the writing of scenarios was also an ordering of responsibilities. Three central actors in the writing process, the project leader, the facilitator and the senior advisor had pre-ordered the material from the scenario workshop prior to the first meeting of the writing group. Yet the distinctive value given to the three preliminary scenarios by these three actors was continually questioned, while uncertainty was expressed about the competence of the group members and the credibility of the scenarios. There were, however, no attempts to address this uncertainty, which raised questions about the existing number and content of the scenarios, with any kind of action. Instead, the uncertainty about the value of the scenarios was dealt with by shifting responsibility around within the writing group. Taking, transferring or rejecting responsibility for further action ensured that the status quo – represented by the agreement to concentrate on these three scenarios – was maintained and that the production of specific pre-ordered scenarios would therefore continue.

As the discussions in the writing group showed, the production process was marked by a continuous calculation and evaluation of the process in terms of certain standards and certain pre-established forms and categories. For example, competence within a field was a presupposed standard which was constantly compared with the performance of the writing group. This induced uncertainty on both the individual and the collective level about whether the majority of the writing group possessed the level of future literacy required (Miller, 2007) for writing plausible and credible scenarios.

Thus credibility coordinated the process in which things and people were evaluated with the objective of creating *equivalences across contexts*. Consequently, the scenarios to be produced were drawn in many directions. They were to become valuable by indirectly influencing ICT research policy, as inspirations for new strategic thinking and as representations of an open dialogue between the RCN, the ICT industry and research institutions; in addition, they were expected to inspire changes in working practices within the RCN.

Seeing the production of scenarios as an attempt to create equivalences across contexts can also highlight scenario writing as a political issue. Returning to Callon (2002) it seems that collective writing is at least partly a strategy of power dependent on mechanisms of simplification. The main focus of the writing process had been delineated early on by the facilitator, who underlined that the job of the writing group was to 'produce scenarios, to create products'. Without this focus collective writing would be much more difficult to manage. It is dependent on a contract between several writers about working towards a specific aim, towards a 'common good' (Thévenot 2002a). It is possible to see the selection and ordering of specific scenario ideas into three scenario suggestions by the three centrally involved group members as a 'strategy of power' in which the desired value of the different scenarios, their content and number were predetermined by only three actors. Yet presenting a workable starting point for the writing group was also a prerequisite for delivering a final product, a point all group members had agreed on by participating in the group. Thus central actors took responsibility and showed engagement in the writing process while at the same time partly shaping its outcome.

It is thus this paradox in the relationship between responsibility, engagement and power which is possibly most visible in the facilitator's way of coordinating activities and redirecting uncertainties towards a concrete outcome. As the manager of the process he had to rely on the participants agreeing to follow certain instructions, suggestions and predefined approaches but he also had to perform instant evaluations during the process. This is the point, as Thévenot argues, at which objects and people get deeply connected with morals and politics. As this chapter has shown, such evaluations and decisions can lead to results even as uncertainties prevail and people are temporarily estranged from the process.

6 FORESIGHT AND RESEARCH STRATEGY

As shown in the previous chapters, the writing of scenarios was closely related to the development of a programme proposal for VERDIKT, the new large ICT programme. The ICT foresight project was expected among other things to help 'clarify which research tasks should be prioritised in the future' (RCN 2004d). Yet the scenarios were created almost simultaneously with the development of the programme proposal. This was partly due to the tight schedule, which required the foresight project to be finished by the end of October 2004 while the first programme proposal for VERDIKT was due mid-December the same year. However, processing projects in parallel whereby one is partly dependent on the results of the other is nothing exceptional in planning.[154]

As these two processes progressed simultaneously the scenarios as important contributions to ICT programme development now entered a new context. The process of scenario creation had been based on coordinating openness and relevance, with the writing group producing scenarios relevant to a number of processes outside the foresight project. Equivalences between the scenario texts and other contexts – such as organisational development, research policy and credibility among RCN employees – had been sought while the group also strove to comply with the narrative criteria of scenario production.

While the scenarios were still being finished, the project group also had to consider developing a programme proposal for VERDIKT. This process involved *creating a new text, a new material outcome of the process.* The project group consisted of five RCN employees and five external members. Their tasks were described on the RCN website as:

> … To plan, conduct and conclude the scenario process for the whole ICT research field. In addition to that, the project group is expected to develop a first draft of the programme plan for VERDIKT based on this process. At the same time the group must consider other similar processes, both conducted earlier and currently in progress. The work of the project group will be delivered to the VERDIKT programme board once it has been constituted in December 2004.[155]

[154] The same synchronous approach could also be observed in a case of municipal visioning. Here the visioning process ran parallel to the development of a long-term social plan, which was officially based on the resulting visions (see Jenssen, 2010).

[155] See homepage for the UTSIKT project (RCN 2004b). The tasks of the scenario project group are described and the group members listed on the webpage 'Prosjektgruppen'.

The project group was thus expected to fulfil several tasks simultaneously as well as adjusting and relating the work conducted in both the foresight project and the programme development to 'other similar processes' within the organisation. Since several of the project group members had been involved in the writing process, they knew what stage the scenarios were at and could evaluate to what extent their current form would be useful in developing a programme proposal. But at the beginning of October 2004 the project group was also under considerable time pressure, having been given only a month after the conclusion of the scenario process to finalise the first programme proposal.

With the project group responsible for developing a research programme, values other than the openness and relevance of the scenarios now became important. As management scholar Per Dannemand Andersen and STS scholar Mads Borup (2006, 6) write in their work on strategy processes and foresight in research councils and national research programmes: 'In the mediating arena between politics and research, the managers (both civil servants and council/steering committee members) of the research programmes are in a situation where they must secure appropriate strategy development for the programme'. In addition they

> ...shall address questions on how the subject area of the programme shall be described and understood [...] and [they] must consider which information and areas of experience should be employed to develop the strategies, who shall be involved in the strategy processes, and which methods and approaches for the strategy developments are practically feasible, appropriate, fair and suitable given the programmes and the position of the related parties. This also includes questions about how legitimacy and accountability for the programme are ensured and about which interests and needs need to be satisfied, for example, in order to maintain support for the programme.

Dannemand Andersen and Borup describe here not only the different responsibilities of research programme managers and developers, but also the *different types of evaluation* these people have to perform. Within these evaluative processes the specific material outcome –a research programme – must meet different demands. In this respect, writing a programme proposal – like writing scenarios – is a coordination process in which the actors involved seek to create equivalences across the different contexts and task areas. Here, too, methods and approaches are applied according to whether they fit certain criteria.

After describing the different kinds of evaluation entailed in research programme development and research strategy processes Dannemand Andersen and Borup (2006, 2) discuss applying foresight activities to the priority-setting of research councils and national research programmes. They see research councils as promising places both for taking a dynamic approach to setting research priorities and for implementing new ways of discussing these. Notwithstanding the potentially positive influence of foresight on prioritising research areas, the authors also highlight the widespread uncertainty about how to apply foresight effectively:

> However, there is great uncertainty about how to implement foresight exercises within research councils. A lot of reports from foresight exercises collect dust on library shelves and a lot of foresight practitioners become frustrated when, after finalising comprehensive exercises, they find that their sound recommendations have not been implemented (ibid).

Dannemand Andersen and Borup argue that to counter this uncertainty one first and foremost needs to apply a broader and more up-to-date understanding of strategy in the development of research priorities. They draw on Mintzberg (1994), who writes that strategy is not only an activity related to analyses and planning but needs to be seen in a wider organisational context. Dannemand Andersen and Borup argue that strategy should include a 'learning process or a process of negotiation between power and interests' (ibid, 5). Thus before foresight can play a role in research policy, strategic planning must include organisational learning and transparency in negotiating interests expressed by different stakeholders, such as researchers, representatives of industry and institutional managers.[156]

In line with several other analysts (Rappert 1999, de Smedt 2008) Dannemand Andersen and Borup also question whether foresight is really a 'decision machine' supporting a rational and linear approach to decision-making, or a source of unambiguous recommendations for such processes. They argue that one should address the linear and rational understanding of policy and decision-making critically, pointing out that 'foresight processes might be designed to leave room for negotiations between interests and powers' (ibid, 14).

Apparently, in these recent discussions the boundaries between strategy, decision-making and foresight have become diffused. Instead of considering foresight as an approach *which*

[156] On transparency and the move from authority to authenticity see Brown and Michael (2002a and b). On authority, legitimacy and credibility of foresight see Jewell et al. (2001).

introduces open dialogue and participation into a traditionally rational and linear strategy process, now strategy and decision-making themselves are expected to embrace these values. At the same time, Dannemand Andersen and Borup consider both strategy *and* foresight as processes which should leave room for 'negotiations between interests and powers' (ibid 5, 14). Thus the question remains how foresight contributes to coordinating research strategy and developing research programmes? As Brown et al. argued back in 1999 foresight can become less significant if its material results (such as scenarios) are not considered vital to priority setting, but are merely considered additional information:

> There are assumptions that decision- and policy-makers, if they are rational, will gather and use the information produced by Foresight exercises; however the observed relations between information and decision-making are not as easy or as clear as the classical theories of decision-making predict. Foresight as output or as mere information (documents, reports, etc.) can be understood as some of the data that decision- and policy-makers need to become more informed, and would thus have the same loose relationship with decision-making that information in general has (ibid, 13).

The optimistic perspective on the role of foresight in research policy presented by Martin and Irvine in 1989 has thus been modified during the last twenty years, often with the underlying argument that the results of foresight are difficult to evaluate immediately after their conclusion (Dannemand Andersen et al. 2007). Rather there are long-term impacts and effects which can only be measured from a distance, at which point it is difficult to trace a direct relationship between positive effects and foresight as the explicit contributor. This thesis discusses the concrete textual outcome of the foresight project on ICT research in the RCN in 2004 and thus does not include other results, such as networking effects or long-term influences. The results of all foresight activities combined in this project may have produced long-term effects, but to analyse those is outside the framework of this study.[157]

[157] The RCN has initiated and funded several foresight activities following this process, especially in the area of regional development (see also RCN 2009c). Large scale strategic foresight focusing on the development of the RCN itself, however, has not been conducted since.

6.1 Evaluation and convention

Scenarios are texts produced to 'qualify for evaluation' (Thévenot 2002a, 57) and the way they are evaluated in other contexts again reflects how actors achieve coordination of important issues, such as research programme development in the field of key technologies. These negotiation processes themselves give thus new insights into the practice of governing public research funding.[158]

To discuss the evaluation of the scenarios as contributions to the development of the research programme proposal, I would like to use a different approach to the practice of research policy and strategies than that suggested by Dannemand Andersen and Borup (2006) above. Instead of looking at these evaluations as expressions of either rational-analytic responses to foresight, or as 'negotiations between powers and interests' I want to discuss them within the context of *conventions as coordinating negotiations in policy development*. The second perspective on conventions provided by Thévenot (2002a, 2006) explains conventions as 'channelling uncertainty through a conventional formatting of events'. By drawing on Thévenot's second perspective on conventions I argue that each coordinating activity also involves acceptance of what cannot be considered relevant.[159] At the same time this acceptance is part of the negotiation process, because not all members of a collective will subscribe to such acceptance immediately. It is coordinated but also 'grounded on the common knowledge that there is no hope for a more complete alignment (which is assumed in classical group collectives)' (Thévenot 2002a, 83). I want to argue that using the concept of convention as developed by Thévenot shows that coordination does not only rest on creating equivalences across people, processes and contexts with the aim of producing relevance. It also involves negotiating what is considered *irrelevant*. It is exactly this evaluative operation which both expresses but also recreates conventions, i.e. common forms of evaluation in research policy.

The question for the project group was to what extent the scenarios in their existing form and content could be considered relevant for developing the programme proposal. This question was

[158] This specific perspective refers back to Callon (1987, 83) who proposes to study technology not as a problem which has to be fixed, but as a tool for sociological analysis, which 'would enlarge the methodological range of the social sciences'. The study of foresight can thus not only broaden the perspective on the practice of research policy, but also contribute to enlarging the methodological range of the social sciences with the future as an additional dimension.

[159] See discussion of convention theory and Thévenot's specific perspective on conventions in Chapter three, subchapter 3.5.

dealt with in three meetings which will be the focus in this chapter. The project group met on 5 October 2004 to prepare the first proposal for the new large ICT research programme. This meeting took place a day after the second meeting of the writing group discussed in the previous chapter. The next meeting, on 7 October, involved the writing group, including the facilitator and the invited consultants who were now developing and differentiating the three scenarios further. At the last meeting of the project group before the second participatory workshop, held on 12 October, a consensus about the three scenarios had to be reached.[160] This consensus was necessary to enable a discussion on research strategies at the final workshop gathering of 30–40 invited participants, which took place on 21 and 22 October. The way the scenarios and the writing work itself were evaluated by the project group shows how the particular expectations about the value of the scenarios were met.

6.2 The need to become specific: evaluating relevance

On 5 October 2004 the project group reassembled to prepare a proposal draft for the new ICT research programme. Six people attended the meeting, which was headed by the leader of the foresight project. In addition, two RCN representatives from the Division of Innovation, who had also participated in the scenario workshops, were present. The three RCN employees were joined by a professor from the University of Trondheim, a representative from Siemens and a representative from Simula, an ICT research laboratory in which the Norwegian government is the principal shareholder. These latter three group members represented the external expertise that the project drew on to ensure that dialogue took place between research programme managers and the future users of the new large research programme, such as public and private research institutions and the industry.

The project leader opened the meeting by informing the project group that there were only a few weeks left to agree on a programme plan. The RCN board needed to have accepted the plan by December 2004 in order to meet the deadline for funding applications on 15 February the following year. The research communities had already been informed about the final date for sending in applications, but they had not yet been informed about *what* they could apply for.

[160] See appendix 9.1. for overview over attended meetings.

Thus while the VERDIKT programme already had a deadline for applications, its content was still to be produced and depended on many parallel processes, including the scenario work.

The project leader announced the agenda of the meeting:

> Today we need an open discussion about the programme. We have the scenarios, and we have you as a peer group to help us shape this programme. But we need to become more specific. We cannot simply wait for the scenario project to deliver results. Today we need to agree on some written results from our meeting.

Here the priority was clearly to produce a specific material outcome that day. Delivering the programme proposal needed to become the top priority, whatever the final outcome of the foresight project. At this point the project leader judged the scenarios not to be sufficiently relevant, although she was, of course, aware that they would be improved. This was a calculative operation: in order to reduce the risk of delaying production of a programme proposal the value of the scenarios had to be disregarded at that point. Given the tight schedule the entire project group had an interest in working to produce specifics, rather than focusing on scenarios that did not have to fulfil the same criteria.

The group discussed how to relate ICT research, the core of the programme proposal, to policy-related questions. One policy issue was *the question of utility*. The technology to be fostered by research should be useful and widely applicable. This, however, was deemed to contradict the requirement to fund basic ICT research exploring new areas and new combinations which could later be developed into applied research. The group discussed whether priority should be given to basic or applied research.

'We have to be able to document the general utility of this new programme', one RCN representative said. 'We need to pursue policy challenges regarding new research. This has to be a part of the new programme.'

'The tension here is to what degree we can use one technology in different sectors. Should the scope of application determine the value of research on ICT?' another participant asked.

'I would think so', an external participant replied. 'ICT's only justification is its being useful for something else! There is a big risk in starting a research programme that is too ambitious.

However, if we only pursue application then the programme will not be ambitious enough! We must also pursue more general challenges.'

So the first value discussed by the group was the usefulness of the programme. Creating a large-scale research programme ought to add something new to existing ICT research programmes. Policy challenges were, according to an RCN representative, the most important justification for the programme, and the first policy challenge mentioned was the usefulness of ICT in different sectors. However, this was also posed as a question. Should the degree of application determine the value of ICT research? The third participant argued that applicability alone would not justify the usefulness of the programme. Instead the programme should justify ICT research as useful *and* ambitious. So both useful ICT research and 'more general challenges' were to be addressed by the new programme. Only then could it be considered meaningful. Here at least two values were being kept in play simultaneously, usefulness and ambitiousness, which were associated with applied and generic research respectively.

By contrast with the scenario writing, here the project group addressed policy, strategy and ambitions openly, since the programme proposal was expected to reflect their choices. Nevertheless, the discussion topics were similar – utility and the social uses of technology. Here, however, any uncertainties about how policy and strategy should be addressed in the finished text were expected to be resolved. Whereas the RCN senior advisor had wondered how to 'direct the reader towards what we want to achieve' in the scenarios,[161] the programme proposal was expected to express priorities discussed and decided upon by the project group members.

To produce the programme proposal, specific content had to be negotiated. In the discussion of the research programme proposal the group members' interests were closely related to the organisations they represented. The task of defining the 'general areas of challenge' thus appealed directly to the project group's various areas of expertise and their organisational responsibilities. As such the programme proposal would reflect a combination of individual perspectives and the priorities derived from each participant's representational expertise. Unlike the open and future-oriented scenarios, the programme proposal needed to become a text representing the reality of research priorities decided on the basis of individual *and*

[161] See Chapter 5, subchapter 1.8.

representative expertise. The question remained what role the foresight project would play in the development of the proposal.

After discussing generic versus applied ICT research, the group then addressed the question of how to ensure democratic participation in the process. An RCN employee wondered:

'Should we already point towards important areas? Or should we invite people to engage in an open process in which they can make suggestions about what might be important in two to five years? Maybe that should be a part of VERDIKT.'

An external participant replied: 'That means we would have to challenge people's imagination. That is always difficult. We should not let VERDIKT become a programme into which all ICT research is stuffed and then called a "big programme". We need to find out what is to be included and what excluded from this programme.'

Having talked about usefulness and ambitiousness the project group now discussed yet another value that was to be reflected in the final programme proposal – participation. One group member expressed uncertainty about whether the programme could be justified if the important research areas were identified by the group members alone. Representative authority was here weighed up against participative authenticity. This was also an evaluation of the work conducted in the foresight project. The project group had invited about forty ICT experts from academia and industry to contribute ideas about important future research areas in a two-day workshop. Here the participants were asked to make creative suggestions, provided they did not represent sectoral or organisational interests. Now, however, one project group member considered in addition to the participatory process they had already conducted a new 'open dialogue' to discuss a shorter time-span (two to five years rather than ten to fifteen). The idea was that by reducing the time-span the participants would become more intensively involved because their expectations concerning the future would be more tangible. The second group member, however, rejected this idea, responding that to challenge people's imagination was a difficult task. A further objection was that too many perspectives would make the programme unwieldy, so clear boundaries needed to be established. By emphasising that 'we need to find out what is included and what is excluded from this programme' the participant reminded the group of their collective responsibility for the task of writing a programme proposal. Assuming responsibility for a list of

tasks was an important convention to adhere to. As members of the project group they needed to be able to justify their group mandate.[162]

This is another interesting move in evaluating the relevance of the foresight project in the process of writing a research programme proposal. Following the open discussion of strategy and policy issues one group member now regarded an open dialogue as relevant to the question of research priorities to be made for the next two to five years. Yet instead of pointing out that they had already conducted such a dialogue, investing in its form, in equal participation and in an open approach, the group member's response was to say that thinking about what research areas would be important over the next two to five years would require too much imagination. The scenario workshops were not mentioned. The open dialogue conducted in the scenario process remained thus outside the collective coordination of the programme proposal. In other words, it was made irrelevant. In the context of developing research programmes this was also an indirect evaluation of the usefulness of collective long-term thinking.

The third and final topic in the discussion about developing a programme proposal specifically addressed the value of the scenarios for programme development.

'Let's talk about content again,' one of the external participants said. 'Let's look at two perspectives:

> VERDIKT is a big umbrella programme with distinctive research areas focusing on either application or technology. We have not got any further with this discussion. Or:
>
> VERDIKT is a supporting vision, and then we just organise things in an efficient way. We already have some visions in written form, for example the vision on 'Wireless future' created by the Telecom Company, or visions produced by the EU commission, like 'Ambient Intelligence' and 'Information society for all.'

'Well,' an RCN representative reasoned, 'if VERDIKT is to represent an increase in quality, then calling it an umbrella programme would not be very helpful. We need to wait for the scenario project to come up with results before we can produce a vision. This programme needs to be much more than just the sum of everything we have done so far.'

[162] See also Law (1994, 90) about being 'under pressure to create performances and offer justifications'.

As an umbrella programme VERDIKT would show clear prioritisation in favour of specific research areas. This implied complex negotiations of priorities in the project group within a short time-span. If, however, the ICT programme was intended to be a 'supporting vision', then scenarios or visions could become important. But the scenarios being developed by the writing group were not mentioned by the first participant. Instead, he referred to other, already existing visions based on technology as the driver of social change.

The RCN representative, however, adhered to the original expectation that the quality required would emerge from the foresight project. As *a promise of increased quality in priority-setting*, the project was expected to ensure that the programme would become 'more than the sum of everything we have done so far'. Apparently, there were clear ambitions and expectations about the influence the project would have on the RCN as an organisation as well as on ICT research. He called for the proposal development to be kept on hold until the scenarios were completed.

The challenge, however, was to create *specific content* for the programme proposal within the relatively short time-span allocated to the group. At this stage, the scenarios were still unspecific about what it was most important to communicate. They did not comply with the convention of providing specific content for a programme proposal, even though the second participant saw them as *potentially producing something beyond what was expected*.

The project group continued by discussing the general utility of ICT research for Norwegian society, for example, as a way of making life easier. Because they needed to come up with specific results, they discussed producing visions right there during the meeting. One participant for example, suggested 'a better society' as a comprehensive vision. Thus the potential visionary elements from the scenario work were abandoned in favour of already existing visions or visions produced on the spot.

Finally the project leader informed the project group about the progress of the scenario writing work:

> We in the RCN have made alliances with a couple of people who are helping us write [the scenarios]. We think aloud together. Our facilitator has worked a great deal since the participatory workshop. For the next two days we will continue to work on the scenarios and then the writers will finish writing them. When we meet the participatory group again we will need to achieve consensus

> about these scenarios within the group. I do hope they will not reject them. We need recommendations from this group. If we see any clear lines emerging in the scenario work we will incorporate them in the VERDIKT programme.

Another RCN employee involved in the writing process concluded the discussion by saying: 'The work on the scenarios raises questions about which road to choose. We might not get much content out of them, but the scenarios we are working on now are relevant for our choice of direction.'

At the end of this meeting the project leader assessed the value of the scenario process for the development of the programme proposal. She acknowledged the work of those writing and ordering the scenarios, mentioning especially the work conducted by the facilitator and the external consultants helping with the writing process.[163] The phrase 'thinking aloud together' was a way of describing the transparency and openness between the different members of the writing group, but also partly a reference to what was not happening, or hardly happening at these meetings – namely, the writing itself. Only a few group members were actually engaged in writing the scenarios, among them the consultants who had been asked to help. Most of the writing work was done in between meetings at the desks of those who developed the stories.

At the same time the project leader hoped that the forty participants at the final workshop would accept the scenarios and recognise their value. She expressed confidence that the writers would create products that would be considered credible outside the writing process. However, in order for the scenarios to be relevant for the programme proposal 'clear lines' would have to emerge from the scenario work. As head of the project group and hence leader of the work on the programme proposal, her judgement would have a distinctive influence on the final evaluation of the scenarios.

In this respect, her colleague might have made the final comment to imply that the project leader's demand for 'clear lines' did not necessarily mean 'clear content', which he doubted the scenarios could provide. Nevertheless, he tried to secure their status as relevant for the programme development work by underlining, as the senior advisor had already done, that the scenario work was valuable for deciding 'which road to choose'. His evaluation, left open, however, *how* the scenarios should be considered relevant for a choice of direction.

[163] The two external consultants are not listed among the participants of the scenario group assembled at the workshops. See list of participants 'Scenariegruppen' at Research Council of Norway (2004b).

This meeting held by the project group to discuss producing a research programme proposal indicates a shift from *coordinating relevance* in scenario creation towards *evaluating the relevance* of the scenarios. In order to qualify for evaluation the scenarios would have to contribute to the desired content of the proposal, which had to be both useful and ambitious in order to present something new and meaningful in national ICT research policy development.

As shown in this discussion, the project group members differed in their assessments of the value of the scenarios for the programme proposal. Some considered the scenarios irrelevant at this stage because they could not provide the proposal with concrete content. This resulted in discussions about using other visions, producing visions on the spot, and even suggestions to hold a new participatory dialogue about research priorities. Others, however, saw the scenarios as 'relevant for our choice of direction' or as helping the programme to become 'more than the sum of everything we have done so far'. Thus the relevance of the scenarios for writing a programme proposal was now poised between *clear content*, *clear lines* or *choice of direction*.

6.3 The work of writing

Two days after the meeting about the programme proposal, on 7 October, the writing group met again, this time to discuss a first draft of all three scenarios. The facilitator opened the meeting, announcing that today they would review what they had got so far and consider new ideas. Twelve people attended this meeting: Four of them were RCN employees, – the project leader, the senior advisor and the two representatives from the Division of Innovation. Also present were the facilitator and one of the external consultants hired to help with the writing process. As well as two ICT experts from a telecom company, one of whom was attending these meetings for the first time, there were two more external participants who had been involved in the workshops. Finally, accompanying me was a master's degree student from the Centre for Technology, Innovation and Culture who had agreed to assist me in observing the process.[164]

The facilitator asked the participants to read the three scenarios consecutively. I have chosen to translate as much of the scenario content as necessary in order to provide the context for the

[164] The data collected by the master's degree student was not used in my analysis.

subsequent discussions by the group members.[165] The participants started with the scenario called 'The Spirit of the New ERA', which I summarise below. The introduction reads:

> In 2004 Norway was still discussing what to do once oil resources were exhausted, but nobody took the discussion seriously; everything was just working too well. By 2006, however, Kværner had gone bankrupt and Norway had embarked on a national endeavour. This coincided with an increasing need for security within the country and in the EU. Here Norway was able to take advantage of its assets. International research focused on the EU and we learned quickly that not everything can be bought. Competence, for instance. In 2015 Norway will be able to boast a number of major ICT successes, especially within the areas of security and electronic administration. Technology will be everywhere and invisible and the technical possibilities ensuing from the national effort have created ethical dilemmas everywhere. The industry's need for concrete results has created new, converging research disciplines and a new research élite is emerging.
>
> *(A summary of the scenario)*
> Big businesses have retreated from the Norwegian scene and have decided to invest in their activities abroad. Unemployment is on the rise, big business has gone bankrupt and a passive government is encountering angry demonstrators. A national committee led by ICT and policy experts has been founded to redefine business policy and come up with policy options which could stimulate new businesses, contribute to innovation and finally define what should be considered as future value creation in an increasingly knowledge-intensive Norwegian economy.
> The national security situation became an important topic in 2006. Norway had invested in innovative use of ICT for surveillance and national security after its engagement in international assignments increased its risk of being a potential terror target. This led to a recognition that a national research effort was needed in the area of ICT, in order, among other things, to reduce the national threat level.
> Four big funds were established, all financed by the continuously increasing oil fund: ICT, oil, marine and biotechnology. Each fund was given 50 billion NOK[166] to ensure cooperation between researchers and commercial interests. The funds were also designed to protect researchers' intellectual property. Norway increased its international and especially European research engagement and English became the official teaching language at all higher education institutions.

[165] Scenario text as issued to the participants at the meeting on 7 October 2004. Information about the UTSIKT scenario project as well as the scenarios: RCN (2004b, 2005b).

[166] 50 billion NOK are approximately 5.7 billion euros.

The scenario then described a number of new, possible relationships between academia and industry based on these financial resources and changed educational infrastructures. These would lead to a growth in ICT and in knowledge-based and creative industries such as communications, software and games, entertainment, design and media. Norway would offer educational opportunities to immigrants, especially those with sought-after skills. Technology would become pervasive and invisible, leading to new forms of organisation, interdisciplinary activities and value chains. Recent technological developments would raise major ethical and juridical controversies about what constitutes a human being (end of summary).

The facilitator had asked the group to postpone discussion until they had read all three scenarios. However, some group members wanted to give their opinion immediately after reading the first scenario.

An external participant wondered: 'To me it seems difficult to argue for this particular shift in the scenario.' An external expert concurred: 'We should make the crisis much more dramatic, exaggerate the situation.' Then a RCN employee raised doubts:

> I am a bit at a loss about consistency in this scenario. There are rather too many possibilities for 'fixing' things here. Don't invent so many cheap solutions. Is it really a credible scenario if we just describe Finnish politics as they are already happening? We have to show people that this situation will cost us something.

This criticism had already been expressed at the first meeting of the writing group. The scenario included many narrative elements pointing to positive developments following a crisis. Whereas the criticism raised in the first meeting of the writing group had questioned the central role of the state in the scenario, an RCN employee now saw these positive developments as 'cheap solutions'. If a scenario included too many possibilities for 'fixing' things, here in the form of four big money funds, it became less credible. Compared with the initial discussions about this scenario, however, the former uncertainty about whether the group was competent enough to speak about scenario content had disappeared. The concrete narrative allowed the participants to be more critical and to ask more questions about the content and intentions in this scenario than during the first meeting of the writing group.[167]

[167] See Chapter 5, subchapter 5.4.

However, the facilitator asked them to stop discussing and to read the second scenario first. The following is just the introduction to the scenario:

> The eConsuming Norway
> The foundations for the future of Norway were already laid in 2005. The research, authorities and industry cooperated to build an infostructure ensuring broadband for everyone. The only thing that remained to be done was to fill the net with content.
> The lives of citizens and consumers were increasingly infiltrated by technology all the way through the first decade of the new millennium. Public administration has become available online, elections are conducted electronically, the PC has taken over the functions of TV and the church is offering an online bereavement concept. The main thing, however, is entertainment. Sugar intake is on the rise, activity levels are slumping. The user is the centre of attention. 'Time to Market' is getting shorter all the time and many products and companies flop shortly after being launched.
> There is a digital divide between those who use ICT exclusively for consumption and for satisfying their immediate needs and those who see ICT as a means for personal development and creativity. Apparently these groups live in harmony with the rest of the Norwegian population, but conflicts are simmering below the surface.
> Many ICT researchers have become part of a support network for the product development departments of various businesses. These, on the other hand, have taken over most of the R&D activities of those businesses. Basic research is only conducted in a few odd areas and Norwegian research funding is channelled through the EU. Nobody sees any point in general basic research anymore: After all, all our needs are covered.

Here several participants remarked that politics was almost invisible here. 'We should underline that politics is not an actor in this scenario. The public sector is completely passive.'

The project leader was worried about the way users were presented in this scenario: 'This scenario claims that user needs are developing in the wrong direction. This sounds strange to me. How can user needs be something negative?'

'What kind of scenario has this become anyway?' another RCN representative asked: 'I remember that at the participatory workshop at Sundvollen we wanted to turn this into a kind of "couch scenario" in which the user would control everything from the sofa!'

Several evaluations were expressed here. Unlike the first scenario in which the state was a central actor, 'eConsuming Norway'[168] did not involve any public politics. Instead, consumers decide about social and normative values. An 'online church' is one of their consumer demands; so is entertainment and short-lived consumer products. The project leader was therefore concerned about the implication of the scenario that user needs could be evaluated as 'wrong user needs'. According to the last commentator the original scenario idea had gone through a considerable transformation and no longer represented the ideas of the workshop group. In other words the scenario had become an expression of user values such as entertainment and personal development rather than offering a view of technology as enabling overall control.

These aspects were not discussed any further at that point, however, since the facilitator asked the participants to turn their attention to the third scenario. While the participants were reading the story, the representative from a business association whispered to his neighbour: 'Who actually wrote this?' Whereupon his neighbour, one of the writing consultants replied: 'Many people. I have written something, and so have Magnus, Jon and Karl.'[169]

This question, raised quietly by one of the former workshop participants, underlines the implicit agreement that questions about who wrote what between the two participatory workshops were not addressed as an issue in the process. The agreement to work together on the scenarios constituted a contract limited to this process whereby the creation of the scenarios would exclude any discussion about who had written what and why. Writing shared between more people and thus more collective coordination would have required more investment from the rest of the group, investment in time and engagement. This could also have been a reason why the remaining participants did not insist on being directly involved in the actual writing of the texts.

After the short discussion about the second scenario described above, the participants were asked to read the final scenario, which focused on the role of research and researchers in Norway in 2015:

[168] The title of this scenario changed slightly throughout the process, from 'Infosumption' to eConsuming Norway' to 'eConsumption'.
[169] Names changed.

> Out of Sync (From the introduction)
> Restless times are creating a vacuum. The supranational authorities and institutions are going through hard times and the market is increasing its influence in a shifting world. This is creating new monopolies in ICT industry and research.
> The oil fund has been consumed by the social security agencies, and the effort to invest in ICT was doomed to fail. Increasingly, research funding is being allocated directly to industry and this creates a divide between publicly and privately employed researchers. Very little groundbreaking research is being conducted in Norway. Big, multinational companies educate their own people. This has produced research super stars with 5 million dollar incomes, and an army of groupies who have to do the boring work. At the same time, this development is being criticised by researchers, who have created a counter movement and are building alliances with organisations such as Attac and Adbusters.
> In 2015 people are sick of news and technological babble. Unlike in the final decades of the twentieth century, ICT is no longer regarded as an uncontroversial area of activity which politicians, researchers and users can agree about. Most of the population accept surveillance through the new 'Ambient Intelligence'- technology, and are mostly interested in functional solutions which satisfy short-sighted personal needs. Industry responds to those needs, and those researchers who join this development can live well in Norway.

An RCN employee raised his voice: 'I was one of the people at Sundvollen who created this scenario in the first place. I believe this is a very important scenario which we should put to use. But there are a couple of discrepancies here again. We should not be so negative; this ruins the whole scenario.'

An external participant wondered about the relationship between ICT and research:

> This is clearly a scenario in which the Research Council loses all its influence and funding. Well, Norwegian basic research in ICT is already almost completely irrelevant for industry today. Do we really need ICT research if it is just supposed to be applicable in every context? This scenario attempts to describe a paradigm shift in which research quits being governed publicly and ICT has become generally integrated. What can ICT researchers do themselves to influence developments? I suppose the scenario could become interesting if we could say anything about that.

The facilitator argued: 'We were trying to keep the RCN as invisible as possible in these scenarios.'

The representative replied: 'I was talking about research communities, not the RCN.'

This scenario was deemed useful for discussing the value of generic research on ICT and the possibilities researchers might have to influence developments. Again, as in the second scenario, public policy was invisible and not given any agency. The facilitator wanted the RCN to stay invisible too and not protrude as an actor. Public research funding would cease to play a role, yet the external representative saw this as a chance for researchers to consider their role as strategic actors. Owing to the envisioned policy vacuum this scenario could turn into a story which could attract discussion about the value and relevance of generic and applied ICT research in Norway.

Yet in the process of writing, the problem about how to distinguish sufficiently between the second and third scenario emerged again. The representative from the business association who had quietly asked his neighbour who had written the scenarios now wondered aloud: 'I think this scenario is again very similar to the second on e-consumerism. What is really out of sync here? I do not understand.'

The facilitator replied: 'It is the same writer – that's why it is similar.'

This comment was not taken up as an issue for discussion. The second and third scenarios had been developed further by the senior advisor who had worked on increasing the distinctions between these two scenarios. Apparently, these distinctions were still not apparent to everyone. The group therefore continued to discuss how to keep the scenarios different. Finally an RCN employee warned: 'We must avoid a situation in which the RCN creates a scenario that it does not wish to promote.'

'I agree,' the facilitator replied. 'We need a fine balance here, but the scenarios must deliver enough content to initiate a discussion about policies at Sundvollen!'

The way the writing work on the scenarios was assigned highlighted a challenge that the group had been negotiating since the beginning of the process. The two scenarios which had initially received less in the way of ideas from the workshop than the 'Spirit of the New ERA' were still coping with the problem of being too similar.[170] However, there were specific narrative elements which could influence the reception of the scenarios in the context of research policy. The project leader's unease about the second scenario presenting short-lived consumer needs as

[170] On the distribution of resources (ideas and scenario drafts) see Figure 3, Chapter 5, subchapter 5.3.

negative implies a hesitation about turning scenarios about the future of ICT research into moralising stories because this could threaten the credibility of the scenario work.

The third scenario was faced with an even bigger balancing act. On the one hand, it could contribute not only to forward thinking but also forward acting if researchers, both during the foresight process and beyond, engaged in a discussion about its research policy implications. On the other hand, it questioned the role of public research policy and thus the role of the RCN as a strategic actor in the field. This was certainly a future situation the RCN would like to avoid. In expressing his concern, however, the RCN employee may have interpreted the role of scenarios as narratives to be either promoted or rejected, rather than to induce strategic thinking in a more complex manner. The workshop participants might thus be encouraged to discuss strategies which would avoid this kind of scenario, and recommend courses of action which would strengthen the RCN's role as a strategic actor. This, however, could also lead the discussion away from considerations of the alternatives for the future of ICT research and research policy.

The facilitator, however, insisted that scenarios needed to be created which would inspire discussion rather than stifle it and thus was more prepared to accept unexpected effects in the reception of the scenarios at the workshop.

At this particular moment of the coordination process the value of the scenarios for the discussion of strategies at the final workshop was negotiated. One way of looking at this is to see it as negotiating power and interest in foresight (Dannemand Andersen and Borup 2006). The RCN held the property rights to the final scenarios, since it had commissioned the project. The four writers, each of them engaged differently in the writing process, were transforming the collected workshop material and all the suggestions made by the group into narratives. Yet because the scenarios as texts were so open, there was sufficient space for individual perspectives and values to be expressed, a circumstance which might influence the final discussions about the scenarios in the project group.

Yet it is also possible to interpret this as coordinating the collective writing and rewriting of texts by simplifying complex demands through 'successive adjustment' (Callon 2002, 192). The writing of scenarios was successively adjusted from the workshop group of about forty participants to a group of ten people responsible for creating scenario narratives. Among this group four members were mainly responsible for producing text, and of these four one person

developed two of the three scenarios further based on the material gathered at the workshop and the comments of the writing group. This type of coordination of the writing process was possible because the writing group had implicitly agreed that there were different responsibilities, degrees of engagement and competencies within the group. Some members of the writing group were thus more involved, i.e. had a greater stake in the process, than others. Responsibility was in this respect closely connected with engagement. And engagement again reflected representation.

The issue of representation, however, was never made explicit here. This demonstrates an important difference between the workshop collective and the writing group collective. It shows that production of the scenarios included issues of representation which stayed implicit. Another point here is to see it as collective activity towards a 'common good' (Thévenot 2002a). The common good was the scenarios, the desired outcome of the process. The group needed a limited agreement on what was irrelevant to the discussion, since there could not be a more complete alignment between writing and equal representation in this group.

Thus the writing tasks were openly allocated at the end of the meetings but only among those who were already involved in the writing process. I want to argue that the question of who was writing what during the process did not become an issue because it fitted into the order of responsibilities and engagement. As an RCN employee, the senior advisor was one of the group members organisationally responsible for the success of the project. The facilitator and the two consultants had been recruited because of their expertise in foresight and in producing narratives and they were thus professionally interested in achieving a successful outcome. My point is that the action of writing scenarios can be studied focusing on its coordination and evaluation. Thévenot calls these connections between evaluation and realistic conditions for effective engagement 'pragmatic regimes of engagement' (2002a, 76). In this sense, the various preconditions set by the project group for the process, along with the coordinating process during the different stages of the scenario work, could be seen as particular pragmatic regimes of engagement. The concept of a 'regime', however, suggests a stable structure in which the whole process was embedded. This notion again removes agency from the involved participants, making it more difficult to analyse the dynamic evaluations conducted by the participants during the process and to ascertain which contributed to the particular outcome. Therefore I choose to retain the concept of 'convention' as a limited agreement based on a common acceptance of what

should be left aside as irrelevant. Here the need to create specific content was met by assigning the bulk of the writing work to the participants most responsible for the project as well as those representing central stakeholders such as the RCN.

The facilitator's response to the criticism that two of the scenarios were too similar to one another was thus a transparent description of what was happening between the meetings. Only a handful of people were writing the texts, and the similarities might therefore have been the result of identical authorship. Nevertheless, this engagement matched the degree of involvement in the process as well as the individual and genuine engagement of particular people, such as RCN employees or those recruited specifically for this project.

6.4 Making scenarios specific

On 12 October, a week before the final meeting with the workshop participants, the project group met for the last time to discuss the scenarios and their use at the participatory workshop which would be held to discuss strategy and ICT programme content. Now the project group was presented with the scenarios that had been revised and rewritten since the last meeting in the writing group. The project leader declared:

> It is important that we think these scenarios can give us what we need for the final gathering at Sundvollen where we are supposed to develop strategies. Another question is what should we do after the last workshop gathering? How should we follow up on the process we have started here?

Rather than following up on these initial questions one of the external group members pointed out that the RCN had published a policy document in which the strategies of the Research Council were outlined explicitly.[171] 'It seems like a good document', he remarked, 'but also already a rather definite one. It is already very detailed. How are *we* to influence this?'

Strategies are produced at the RCN all the time, and the project group had been asked to take note of and consider the relevance of other processes, both processes that had already been concluded and ongoing activities. The external participant, however, expressed his uncertainty

[171] The RCN had released a strategic policy document regarding ICT research prior to the foresight project entitled 'The will to invest in ICT: Research in information and communications technology 2003–2005' which outlined visions, ambitions, goals and measures for research development (RCN 2004e).

about the value of the scenario work compared with a policy document already published, which outlined the strategies of the RCN explicitly. This policy document seemed to be everything the scenarios were not: definite, detailed and explicit.

The project leader replied: 'We have not done any work on this document for a year. There is no final agreement about the text. It is an internal document. But I am not sure how foresight is supposed to change any of this.'

The participant asked again: 'But doesn't this document by and large reflect the RCN's present understanding?'

'Yes,' the project leader replied, 'but this is an internal document. It is 'we' who did the thinking here.'

Thus not only did the external participant in the project group express uncertainty about the value of the scenario work, the project leader also doubted whether foresight could influence strategic development in the RCN. Nevertheless, she thought the scenario work was valuable because it possessed certain features the specific policy document lacked, like, for example, including external perspectives.

During the discussion one of the external experts had to leave. Now only two external experts were present who had not read the scenarios before. The facilitator had arrived to present short versions of the three scenario texts. He asked the participants to read them, but not to take more than five to ten minutes to do so. The two external participants familiarised themselves with the scenario texts while the remaining two RCN employees and the facilitator waited for them to finish reading. They then turned to discuss the scenario 'Spirit of the New ERA'.

One of the external participants who had not been involved in the scenario work commented: 'I do not understand the word 'convergence'. Hasn't this lost its importance? And what about this new term: 'ICP – information and communication processes'? I cannot say I understand this either. There should be a better explanation for this kind of term, since it really is not anything new. Apart from that there are only minor mistakes. What is this about MIT and the University of Trondheim entering into contracts? What is this all about?'

An RCN employee defended the idea of including MIT in the 'Spirit of the New ERA' scenario: 'We need names so people will feel these scenarios are trustworthy.'

His colleague agreed: ‘We want to show that Norwegian universities have become attractive for internationally important partners. If we have proper funding regulations this could lead to even more cooperation.’

The scenario writers had included the use of such contracts simply as an illustration of Norwegian universities becoming attractive to internationally important partners. However, as the external expert informed the rest of the group, precisely such a contract had been entered into between MIT and Trondheim University the previous week. Thus, what the writers had assumed were illustrations of probable future developments had already taken place in reality. To the external participant therefore this became a useless element in the scenario narrative.

Finally the discussion of the first scenario turned towards other elements the external expert viewed as undesirable in the scenario. This time it was not a question of a narrative element already existing in reality but of a development within teaching institutions which this group member did not approve of:

‘Another thing I do not like about this scenario is that existing teaching is cut down and is moved down to Vestfold.’

The other externally invited expert exclaimed: ‘Vestfold? I’d say Stavanger is more probable!’

‘Do we need to make this scenario probable now?’ a RCN employee wondered.

The first external participant warned: ‘Be careful the scenario does not lose its credibility.’

‘If everything becomes very probable,’ the project leader argued, ‘then this is going to be pure extrapolation.’

‘No,’ the external expert replied, ‘if we suddenly get many highly educated teachers that would be far away from today’s reality.’

Thus the discussion had become a negotiation about whether what was probable was also credible. The external participant did not like the idea of moving teaching institutions south to the region of Vestfold. He did not discuss whether this was probable but simply expressed unease about the idea. In his view, this idea compromised the credibility of the scenario. The

project leader, however, evaluated probability as pure extrapolation, and thus not as the type of future scenario they were trying to create.

The facilitator finally intervened in the argument:

> The point about these scenarios is that they should illustrate something unexpected, yet not entirely unimaginable. If you all say you don't believe there will be a university in Vestfold in 2015 then we need to find a balance here. As the project leader has already said, we have to be a bit outside today's reality. Let's finish this discussion now. Maybe we should move this university to Agder if that seems more plausible to you, but this is only a small building block in a big picture, this should not disturb the whole picture. We need some surprising elements, we have to demonstrate some form of dynamics... see ... I have already erased 'Vestfold University' here and put in 'Agder University', so things happen fast here. [172]

The external participant's critical comments had a major impact on the meeting, with the facilitator eventually evaluating the situation as if everyone had agreed that the idea of having a university in Vestfold in 2015 was implausible. The compromise to move the scenario university to Agder instead was evaluated as 'more plausible'. Nevertheless, the facilitator assured the group, this was only a small building block in a big picture. Thus the first scenario, which described successful public governing of research policy and development and hence differed from the other two, was here evaluated critically in terms of its credibility and plausibility – especially by one external group member representing academia and thus an important stakeholder in the development of the new ICT research programme.

In this last meeting of the project group before the second workshop with external participants the question of scenario content finally became the focus of evaluation. The project group had to reach at least a preliminary consensus about scenario content so that the scenarios could be evaluated and discussed by the approximately forty participants in the second workshop about strategic recommendations. Now the negotiation of scenario credibility according to specific criteria became important. This discussion targeted most of the criteria necessary for scenarios as presented by the facilitator during the first participatory workshop. He had defined good scenarios as being 'believable, plausible, internally coherent, entailing some element of surprise

[172] The former college of Agder was formally established as a university on 1 September 2007, three years after this scenario process. It is the youngest university in Norway.

and strategically relevant'.[173] Here the external expert from a public research institution questioned the use of specific terms and ideas, saying some of them were out of date while others did not add any innovative value to the scenario. The discussion thus shows how individual preferences and criticisms can turn into evaluations of scenario credibility and plausibility and ultimately affect the content of the scenarios.

6.5 Conclusion: conventions and credibility

In this chapter I have described a shift in the activities conducted in the foresight project, moving from coordinating collective ideas and negotiating scenario content towards an evaluation of the scenarios as relevant for research programme development. While the writing group was still working on the content of the scenarios, their relevance and usefulness for programme development was already being assessed in meetings of the project group, which had been given the task of writing a research programme proposal. This can be seen as a movement from *coordinating relevance* to *evaluating relevance.*

The scenarios were thus still hovering between relevance and irrelevance for research programme development. The lack of 'clear content' was seen as both a drawback *and* an advantage. The scenarios were not a conventional form of document, and their content was still unresolved. Since they were not finished their potential value was still uncertain. Yet within the context of developing a programme proposal they were evaluated in terms of the *need to become specific*, to create a concrete text with strategic content within a limited time-span. One convention was thus the expectation that texts should have specific and coherent content, not only in the context of research policy, but in general. The scenarios were poised between representing alternative futures and informing the strategic present and thus outside the calculability of concrete content. Yet the ultimate objective of the foresight process – to produce a research programme proposal presenting explicit research priorities – was always implied. In this way, the prevailing uncertainty about the relevance of the scenarios was channelled through a 'conventional formatting of events' (Thévenot 2006, 111), that is the need to become specific.

[173] See Chapter four of this thesis, subchapter 4.9.

Coordinating the writing work between four writing group members was not so much a negotiation of power and interest as an implicit agreement within the writing group that those members with the most responsibility for the success of the foresight project should be most engaged in the writing of the scenarios. This limited agreement created a link between 'evaluation and realistic conditions for effective engagement' (Thévenot 2002a). Rather than understanding these links in terms of 'pragmatic regimes of engagement' (ibid), I interpret them as *conventions of engagement* within the context of responsibility for successful outcomes. The question of representing specific interests was consequently not made an issue in the writing group. It remained a limited and implicit agreement based on a shared acceptance that certain aspects of collective scenario writing should be considered irrelevant. It did, however, raise the unresolved issue of achieving three inherently different and meaningful scenarios.

Finally in the third meeting, a preliminary consensus about the content of the scenarios had to be reached. The discussion about specific terms and events in the first scenario became an issue of scenario credibility. Here one external group member influenced the content of the first scenario because he did not like its implications. In the bigger picture, these small changes would not influence the overall character of the scenario. Yet the negotiation of this change shows how interests and influence could be played out in the need to create specific scenario content.

7 COLLECTIVE EVALUATION

In the preceding chapters I showed how collective scenario work and the writing of scenarios involve coordination of openness and relevance, and how evaluating scenarios for research programme development also involves deciding what is irrelevant. This chapter discusses the collective evaluation of the scenarios at the second participatory workshop, which again involved about forty participants. By this concluding stage of the foresight project the written scenarios had reached a definite material form. Rather than negotiating uncertainty about form, number and content, the participants were now evaluating the scenarios as material outcomes of the foresight project. After all the workshops were finished the project group would evaluate the finished scenarios with respect to their relevance for the ICT research programme proposal. Thus the empirical questions in this chapter are: What forms of evaluation did the second participatory workshop engage in? How did the finished scenarios influence the proposal for the large ICT research programme?

Compared with the evaluations conducted in the project group and by those writing the scenarios, the final workshop was to evaluate the scenarios in a more uncertain, pluralist and dynamic way. First of all, in contrast to the meetings held to write a research programme proposal, the final workshop with external participants was not about producing *one specific document*. Rather the organisers asked the participants to *contribute strategic recommendations* for future ICT research. Second, the implicit agreement (and limited contract) not to represent sectoral or professional interests became valid again. In view of these preconditions the narratives were expected to offer 'directions' rather than specific content.

Rather than opening this chapter by discussing collective evaluation processes in general I have chosen to present the different evaluations in more detail to show the diversity of dynamic evaluations but also to show the limits of the contract which had shaped the contributions of the participants during the process of scenario creation. Then I describe how the scenarios were finally evaluated within the foresight project group and discuss the negotiation of the value of scenarios as a question of change versus progress.

7.1 Understanding scenarios

On 20 October 2004 the workshop participants met again at Sundvollen to discuss the scenarios and to contribute strategic recommendations for future ICT research. The two-day workshop included several activities designed to connect the work on the scenarios with strategic thinking. The first day was dedicated to achieving collective acceptance of the scenarios. Here the participants were assigned to several groups and asked to work to 'increase understanding and acceptance of the scenarios both individually and in the group'.[174] Later in the day the participants were asked to imagine the three scenarios as reality in 2015. They were to pretend they were the decision-makers and generate 'a set of strategic actions between 2004 and 2015' (ibid).

This time there were only thirty-two participants. The project leader welcomed them and informed them briefly about the work that had been done between the two workshops. Then the facilitator introduced the three scenarios:

> These scenarios are the testing ground for the strategy discussion. We will ask: 'If this happens, what does it mean for ICT research in Norway?' We need a broad range of ideas from you, we do not need consensus. First you need to understand the scenarios. They are very information-rich, and thus not very easy to understand. Second, you might perhaps want to improve them a bit. The common understanding for these scenarios is that they tell us something that might happen and that they challenge the existing rules of the game.

As in the first workshop, the facilitator asked participants to take an open approach in order to produce a variety of ideas rather than to arrive at a consensus. The task of understanding scenarios presupposed that they were now ready to be regarded as coherent narratives about possible social, technological and research-related developments that might have taken place by 2015. The facilitator also asked the participants to share a 'common understanding' of the scenarios as a precondition for further work. The participants' contributions were to be based on evaluating the scenarios as both *probable* and *challenging*. To improve the participants' understanding before the group activities the facilitator showed scenario axes models intended to explain the scenarios. He also showed further graphics illustrating the dynamics between forces

[174] Agenda second workshop ('Opplegg samling 2'), a document explaining the agenda of the second workshop sent to all participants on 15 October 2004.

and counter-forces.[175] After that, all three scenarios were presented in one go, and the facilitator asked the audience not to comment on the scenarios in the plenary session. 'I want you to work in groups to increase your own and your group's comprehension of the three scenarios. You can decide how to organise your group work. Now I have talked long enough. Are you with me on this?'

7.2 Making scenarios realistic

As the groups started to form I chose to observe several groups during the exercise in order to get an overview of the different understandings of the scenarios. I started with Group 6, which included four external experts who had taken part in the first workshop, one of them having also been present at some of the meetings of the writing group. The four participants discussed the 'Spirit of the New ERA' scenario. One participant was surprised about how well the scenario had been developed since the first workshop. The industry representative who had followed the writing work agreed: 'Yes, I thought it worked out fine. We commented on the rough drafts. Now none of these scenarios describes anything we have today.'

'These scenarios are really very interesting,' a second participant observed. 'There are clearly not two negative ones and one positive one.'

'But which of them can we believe?' a research institute representative asked. 'In my opinion, the "Spirit of the New ERA" is the most realistic one. Here we see a crisis and deep social change.'

'Yes,' the first participant agreed. 'This reminds me a lot of Finnish efforts following their crisis. But can we imagine such a crisis here in Norway?'

'Well, if oil is discovered in other places that could deepen this crisis,' the researcher replied.

'But couldn't we do something more realistic here?' a third group member asked.

In this discussion comprehension emerged as an evaluation of what the group could believe and which scenario would be most realistic. The scenario describing a national development already experienced in Finland was evaluated as the most realistic and credible. The group

[175] See PowerPoint presentation (RCN 2004c).

discussed enhancing the realism of the first scenario by making the social and economic crisis depicted in the scenario more dramatic. The scenario earlier described as being too positive and containing too many possibilities for 'fixing things' was now seen as the most realistic one. The second and third scenarios were thus implicitly evaluated as less credible since they were less realistic than the first. Thus the group ordered the scenarios in terms of what they believed to be realistic.

7.3 Clear versus fuzzy scenarios

The next group discussed the second scenario, entitled 'eConsumerism', which they had difficulty understanding. 'Perhaps we'll be able to understand it better if we concentrate on what is missing from the scenario,' a representative from a business association suggested.

'We need more focus on the needs of industry as an important driving force for the whole scenario', an ICT entrepreneur argued. 'Even though this scenario is consumer-driven it does not mean that industry is completely passive. There is not enough focus on wireless and mobility here.'

The group approached the task of 'understanding' the scenario by focusing on what they thought was missing – mainly technological aspects, such as wireless and mobility. By establishing what was missing from the scenario they thought they might be able to improve it. The ICT entrepreneur, however, argued that the problem of the scenario went beyond what was missing from it. He raised questions about the connections created between ideas in the scenario:

> We should have a diagram here with lines describing different possible developments, such as strong political governance, strong value creation, etc. I think the whole scenario is just too fuzzy.[176] There are just a lot of different aspects gathered together, but no real connection. My guess is that the scenario is confused and unclear on purpose, and it does not answer the questions clearly enough.

'I agree, the scenario has to be clear,' another participant agreed.

[176] In Norwegian: 'rotete og uklart'.

‘But we do not know what will happen, therefore we need to be able to invest in many different things,’ a third participant argued.

‘If we make the scenario any clearer,’ another group member objected, ‘then it will become more improbable and thus less acceptable.’

In comparison with the first scenario, which had been viewed as most realistic and thus most credible, making the ‘eConsumerism’ scenario clearer would make it less probable. By being fuzzy, the entrepreneur declared, the scenario did not ‘answer the questions clearly enough’. Another participant argued that the openness of the scenario showed the need to invest in ‘many different things’. Thus, by keeping ideas in the scenario unconnected or fuzzy, one could show the multitude of ideas needed to meet the lack of knowledge about the future. A ‘clearer’ scenario would not allow for that openness.

This demand for a ‘clear’ scenario was different from the first group’s attempt to increase realism discussed above. The realism in the ‘Spirit of the New ERA’ scenario was based on parallels with the already experienced economic crisis in Finland. Here, however, the group members had varying opinions about whether a ‘clear’ or realistic scenario would answer questions or retain the necessary variety of ideas to address the lack of knowledge about future challenges. A fuzzy scenario could serve two purposes: it could provide the range of ideas necessary to find out ‘what to invest in’ in the future; and by being vague it could be interpreted in various ways and thus be more acceptable than a ‘clear’ scenario.

7.4 Distinguishing between the scenarios

After the discussions about the scenarios in groups the whole workshop gathered again for the plenary discussion, and three people responsible for collecting all the comments presented summaries.

First the RCN senior advisor who had collected comments on the third scenario ‘Out of Sync’ summarised the replies: ‘People still think the difference between ‘eConsumerism’ and ‘Out of Sync’ is not clear enough. We should either modify or strengthen the scenarios.’

The industry entrepreneur interrupted the presentation: 'I have to criticise the form of these scenarios. They are all still too fuzzy. I simply do not understand them.'

'None of these scenarios gives space for free ideas, free thinking,' another participant remarked.

'Well, then I must have misunderstood completely,' a researcher replied. 'I thought that 'Out of Sync' was the scenario of free ideas, only the ideas have become marginalised.'

'We really have to make these scenarios clearer,' another external participant declared, 'because they will not be happening anyway.'

This discussion showed that the workshop participants evaluated the narrative content of the scenarios differently. Now that the number of scenarios had been limited to three, content and form were evaluated according to whether they were clear or fuzzy, realistic or credible. The lack of difference between the second and third scenarios was still an issue among the workshop participants. These three comments – the lack of difference, the fuzziness and the lack of free ideas – seemed to be evaluations of the scenario narratives as texts, as *stories*. The fourth comment, however, focused on the *implications* and message of the scenario 'Out of Sync'. The participant interpreted the idea that in 2015 research would be 'out of sync' with the rest of society as the 'marginalisation of free ideas'.

Thus not only did the participants evaluate the scenarios in different ways, they also engaged in different kinds of assessment, some evaluating the scenarios as narratives and others interpreting their implications. The final comment thus argued for clearer narratives, 'accentuating' the stories to increase their *strategic value*, because as alternative futures they were not seen as very probable. In other words, there was little risk that they would be taken too literally, as Dietz and Forfang had warned earlier (2003, 33).[177]

Openness and uncertainty had been elements of the foresight method and approach and had also emerged as effects of attempting to ensure both creativity and relevance. They were now reflected in the evaluations of the finished scenarios. These comments, even though they represent just a few I collected in different groups and plenary discussions during this stage of

[177] See Chapter 2, subchapter 2.3.

the workshop, illustrate the difficulty of finding a common understanding of the scenarios as 'something that might happen' and as 'challenging the existing rules of the game'.

7.5 Including strategic actions in the scenarios

Following from this collective evaluation of the scenarios, the participants were now asked to work with strategic recommendations. They were to address each scenario and assume this scenario actually taking place in 2015. On that basis they were asked to imagine themselves as decision-makers and to generate a set of strategic actions (between 2004 and 2015) with the aim of '*increasing the value of society's investment in ICT research*' (italics added).[178]

The strategic actions to be discussed thus already had a collective goal: to create connections between *value, investment, society* and *ICT research*. Society could be seen as an actor who needed to invest more in ICT research, or, in another possible reading of this task, the value of investment already made in ICT research needed to be enhanced. In either respect, the goal of these strategic actions clearly implied social and economic growth.

Rather than deriving strategic actions from what the scenarios implied, the participants were asked to incorporate these actions in the scenarios themselves. The facilitator specified the task:

> The whole point of this exercise now is to increase the number of actions in the scenario. Afterwards we will look at what these actions are directed at and finally, we will look specifically at the areas of action which concern the Research Council. Then we will pick out these actions from across the scenarios.

Even though the scenarios had not been changed since the previous discussion about their content, the facilitator implied that they were now different enough to include specific strategic actions.[179] All the participants were asked to start with the scenario 'Spirit of the New ERA', arguably the one with the clearest narrative about national policy-making.

[178] In Norwegian: 'Øke verdien av samfunnets investeringer i IKT forskning' (Agenda 2nd workshop).
[179] This task was set on the first day, thus there was no time in between tasks to make changes based on the participants' suggestions.

I joined one of the groups to listen to their discussion. A female participant who had long experience with scenario processes in her organisation wondered aloud: 'There is already too much about policy actions in this scenario. It makes it hard to think for oneself.'

Another participant remarked: 'This scenario is really the bonanza of Norwegian ICT research.'

'But why is there so much about security in this scenario?' another participant asked. 'ICT is everywhere and in everything. What then is the programme for ICT research?'

'Well, the second participant replied, 'it is the crisis which has created unrest in the research world.'

'But according to the scenario the crisis will be over by 2015,' the first participant objected.

'There is already a lot about priority actions in this scenario,' a representative from a public organisation said. 'It is clear that the RCN will experience a kind of renaissance in this scenario. They will be responsible for administering the oil fund and putting the money into prioritised research.'

According to the first participant, the scenario was already policy-oriented, with strong state-governed funding of public ICT research. Here, as the last participant remarked, the RCN was a strong actor. However, the role of ICT research was unclear, since ICT was ubiquitous and used to provide omnipresent security. According to this particular group at the workshop, the scenario did not leave enough room to incorporate more relevant strategic actions.

The ethnographic moment presented here was taken from the first part of a series of tasks focusing on the development of strategies. Later the participants were asked to allocate strategic actions to different actors, such as research institutes, universities, industry and the public sector. As the short example suggests, the strategic discussions were influenced by the earlier evaluations of the scenarios as realistic, too fuzzy or improbable. In the scenario discussed a strong research supporting policy was juxtaposed with an ambiguous role for research in a society where ICT had become invisible and ubiquitous.

7.6 A scenario to be avoided

On the second day of the workshop the participants were to discuss the RCN's strategic choices. They were to identify situations in which the RCN would face important decisions and discuss the risks related to these choices. They were then to give recommendations, including recommendations about timing.

'I want you to discuss the different strategic decisions the RCN will have to make, the facilitator asked. 'Concentrate on the main lines of thinking and use two minutes to discuss the strategy. Discussing the risks or the pros and cons of the strategy is optional.'

The strategic choices of the RCN were to be informed by the objective 'to get the most out of research in Norway'. I joined the group which included an RCN representative, a university researcher, two representatives from industry and two participants from research institutes.

'Now, should we have free basic research?' the RCN employee asked the rest of the group.

'Well, I think all research includes aspects of application, but this can happen over a period of ten years,' a research institute representative replied.

'Should we think short-term or long-term research? And where is the long-term research supposed to be conducted? At universities, at research institutes, in industry, or in a combination of these?' asked a female representative from the economic sector.

'Are we still at the stage where we're asking questions?' the RCN employee wondered aloud.

'Well,' a researcher replied; 'we have to come up with an answer about what we think is important. We definitely need to avoid the 'Out of Sync' scenario. To avoid this scenario we will also need user-driven research, not only long-term research.'

Discussing strategic choices required participants to find a common context for these choices. Gradually, the third scenario 'Out of Sync', came to stand for a development which should be avoided. The strategic choice suggested was to include both user-driven and long-term research as had also been proposed in the meeting of the project group held to discuss the new ICT research programme. This in itself did not represent a new strategic action. This short example from the many dialogues that took place that afternoon shows that the participants had returned to discussing the basic challenges of Norwegian research policy. These basic challenges had

been highlighted by the scenarios. However, the discussion presented here did not imply that the scenarios had helped to see these challenges in a new light.

These evaluations and discussions conducted in the workshop involving thirty-two participants represented forms of coordination different to the evaluations that had taken place during collective writing and later during the project group's discussions of the scenarios' relevance for programme development. The participants were now carrying out the tasks set by the workshop agenda – namely to 'understand' and 'possibly improve' the scenarios and later discuss strategies and strategic actions related to these scenarios. Their evaluations, which arose out of the different tasks set, opened the scenarios to different possible interpretations, but also implied a specific ordering according to the strategic value of the scenarios. In the discussions presented above the 'Spirit of the New Era' was considered the most policy-oriented scenario and 'Out of Sync' was the scenario to be avoided. Finally 'eConsumerism' was viewed as the most 'fuzzy' scenario; it was seen by one participant as 'unclear on purpose' with no clear technology content but many different, unconnected ideas. This specific characteristic, however, could also be valuable precisely because it allowed for many perspectives and interpretations. Thus instead of trying to create equivalences across contexts or deciding what was irrelevant, here the collective evaluations led to a new opening of the process in terms of how the scenarios could become useful in the following strategic discussions at the RCN.

7.7 Concluding the collective process

In the concluding plenary session the participants were asked to contribute final comments on the development of the new large ICT programme. An external participant from industry remarked: 'Many of us have requested that priorities be set according to thematic areas.'

'That is a good suggestion,' a RCN employee replied. 'But how can we get there? We will need a good process.'

'Why not establish the main outlines of a research programme and leave the priority problem to those taking the decisions about the programme?' a representative from a research institute suggested.

These last comments started to reflect the interests of the invited participants, who until then had been asked to 'leave their agendas at home'. But now that they were discussing the programme development and specific thematic areas their own research or commercial interests potentially became relevant. Yet in order to reach consensus over which areas should be included in the programme, the group 'would need a *good process*', as the RCN employee observed. This remark echoed the proposal made at the meeting of the project group in which one RCN employee had suggested inviting people to an *open process* in which they could make suggestions about possible research areas to be prioritised in the new research programme. Referring to other open processes while many important stakeholders were already assembled at the workshop indicated that the foresight project was not seen as an adequate arena to discuss these questions. Setting priorities according to thematic areas was not an easy task, so a third participant suggested leaving the 'priority problem' to those making decisions. The first discussant might have wanted to address this issue at the workshop, yet his request was not part of the workshop agenda and thus not taken up in this setting.

The facilitator asked the plenary assembly to comment on the strategy process so far. The response he received was not so much about the strategy process, but about how the participants had been asked to contribute to the project.

'Why have we not talked about technological development at all?' one participant wanted to know. 'Why have you not taken advantage of the competencies of these participants?'

'The RCN decided early on to create policy foresight,' the facilitator replied.

'Why should we develop strategies here when there are already strategies published by the RCN?' a second participant asked.

'Because those are grey and boring; we want to be exciting,' the facilitator declared. Then he rounded up the discussion: 'The scenarios will be used as contributions to the development of the research programme. During the next few days there will be discussions in the RCN about new meeting places after this process. But I am not going to promise much'.

During the two two-day workshops, involving about forty people from ICT research, industry and the public sector, the participants had agreed to accept the preconditions for the foresight project specified by the invitation. By following the invitation they had accepted the convention

to regard foresight and collective scenario development as a limited agreement about 'selected features people use to control events and entities' (Thévenot 2002a, 83). The uncertainties expressed during the collective evaluations were not only related to the scenario texts, but in some instances also to whether the tasks set matched the material they were to work with. These uncertainties did not, however, raise further or more widespread objections during the process because the participants had been *engaged in* the process.[180]

Yet, as the workshop drew to a close, the agenda of the meeting had been fulfilled. This released the participants from the limited agreement about following the suggestions made and tasks set. Now questions were raised among the participants about the relationship between the foresight project's goals, their competencies and the role of strategic recommendations. These questions highlight one challenge specifically: What does it mean to create *policy foresight*? I will return to this question in the conclusion to this chapter.

Finally, the foresight project leader summarised the process of the project with all participants present:

> There have been many opinions and meeting places in this process. It has been an exciting process, especially concerning group dynamics. I hope we have all become wiser regarding foresight and its relation to strategic processes. But of course we are not finished. Now we have to establish a frame here, but you can all be active and contribute to this process; on a voluntary basis, of course. We are going to produce two reports, one internal one and one showing the results of this process. The scenarios will be used more extensively in different contexts. Next April we will conduct a conference which will summarise all foresight projects carried out at the RCN. After all, we are spending some money and time on this, and that should be visible.

Then she gave a short overview of the next meetings concerning the development of the new big ICT programme.

'Our main focus over the next few months will be the development of the VERDIKT programme,' she announced. 'Unfortunately we already have to decide about the main structure of the programme by 1 December. But that's the way things are.'

A female representative from industry expressed her reservations:

[180] See footnote on the extended meaning of 'engagement' in French (Thévenot 2002a, 81), Chapter 1, subchapter 1.5.

'Now we have to be careful VERDIKT doesn't turn into a small and hurried affair. The success of this process will be measured by how the scenarios are incorporated in the VERDIKT programme!'

'The application deadline has already been postponed by two months,' the project leader replied. 'I would really like to thank you all for giving us your time, competency and energy!'

Finally she acknowledged the work of the facilitator: 'Many of you were sceptical at the beginning. But I can see that your scepticism turned into support during the process.'

Thus the final note in this process was a reminder of the relationship between the foresight project and the reality of research programme development. The project leader informed the participants that there was very little time left to ensure the integration of the scenarios in the programme development. Yet the success of the foresight project, as underlined by one participant, would be measured in terms of the influence the scenario work had on the programme development. The project leader's first priority, however, was to keep to the prearranged time schedule.

7.8 The value of scenarios: change versus progress?

What role did the scenarios finally play in the project group's negotiations about the large ICT research programme proposal? Once the participatory scenario process had finished, the writers edited and finalised the three scenario texts.[181] The project group, consisting of RCN employees and external ICT experts, then reassembled in four meetings to discuss the completed scenarios' significance for the goals and possible research topics of the new ICT programme. For personal reasons I was not able to attend these meetings, but I have reconstructed the discussions with the help of internal reports and personal interviews.

During the first meeting on 24 November 2004 the project group agreed to write two short documents, one on possible future ICT research topics and one based on a broad visionary approach.[182] Both documents were to deliver ideas which, according to the external ICT experts,

[181] For a short version of the scenarios, see appendix 9.2. The complete scenarios (in Norwegian) at RCN (2005b).

[182] Meeting report of the UTSIKT project group 24 November 2004, unpublished.

would satisfy the ambitions of the new programme regarding future technological developments. The external experts argued that there was not enough information on technological developments in the scenarios and one of them thought the scenarios should be supplemented with technology foresight. Several RCN representatives agreed with this view. The RCN senior advisor argued, however, that the scenarios were examples of possible roads towards the 'network society'.[183] As he explained a year later, in an interview conducted in January 2006:

> The network society has much deeper implications than ideas of wireless communication or mobile phone users of the future. The others adopted the term network society willingly, but their associations were wireless communication and mobile phones. Yet that was not what I wanted to discuss. Nevertheless, the group agreed that network society could be used as a comprehensive term for the goal of the new programme.

The external experts, however, maintained that the programme needed to focus on expected technological challenges and aims. Since the scenarios had not delivered this kind of focus, input would be needed from other sources. For the second meeting on 9 December 2004, two documents were presented. One was a vision of Norway as a 'living lab'. The second included a list of priorities for ICT research for the next ten years. These included core technology, micro-technology, infrastructure, distributed applications and business models as well as rules and regulations.[184]

In response to this list of priorities, the RCN's senior advisor offered to write a document discussing strategic options and dilemmas based on the implications of the three scenarios.[185] His paper discussed radical ideas about the possible situations in which ICT research might find itself in 2015. The writer suggested that the exclusive technological or technocratic understanding of ICT would have disappeared by then. In his view, the strength of the scenarios was that they showed that technology not only enabled more effective production processes, faster communication or increased wealth and prosperity but in addition that

[183] The RCN's senior advisor based his understanding of the network society on Castells (1996).
[184] Meeting report of the UTSIKT project group 24 November 2004, unpublished. Vision document 'living lab', unpublished. Document on possible research topics of VERDIKT, unpublished.
[185] Strategy document written by the RCN senior advisor: 'Hva vil vi med VERDIKT? Noen strategiske lærdommer fra UTSIKT' (What is our ambition for VERDIKT? Some strategic lessons from UTSIKT), unpublished.

> ICT will shape society and changes will occur in unpredictable ways. ICT will cease to be a research field, and will emerge instead as a *social force field*.[186] New competences will be needed, even though the need for basic mastery of ICT will not disappear. The real innovation potential might not be where the ICT sector is looking today. Therefore more reflection is needed on the emergence of the network society.

The advisor thus highlighted the message the scenarios were supposed to be delivering, namely that choices had to be made. Not all ICT research could succeed in Norway, so some of it, basic, applied or industrial, would have to be scaled down or organised in a different way. New combinations of research to foster innovation, as well as novel social contextualisation should move to the forefront to meet the challenges written into the scenarios. According to the senior advisor the scenarios were meant to induce changes in thinking – changes in thinking about ICT research, the future and strategy.

The report from the third meeting on 11 January 2005 acknowledges that this strategy memorandum had sparked off a debate about the focus of the new research programme. The group members reminded each other that the scenarios were not literal descriptions of the future, but were intended to train the mind to think about 'strategic possibilities' and to develop 'sound practical measures'.[187] Yet because the scenarios did not contribute ideas on technological development, the stories sounded unconvincing to the ICT experts. Their strategic interests were first and foremost *competence growth* and *progress,* not *choice* and *change*.

The scenarios thus set in motion a new 'production line' of additional documents competing to define the position of the scenarios in the programme discussion. Roughly speaking there was a dividing line between *advocates of qualitative future change* and *advocates of quantitative future demand*. This rough definition is by no means meant to assign all positive values to the first and derogate the intentions of the latter, but simply to find a way of describing the difference in the perspectives of the two sides in the debate. Thinking about the production of the additional documents in terms of qualitative change and quantitative demand corresponds to some extent to the narrative structures of the different documents. Whereas the ICT professionals contributed lists of possible research topics and necessary priorities, the RCN's senior advisor

[186] In the original document: 'IKT må oppfattes som et *kraftfelt i samfunnet* snarere enn som et "fag" '.
[187] Meeting report of the project group, 11 January 2005, unpublished.

produced a pamphlet-like memorandum challenging a technocratic understanding of ICT and questioning the role of the new large-scale programme as based on core technologies. As objects of intervention, the scenarios thus led to the production of documents distinctly different in their textual structures. However, the distinction between qualitative and quantitative does not explain the differing perspectives completely. It works only partly as a possible reading, since the ICT professionals also wrote a document based on a specific vision, adopting ideas from the first scenario.

The fourth meeting on 28 January 2005 concluded that ICT must be based on research which contributes to progress in ICT. All arguments about why ICT research is necessary should be based on relevance.[188] The project group finally agreed to apply a 'dynamic definition' to ICT. The argument was that all aspects of ICT applications are constantly changing and we really cannot answer the question: 'What is ICT?' The programme proposal, published in spring 2005 was described as follows:

> The programme VERDIKT– core competence and value creation – invites projects within basic as well as applied and industrial ICT research which relate to the focus of the programme: ICT competence for innovation and cooperation in the network society. The programme will give priority to research developing generic ICT knowledge. The planned annual budget for the programme is 18 million euros.[189]

In the first programme proposal the future was thus linked to *today's values*, such as core competence, value creation, innovation and cooperation as well as the development of more generic ICT knowledge. The senior advisor's term 'network society' – intended to change the way people think about change – was also included in the same text, albeit alongside the list of priorities, which represented a compromise rather than a challenging perspective on the future. In the end the scenarios were not considered relevant enough to inform the research programme proposal. In an interview conducted in January 2006 the project leader explained why:

> We wanted to push the limits of ICT research for this programme into the social realm, but not too far, because then the programme would have ended up in applied research. It was important to include the aspect of generic ICT

[188] Meeting report of the project group, 28 January 2005, unpublished.

[189] The original programme proposal has been changed over the years to comply with changing priorities. This version is no longer available among the documents regarding the ICT research programme published online by the RCN.

> research in order to push the whole research field and contribute to progress in ICT research.

To underline her argument about the importance of including generic research, the project leader stated that other programmes financed by the RCN had already dealt with ICT applications, such as in the oil and energy sector as well as in health and medicine. In her opinion, the scenarios had had little influence on the programme.

The scenarios themselves reappeared in external presentations in other regions of Norway and were mentioned in Nordic foresight activities. In the programme proposal for the large research programme on ICT, however, they were deemed irrelevant. [190]

7.9 Research policy foresight: irrelevance or intervention?

In this chapter I have addressed the final stages of the foresight project on ICT conducted in the autumn of 2004. The first part of the chapter described the collective evaluation of the three scenarios in the final workshop on developing strategic recommendations. Here some of the uncertainties which had emerged during the writing stage and the first evaluations in the project group resurfaced during collective discussions, while the scenarios as the material outcome of the process were now subjected to more dynamic and pluralist evaluations. In this respect, the process became more open again as the scenarios could now become relevant, not so much because of their specific content, but rather in terms of their implications for directing strategic thinking either as strong policy scenarios, scenarios to be avoided or 'fuzzy scenarios' open to interpretation and various ideas about future research investment.

However, the final stage of the collective scenario process also showed that with the workshop agenda completed, the limited agreement between foresight organisers and participants about following specific methods and approaches and accepting preconditions, ceased to apply. Now the participants raised questions about the role of their competencies and the value of their strategic recommendations in relation to already existing policy documents. According to the organisers the goal had been to 'create policy foresight' instead of technology

[190] For a comprehensive evaluation of all five foresight projects under the umbrella project CREATE see Research Council of Norway (2006a). See also a reference to the results of the foresight project on ICT in Dannemand-Andersen et al (2007, 39–42).

foresight. The idea of creating policy foresight had given shape to the preconditions stipulated by the invitation, as well as the open and all-inclusive approach to driving forces, and the constantly repeated request to the participants to create (new) relations between ICT, society and research. The project was thus partly shaped by decisions taken prior to the participatory workshops about how alternative futures should be created. The foresight process itself became a political technology to achieve exactly this balancing act between the ICT competencies of the participants and the policy-oriented objectives of the project group.

The final meetings of the project group, in which the programme proposal needed to be produced, passed through similar stages to that of the scenario development process. Here the relevance of the scenarios was again negotiated, evaluated and finally assessed in relation to the first proposal for the new large ICT research programme. Now, however, in the project group consisting of ten members, half of them external experts, and the other half RCN employees, the representative status of external members from industry and academia once again involved their ICT expertise and revived the previously contingent status of technology. This resulted in activities that the groups had sought to avoid during the scenario writing stage, namely the creation of *additional texts* beside the three scenarios. Whereas the coordination of responsibility during scenario writing had ensured a result within the available limit of time and engagement, now new texts on visions, research priorities and strategic challenges supported, challenged or replaced the existing scenarios.

In this respect, the scenarios, although regarded as not relevant enough for the research proposal, nevertheless produced a certain level of intervention during the discussions on the new research programme. Different perspectives and positions in the project group materialised in new texts. The need was expressed to coordinate the research programme according to present conventions such as lists of research areas to be prioritised, the relationship between those areas and specific ways of classifying and ranking them. Thus the creation of research priorities in the scenario group was based on evaluation and calculation, and on the *authority* of those agreeing with this viewpoint to insist on the realisation of these priorities. According to Callon and Law (2005, 720) the power of calculation depends on elements like lists of entities, the number of relationships between them and how they can be classified, manipulated and ranked. In addition Law (ibid) argues that this also implies the *capacity* to calculate, i.e. the material apparatus (here

in the form of interrelated texts, such as already existing policy and strategy documents, tables etc.). I argue that it also involves *authority* to decide about priorities and create lists of them.[191] The discussions in the project group show that some group members had more authority on the subject of research priorities than others. Their authorship prevailed based on their understanding of technology as progress.

In this respect, we can see the development of the research programme proposal as a form of calculation to reduce uncertainty.[192] In comparison the scenarios expressed what cannot be calculated. However, a situation in which calculation is 'rendered impossible or highly complex requires heavy investments' (Callon and Muniesa 2003, 197). The request expressed by the RCN senior advisor to reconsider the relevance of the scenarios and to base the research proposal on a notion of *change* rather than *progress* was clearly considered too risky an investment.

A final question arises then about the initial goal of the ICT foresight project to create 'policy foresight'. Saying that the objective of the foresight project was to produce 'policy foresight', it seems, may have been a strategy to avoid reducing the discussion of priorities to issues of technological progress and development, and to include notions of change.

Yet according to the project leader, it had been especially important to highlight the aspect of generic ICT research in the research proposal, in order to 'push the whole research field and contribute to progress within ICT research'. The research programme itself was meant to take account of societal issues but not to 'end up in applied research'. The original objective of the foresight project on ICT, with its broad focus on *socio-technical speculations* rather than *technological extrapolations*, in this respect presented something of a quandary. The scenarios created were meant to contribute to 'increasing the quality of research priorities', but the need for generic and basic ICT research was not to be excluded from this process. In this respect, the foresight process discussed in this thesis shows the difficulty of relating the future value of technologies to changes in social relations and today's decisions on investment in research priorities.

One could conclude that the value of the scenarios for developing research priorities had been decided based on a linear understanding of innovation. Political geographer and STS scholar

[191] In German, my mother tongue, the word 'Kapazität' can mean both the material conditions and the status of an expert in a specific field.

[192] See Stark's argument about how uncertainty is attempted to be reduced to risk through calculation (2000, 3).

Andrew Barry explains this linear understanding as the idea that 'commercially successful new products resulted from innovative technology, which in turn resulted from advanced scientific research' (Barry, 2002, 152). Applied research, studying present and potential uses of technology and how these could be incorporated into different social contexts, could be seen as a counterweight to this linear understanding of innovation. These diverging perspectives on technology can be found in many institutions occupied with the regulation of science and research policy, for example the Directorate General for Science, Research and Development of the European Commission (previously DG XIIA) (Barry 2002). Yet to reduce these different viewpoints on socio-technological development to a discussion of change versus progress would not do justice to their complexity, a complexity which certainly deserves further research, in general as well as in the context of foresight and future orientation.

Producing limited lists of research priorities deemed important is a dominant way of dealing with policy issues, prevailing over the production of future scenarios as rhetoric repertoire. The complexity of possible futures, however, is doubtless more effectively captured in stories than in short points.[193] Ultimately, what effect such scenarios have is likely to depend on their quality as narratives, and on who is willing to read them and use them to think about strategic possibilities beyond limited lists, established relations and classifications.

Present priorities and future values belong to different worlds which may be brought closer through foresight if it contributes just as much to *opening* as to *shaping* the future. The story of the ICT foresight project at the Research Council of Norway is the story of an attempt to achieve such an opening, in a particular way and in a particular context. In this respect, it resonates with similar efforts to govern the social, technological and political on different scales – institutional, national, and international. This thesis has focused on discussing an example of foresight in practice and on showing the challenges it produces as a new way of governing between uncertainty and convention.

[193] Barry (2002, 154) gives the example of a conference organised by the DGXIIA unit FAST (Forecasting and Assessment of Science and Technology) in 1993 at which 'a hundred researchers over three days attempted to condense a vast body of research on the complexity of the global technological and economic system into five short point that could be presented to the Commission later that summer in an effort to influence policy. The notion was that only if arguments [...] were put in a simplified form would they have any chance of convincing senior political figures. This particular effort failed.'

8 CONCLUSION

The aim of the conclusion is to underline some of the arguments made in this thesis, to explain how my perspective developed during the study and to ask which questions it might be worth pursuing further. Since I have studied a single case I am wary of trying to deduce universal lessons about foresight practice. I nevertheless believe there are some issues concerning foresight and research policy-making as well as participatory processes in public institutions which this case study has brought to the fore and which I would like to highlight in this conclusion. These issues include responsibility, uncertainty and the value of collective future orientation. Therefore, while seeking to avoid 'conceptual closure' (Flyvbjerg 2006) at the end of this thesis, I would like to suggest a few concepts that might be pursued further when studying foresight, public participation in policy-making or 'communicative planning' in regional and local government (Pløger 2001, Hagen and Asmervik 2003).

First I will discuss a few analytical strategies I adopted while studying foresight as a process. Second, I will revisit the five features of foresight which I consider as enabling foresight practice to travel between different contexts and locations. Third, I will recap my theoretical approach and highlight the relationship between theoretical concepts and strategies found in foresight practice that support my understanding of foresight as driven by two forms of coordination, convention and non-calculation. Fourth, I will discuss the concept of foresight as power, returning to the scenario writing phase as an important part of the whole process. Here I will argue for further research into the 'conventions of engagement' at work in collective foresight and other participatory processes. Finally, I will look beyond foresight and the questions raised in this thesis and ask more speculatively what might make a difference in the creation of futures.

8.1 Foresight as process: opening and shaping the future?

In this thesis I have discussed a case of participatory foresight in research policy and programme development. My aim was to show how the future is opened and shaped collectively through coordination and evaluation. *Opening the future* is the term I used to describe coordinating activities aimed at including multiple perspectives on a particular issue and thus

seeking to tap the unexpected, creative and new. *Shaping the future* was the term I used to denote evaluations used to sustain the relevance of the process with regard to its original objectives. *Opening* as an activity was thus related (mainly though not exclusively) to participation, while *shaping* was related to relevance. Using these terms in a contrasting manner to describe participation and relevance was an analytical strategy that emerged during my study. It enabled a topic to be discussed that is high on the foresight agenda and also on that of other formally future-oriented activities. Stakeholder inclusion, citizen participation or user involvement are all pertinent issues at the intersection between social, political and technological concerns. Here, however, participation referred not simply to the involvement of external stakeholders, but to the collective effort engaged in by project organisers, facilitators, invited participants, hired consultants and employees of the institution responsible for the project. Taking the focus away from the demarcation line between external and internal stakeholders was an analytical approach which allowed the foresight process to be studied not as a negotiation of differing interests between project organisers and invited participants but rather as a *collective engagement in a common concern*. Using this approach I argue that foresight is not necessarily about aligning different perspectives but about coordinating participation and relevance, which raises paradoxes and challenges of its own.

Studying how the future is opened and shaped collectively was the task I set myself at the beginning of my investigations. As my study proceeded it became more of a guiding line for exploring the relationship between three issues emerging during my observations: *responsibility for*, *uncertainty about* and the *value of* foresight. This also meant shifting the focus more towards the coordinating activities of the project organisers and looking at what they achieved during the process.[194] Yet these issues were not separate from the collective engagement in the project; they emerged during the interactions between invited participants and organisers. Here it is important to underline that responsibility was initially unevenly distributed and was redistributed during the process – not only among employees of the RCN, the initiating organisation, but also among organisers, project owners and invited participants. While there was a clear formal allocation of ownership assigned to various representatives of the RCN and the project group responsible for conducting the project, the process shows how attempts were made to make ownership and responsibility *collective*.

[194] See also Jenssen (2007).

Asking specific research questions at the beginning of my study of foresight was a second analytical strategy I adopted to put a certain distance between me as the researcher and my object of study, the participatory foresight project on ICT. Here I draw a distinction between *critical* distance and *relational* distance. Critical distance to a study object implies that there is already a pre-adopted position, a critical view of the object which may in some respects predetermine the results of the study. This viewpoint can also be partial, in the sense of taking a critical view of certain aspects of the study object – e.g., its political implications or actual implementation – while being more open or favourably disposed towards other aspects of its realisation. Most social research will ultimately point out shortcomings, challenges or potential improvements and thus contribute to a certain critique of existing realities.

Relational distance, on the other hand, additionally acknowledges that the study object is also re-enacted through the way it is represented in a study, i.e. that a study does not convey a *representation* of the study object but a *relation*. Relational distance does not assume that the studied object is a stable and real thing located spatially and temporally 'out there', but that it becomes something new and different by being studied. This distance is not something that comes naturally or automatically. It has to be achieved. It entails selection of data, prioritising of questions, reflection on perspectives and the weighing of theoretical and methodical tools and their relevance for the investigation. My study conveys this relation first and foremost in the selection of a limited number of ethnographic moments from the many notes collected and in relating the public sources of information about the project and its context to the observations discussed here. In that respect, a researcher has two responsibilities: first, to highlight the specific relational distance which has been achieved by re-enacting the research object; and second, to provide an account of her critical distance to the research object and to describe how this was pre-adopted or emerged during the study.

Two questions guided my study: How does the interaction between stakeholder involvement and the need for a result useful to the organisation produce future stories? To what degree are participants' contributions to a particular story about the future an effect of coordination? While initially I thought these would enable me to uncover the multiple challenges and issues of participatory foresight, in some respects they became increasingly problematic. Doubtlessly, the scenarios were produced to help develop the RCN's research policy and establish priorities in a

large ICT research programme. However, what does it mean to involve stakeholders in this process?

Practice shows that involving stakeholders is not only a matter of recruitment and design, but is also shaped during a foresight process. Organisers and project owners need to establish mutual trust with the stakeholders if their contributions are to be sufficiently valued. Yet this requirement must be balanced against the need to create specific texts to meet the organisational and political expectations associated with a foresight project. My study shows that there were strategies to open the process, e.g., by removing frames of reference in the collection of driving forces or by proliferating choices of scenario models or necessary scenario criteria. This did not always increase creativity and openness, however, but also created uncertainty about the participants' individual and collective competence for achieving coherent stories and about the strategic relevance of fictitious relationships between technology, society and research.

The second question was to what degree the participants' contributions to the scenarios were effects of coordination. During my observations of the different stages of scenario development I realised that contributions are never brought into the process by the invited participants' competence and creativity alone. They are shaped by process objectives and design and by the ways participants are recruited and methods and approaches applied even before the start of participatory workshops and collective scenario creation. In this respect, participants' contributions to a foresight project are always an effect of organising.[195]

So how are futures opened and shaped in participatory foresight? Futures in foresight are not the 'real futures' awaiting us in the decades to come, but places to explore different possible, plausible, preferable or undesirable outcomes of present realities, activities and decisions. Presenting the future as a political and economic state of affairs a decade away from today's concerns produced specific uncertainties about how to evaluate what should be relevant or what it might be important to include in the scenarios. These uncertainties in themselves raised political and economic issues during the process. In this respect, the future was not only opened and shaped collectively but also *simultaneously*, by keeping several options open throughout the process of achieving relevance.

[195] See also Jenssen (2009) on how pre-defined stakeholder images shape contributions in municipal visioning processes.

Does this perhaps mean that there is no difference between opening and shaping the future? Are there other coordinating activities at work which remain hidden or are rendered irrelevant by focusing on opening and shaping the future in a foresight process?

At this point I have no answer to these questions, but I see them as important. They point back to the requirement stipulated by researchers to look *at the future* in order to distinguish between foresight's rhetoric and the complexities of its practical implications (Brown et al. 1999). Openness, transparency and authenticity are issues that are repeatedly debated in participatory processes at the intersection between society, technology and politics (Brown and Michael 2002a), just as relevance, result orientation and effective coordination are important issues when it comes to the capacity of policy institutions to make responsible and reflexive decisions about collective futures (Beck et al. 2003). In this sense my study has shown that *the rhetoric of foresight is part of its practical implications*. Rhetoric cannot be separated from practice; it must be understood as part of practice and outcomes. Studying foresight as a process has hopefully contributed to the collective academic endeavour to look *at the future* and to explore how the future 'as a temporal abstraction is constructed and managed, by whom and under what conditions' (Brown et al. 2000). While research questions and analytical tools are always incomplete they can nevertheless increase an understanding of complexity and induce curiosity about how it might be different.

8.2 Foresight as technology: the unstable field of practice

In the emerging health and life sciences in which old barriers between science and technology are receding (as for example in bioengineering), innovation concepts are increasingly being shaped by expectations and promises, and 'competitive pressures' are forcing social action to 'increasingly occupy future positions of advantage' (Brown and Michael 2003, 6). The exploitation of future opportunities is now driving development and has displaced the passive mode of expecting the future to be based on established routines and habits (ibid).

These arguments, which roughly represent the cornerstones of the sociology of expectations, have enabled us to take a new approach to science and technology studies by highlighting the importance of including the future as a research object. Compared with the 'expectations as

drivers' perspective I have here investigated future orientation as tightly linked to organisational issues and established policy activities. In this respect I have sought to increase understanding of formalised future orientation and 'of the ways in which shared understandings actually emerge and about how they can be sustained' (Berkhout 2006, 307).

I have approached foresight as being characterised by five features forming its 'immutable content' which enables foresight practice to travel between different contexts and locations. First, the requirement for a specific competence about how to make sense of the future; second, the understanding that foresight is above all a systematic way of thinking about the future; third that it should be both forward-looking *and* forward-acting. By including a fourth feature concerning unintended effects in my analytical framework I wanted to pursue the question of whether foresight as a relatively recent approach can generate effects not already established in objectives and methods and whether these effects may be valuable and worth preserving (Brown et al. 2001). The fifth feature, which deals with creating futures between social priorities and technological possibilities, is often related to the demand to include a broad variety of participants in foresight processes, similar to a 'democratisation of science' as envisaged by Funtowicz and Ravetz (1993) in their call for extended peer communities on policy-making issues. Participants should not only be scientific experts, officials and professionals but also stakeholders with hands-on experience of certain policy issues, such as dealing with epidemics or environmental hazards.

In my study these five features represent the ongoing negotiation of the *credibility of foresight* as both a systematic and a democratising approach to future challenges, and the *legitimacy of foresight* as an adequate set of rational approaches to policy-making, which include scientific, managerial and deliberative tools for steering and governing. In the foresight project studied here these features had implications for design, recruitment and process and generated specific effects during the process as well as influencing the eventual outcome of the project. For example, the demand to be both forward-looking and forward-acting created a mode of production which subjected the process to organisational routines and time management and eventually highlighted uncertainties about how to discuss strategies based on the three scenarios, each of which were perceived differently by the participants who had created their original content.

The feature concerning unintended effects proved to be the most evasive and analytically ambiguous. What can be perceived as intended or unintended effects is not always clear. Besides creating scenarios there are a number of other objectives associated with foresight such as fostering new networks between participants, contributing to collective discussions of the future not necessarily included in scenarios and learning about the potential and limits of foresight through practice. These intended effects also played a role here, but they were not part of my study and thus have not been discussed as effects of the foresight project. The effects I observed during the concrete coordination process of creating scenarios were rather expressions of uncertainty about the project, signalling the need for further research into the practice of foresight in order to better understand the intended and unintended effects of coordination on the concrete results for policy- and decision-making.

This thesis is thus also a study of political practice. By including foresight in the range of both steering and deliberating technologies characterised by these five features, I argue that foresight has definitely left the anteroom of politics and has taken a seat beside other planning instruments in the high office of governance. However, whether it is influential in the corridors of power, is regarded as a legitimising prerequisite for other processes or produces entirely different effects can only be understood by looking at each case individually.

8.3 Foresight as convention: connecting practice with theory

One question which connected my case study to the field of foresight practice was that of the value of foresight in policy-making. What does it mean if a specific formal approach to the future is regarded as valuable for coordinating policy processes on the national, transnational, regional and institutional levels? How can this question be approached from the point of view of a single case study rather than from a taxonomy of different practices of foresight? How can value be studied in practice, in the socio-material activities of different actors? I have chosen to regard the creation of value as an activity – as *evaluating* – and evaluating as part of the coordinating activities of the foresight project.

First, my intention was to study foresight practice in the light of several theoretical perspectives. In the first chapter of this thesis I advocated applying STS and recent actor-network

approaches such as the use of the collective, to the study of foresight. However, using STS and recent ANT more extensively raised a problem. The temporal limit of a specific short term project did not correspond productively with discovering and imputing *patterns* (Moser 2003) or *modes of ordering* (Law 1994) observable after a longer period of ethnographic research. Rather than using patterns I therefore chose to discuss ethnographic moments. Although the creation of texts about social and technological change seemed to correspond well with STS concerns about materiality, agency and complexity, I saw a need to include theoretical tools that could enable a discussion of scenario development based on dialogues and collective task performance over a short time-span of a few months.

The sociology of expectations provides examples of ethnographic approaches and single and multiple case studies. It also includes STS perspectives and shows how technological developments are negotiated through future orientation. Increasingly, however, the problem emerged that this specific approach focuses on expectations as actors and drivers of development. Whereas in Chapter 2 I identified specific expectations connected, expressed and acted upon within the ICT foresight project, I found that in order to use the observational material collected I needed to focus my attention more on the *actual interactions within the process* than on the expectations framing the project or randomly expressed during the project. Rather than being drivers of the project, I found that expectations were synthesised during the project, in the sense that attempts were made both to merge them and to make them synthetic or artificial, in other words 'formalised'.[196] Yet what I wanted to do was to find out what moved this project forward. Expectations did not play a central part in this coordinating process. While initially offering a multitude of inspirational perspectives the sociology of expectations in the end did not play as prominent a part in my study as I had expected.

Another theoretical approach I initially intended to follow but then abandoned was to discuss the process in terms of reflexive modernisation and reflexive future orientation (Beck et al. 1994, Lash 1994, Beck et al. 2003, Latour 2003, Lash 2003, Voß, Bauknecht and Kemp 2006). This included reflexive approaches (Woolgar 1988, Wynne 2002, Bruun Jensen 2005, Cañellas-Boltà

[196] See Berkhout (2006) and Salo et al. (2004) for different perspectives on the 'synthetic' in foresight. I have used these perspectives as a basis for discussing synthetic expecations at 'Expectation–building and innovation processes', 17–18 September 2009, Zürich.

and Strand 2006) and reflexive design in governance and organisations (Cunliffe 2003, 2005, Grunwald 2004, Grin, Felix and Bos 2004). However, although I found that reflexivity can be a fruitful concept when studying documents and analysing interviews it became less useful for a study of face-to-face interactions. The discourse on reflexivity, its productivity and its limits did not sit well with my observations of dialogues and task performance and the dynamics of undetermined aspects of coordination. As a social theory reflexivity became at once too comprehensive and too specific.[197]

Eventually it was Thévenot's perspective on conventions as complex coordinating devices that deal with the 'limits of more localised engagements, when there is a need for third-party assessment' that became the way I chose to connect coordination and evaluation to the question of value in foresight. Nevertheless, when I followed Thévenot's discussion of conventions through several publications (2001a, 2001b, 2002a, 2002b, 2006, 2007), the idea that, on the one hand, conventions include undetermined, dynamic and creative aspects of coordination (2002a) and, on the other, that conventions 'channel uncertainty through a conventional formatting of events' (2006) seemed to produce a contradiction. How could conventions be discussed as both 'undetermined and dynamic coordination' and 'conventional formatting'? Rather than seeing this as a paradox, I tried to make use of this tension by using 'common forms of evaluation' as the connecting link between these two perspectives.[198]

In this way I have tried to highlight that there are two different forms of coordination which become influential in foresight practice. Arguing for these two forms of coordination is also a way to combine my use of STS and ANT resources with the inspirations I received from convention theory. The first contributes to opening the future through *non-calculation* (Callon and Muniesa 2003, Callon and Law 2005). Achieving non-calculation is done through two different strategies, *rarefaction* and *proliferation*. Both emerged in the process of inviting participants, creating scenario ideas and writing scenarios. As I have shown, they involved an entanglement of different elements, such as material, human, conceptual; and produced multiple, often unexpected effects. Both were meant to produce creativity and to address the future in an open way, i.e. through removing participants' representational status, removing frames of

[197] However, it was a fruitful approach in the study of a vision project in a Norwegian municipality (Jenssen, 2010).

[198] See Chapter 3, subchapter 3.5.

references or offering a multitude of important criteria to relate to. As I have shown, they also produced uncertainty, for example about competence, relevance and credibility of the foresight process.

The second form of coordination is based on *conventions*, in the broad and complex understanding represented by Thévenot's work. Two strategies in particular contributed to shaping the future and producing results of the project relevant to the project owners. The first was the attempt of the project group and the writing group to *create equivalences across contexts* to justify the production of scenarios about ICT research in 2015. The scenarios would have to be qualified for evaluation in different contexts and thus had to be aligned with certain conventions of documents used in policy contexts.

The second convention was the collective coordination of *evaluating what was considered irrelevant*. What I experienced as most striking in following these two strategies in practice was how they produced specific silences. Certain questions remained unanswered, specific situations were not commented upon and proposals were expressed without being followed up. These silences however were necessary to ensure producing specific texts, which could inspire strategic thinking, assign a certain role to ICT research and maybe even produce unexpected effects.

Recapitulating and summarising the most important theoretical concepts in this way I want to underline that these forms of coordination are something which I *both detected and imputed* in my fieldwork material (Moser 2003). I found them compelling because they helped me to gain a certain understanding of value in foresight, and collective coordination of value in general. They also made me attentive to the issue of responsibility, how engagement relates to responsibility and how we can understand uncertainty in practice. These forms of coordination, non-calculation and conventions, do not exist separate, but influence and condition each other. This means that conventions alone cannot explain coordination under uncertainty. Non-calculation can be used as a complement and counterpart to its explanatory potential. However, as with all concepts used to discuss empirical material, these are subject to revision with each new context and location visited and observed. They have highlighted particular challenges of foresight in research policy while restricting the discussion of other issues.

As a contribution to the field of science and technology studies and recent actor-network studies, I want to argue that using convention theory can add a specific sensibility to issues of

responsibility and particular its relationship with engagement. As Thévenot (2002, 75) observes: 'Will a symmetrical treatment of human and nonhuman beings, and the conception of their relationship as a network, lead us to get rid of the notion of responsibility, a central category in moral issues?' That the answer to that is negative has been shown by much STS and ANT work in recent years and this study of participatory foresight in research policy is meant as one possible contribution to this endeavour.

8.4 Foresight as power: writing relevant scenarios

My thesis has focused specifically on the writing phase in scenario creation. Following Wright (2005), who sees scenarios not as innocent practice but as social and collective constructions, I argue that it is during the writing process that the ambitions of a foresight project emerge as explicit negotiations of scenario content, number and form. It is here that the credibility and relevance of scenarios are coordinated and competences performed. I followed this process in Chapters 5 and 6 and showed how writing was coordinated by distributing responsibility and creating equivalences across contexts. My point is that the action of writing scenarios can be studied fruitfully as a form of collective coordination and evaluation. Whereas it is for most research purposes not interesting to follow the individual activity of writing, this approach enabled me to study how scenario ideas, drafts and texts are selected, ordered and transformed in collective processes.

The question I wanted to target is how writing is distributed in scenario creation and how responsibility and engagement can be understood in relation to power. This is part of a broader question about the distribution of responsibility in foresight projects. Having studied the EU-funded *ForSociety* ERA-net project, which was designed to enable coordination among the national foresight programmes of fifteen countries, STS scholar Mikko Rask (2008, 1163) explains: 'Most of the foresight programmes/activities analysed were structured around a core group of key actors with the responsibility for choosing topics treated, scenarios written and recommendations given.'

Such high-level coordination processes raise questions about who is able to influence the outcomes of foresight processes. My approach has been to link the question of responsibility to

that of engagement. In my view, including engagement brings out issues of collective agency which would be left out if responsibility were simply to be defined as being accountable for a process and result. This makes the question of power in participatory foresight processes more complex, because engagement without responsibility can influence outcomes just as assigning responsibility can be met by disengagement, both regardless of the status of the participant in the project.

Participation in writing scenarios is thus responsibility coupled with engagement, which distinguishes scenario writing from, for example, responsibility for distributed writing in service companies (Callon 2002) or the collective writing of budgets in municipalities (Czarniawska-Joerges 1992). In particular I want to argue that it highlights the activities of those writing the scenarios as *being between writing* and *authoring*. People collecting, ordering and transforming multiple scenario ideas, sketches and models into coherent narratives are responsible for representing collective ideas in a justifiable manner *and* creating relevance to multiple contexts both within and outside the foresight project. In addition to that, notwithstanding the collective effort involved in creating representative scenarios, narrative competence and individual perspectives interact and allow certain ideas to become more prominent during the writing process. It is an expression of my critical distance to this observed phenomenon that I do not regard this just as the everyday necessity of process management but as an important aspect of scenario writing and foresight practice which deserves further investigation.

I want to argue that this is an important but also difficult area of research. How can this question be studied further? Economic priorities in the development of national research strategies work as an underlying legitimation for foresight processes geared towards scientific and technological advances and for a distinctive role of research as enabling progress. In this context, all distribution of responsibility can be interpreted in the context of working collectively towards a common good, by involving necessary competences and relevant stakeholders and assigning process coordination to institutions with the authority to make decisions or at least contribute with influential recommendations.

This context or frame of working towards a common good is linked to the certainty narrative that assumes the ‘inevitability of the development of particular technologies’ (Brown et al. 2000, 4). Yet it is also linked to the assumed existence of universal values which everybody can agree

upon without reflecting on 'what the good values are and whether planning should be an activity at the service of good' (Hagen and Asmervik 2003, 5). The difficulty for the analyst is that 'we cannot place ourselves outside the world of expectations as if we were objectively disinterested observers' (Brown et al. 2005, 3). I want to argue that a good way of studying foresight practice is to look at the process as an observer and reflect on this particular frame of collective engagement in a common good. I suggest that further research might investigate the *conventions of engagement* at work in these coordinating practices and see conventions both as limited agreements *and* formatting devices. This seems to be a perspective which could uncover wider implications for the practice of participatory processes. The experiences collected in this study and similar public future orientation projects suggest that the concrete coordination of such processes is often taken for granted and thus not regarded as an issue.

8.5 The value of futures

According to STS scholar Andrew Webster (2007, 469) foresight methodologies adopted by most government agencies remain 'extremely limited in their tie-in with innovation dynamics'. He argues that: 'Foresight is primarily a form of futures thinking that serves the interests of various social (including economic) elites and does little to include other voices that might ask whether the priorities chosen serve broad social values.' Foresight thus involves specific social groups largely responsible for the creation and distribution of knowledge conventionally seen as legitimate for informing research and development priorities. There are other forms of participating in future orientation which are more open and include social stakeholders such as consensus conferences or citizens' hearings.[199]

Perhaps the challenges of foresight highlighted in this thesis can be explained against the background of existing and stable innovation networks (ibid, 468) consisting mainly of academic, government and industry representatives which are difficult to change or expand, even if a 'wider than normal debate' is one of the requirements for a foresight project. Yet rather than looking for explanatory resources that might rank this case of foresight practice in terms of success or failure, I want to ask how futures thinking might be valuable as a form of engagement

[199] For an overview of participatory methods see the Danish Board of Technology, www.tekno.dk. See also Bruun Jensen (2005) for a case study of citizen projects and consensus building.

which makes a difference. This question goes beyond foresight as a relatively established approach to policy-making and looks instead at the broader field of participatory future orientation. However, it also presumes that the future of foresight is not settled (Brown et al. 2001, 3) and that its potential is therefore dependent on contexts and on the ambitions of those employing it. In this respect I follow Moser's argument about ordering and opening and argue that the potential of foresight to make a difference remains open precisely because it needs to be 'enacted anew in every instance' (Moser 2003, 299). The question remains what this difference might consist of.

Doubtless the demand for broader participation and inclusion of multiple perspectives is part of this question of potential, but should not be reduced only to this. Openness, as I have argued, is coordinated in collective foresight through different strategies of non-calculation and investment in creative uncertainty, including participation, but also through specific methods of scenario creation or coordinating policy discussions. In each process of future orientation we can ask what these forms of openness are meant to achieve. Following Callon and Law (2005) I have tried to show that various strategies of non-calculation, i.e. opening a process, can have different social, political or moral effects.

Both the demand for specific forms of openness and the confirmation of relevance are deeply embedded in our understanding of participatory processes. This leads me to ask: Can we think about creating futures (verbal and written) which make a difference in this continuous quest for openness and relevance? Can we think outside this framework for our futures at all and does this have any practical, political (or social, or cultural) value? Should collective creations of future scenarios in public organisations produce a sense of estrangement from our material and semiotic present?

According to science fiction writer and theorist Samuel R. Delany, linguistic distortion used in science fiction is 'neither allegorical nor satirical in its essence' but the result of 'random combination and orderly recomplication'.[200] In this respect, participatory scenario creation, which involves collecting and ordering numerous scenario ideas and making them more complex through writing, is not so different. Yet collective foresight is meant to say something relevant about our future(s) and take the implications of various future stories seriously, while science

[200] Samuel R. Delany, quoted in Parrinder (1979).

fiction uses the future simply as one of a number of linguistic strategies to create entirely different universes.

The role of the future in foresight and scenario development has been questioned, since foresight could just be seen as 'management and resource allocation methodology or strategy development under a different name' (Staton 2008, 64). As Borup et al. (2006, 296) argue, scholars should now combine looking *at the future* with looking *into the future* and thus assume responsibility for the possible implications of analytical investigations of foresight and other future-oriented practices. What the future could, should or should not be is part of the value of participatory future orientation and perhaps requires us to think about the future in a more unconventional way, both as foresight practitioners and foresight analysts.

9 APPENDIX

9.1 Attended meetings and workshops of the foresight project on ICT at the RCN

2004	18 & 19 September	27 September	4 October	5 October	7 October	12 October morning	12 October afternoon	21 & 22 October
Meeting (whole day meetings)	Scenario workshop on drivers, models and drafts	Writing group	Writing group	Project group	Writing group	Project group	Project group	Scenario workshop evaluating scenarios and discussing strategies
Participants*	37	10	10	6	10	6	5	32
Agenda	Collecting driving forces, creating scenario models, collecting ideas for scenario narratives	Reaching consensus about merging scenarios, Develop three scenarios further	Discussing the format of the three scenarios, texts, visuals and models	Discussing the content of the new ICT programme VERDIKT, discussing use of scenarios for the programme	Discussing the written scenarios, developing them further, collecting ideas to differentiate scenarios	Discussing the content of the scenarios in detail, evaluating them according to programm e relevance	Presentation and discussion of programme NORDITE in relation to VERDIKT *Material not included in thesis*	Increasing actions in scenarios, collecting 'strategic actions', suggesting strategies/ policies for the RCN
Facilitator	Yes	Yes	Yes	No	Yes	Yes	No	Yes

*The author (or – as in three meetings– the author + assistant) as observer is not included in the count.

9.2 Short summary of the three scenarios

The following text is a translation of a short overview of the three scenarios produced in the UTSIKT project. It is taken from the report on the UTSIKT project (RCN 2005b, 26–7) which also includes the complete scenario texts (ibid, 41–65). Both the overview and the complete texts are originally in Norwegian.

Three ICT scenarios

eConsumption

By 2015 Norway has become richer than ever because of oil resources. This prosperity has stimulated greater consumption, and Norwegians are curious about innovations in ICT. ICT development is user-oriented. Users are both active and passive but can in both cases be difficult to satisfy. Some use ICT first and foremost for entertainment and leisure; others regard it as a means of personal development. The focus in the research effort moves from hardware and software to user ware. A clear boundary emerges between technological research and research on ICT applications. Basic research is mostly about enabling user-friendly solutions. Norway relies on basic research in the EU, and major components of research funding are now channelled via Brussels. Norway becomes a test lab for ICT innovation in the EU. ICT plays a key role in the private sector as a 'business enabler'. The possibilities for launching new ICT services are good, but the market is tough. The time-scale is generally short, and interest in the development of long-term competence and new challenges linked to converging technologies like nano-bio-cogno is marginal. Concerns about high technology consumption are tacitly ignored.

Out of Sync

In 2015 many people have lost patience with ICT. People are sceptical about technology which often steals time and complicates everyday life. ICT has become omnipresent; even if it allows patients with digital implants to be monitored precisely and effectively there are obvious disadvantages. Nobody really knows what might happen to the enormous amounts of surplus information generated. ICT has contributed to removing the boundary between technology-generated and human-generated functions. For this reason important social groups have major

reservations about ICT, and ICT research is regarded as a problematic area of investment. Advanced ICT has come to be taken for granted as part of everyday life and few citizens need to worry about having the necessary skills to use it Academic ICT research experiences lean times. In a world full of unrest and failing international cooperation, the big global market actors take over most of the initiative in ICT development. The Internet falls apart and is replaced by a regional splinter-net. The leading Norwegian talents wind up in 'Corporate Universities' owned by companies like Microsoft-Novosto. The European research cooperation encounters difficulties, except for one interesting area: There is a strong demand for new surveillance systems to strengthen European security.

The Spirit of the New ERA

This scenario starts with Norway being thrown into a crisis caused by Kværner[201] going bankrupt. Norway witnesses the worst unemployment since the thirties. Industry moves abroad or is decommissioned. Out of this crisis a new awareness arises that the country needs new innovation policies based on a more wholehearted understanding of the knowledge society. Tax-neutral policies are abandoned. The oil fund is used to establish a research fund worth 30 billion kroner and these resources are channelled into a new infrastructure, modernisation of the public sector, and competence development. Norway becomes even more actively engaged in European research and innovation cooperation and takes the lead in working for a European software policy. Norway tries out innovations and starts a systematic recruitment of foreign researchers and people with special competencies. In 2015 a number of Norwegian research communities start to flower, and internationally successful small- and medium-sized ICT companies emerge. Competition within academia is fierce, however. The knowledge society offers a broad variety of economic and cultural possibilities. Many citizens start finding it difficult to keep pace in a society in which there is a constant demand for learning and readjustment.

[201] Kværner was a Norway-based engineering and construction services company in existence between 1853 and 2005 when it was merged with Aker ASA (http://en.wikipedia.org/).

10 REFERENCES

Adam, B. 2005. Futures in the making: perspectives & methodological dilemmas. Paper presented at conference on 'Researching expectation – theory & method', 18–19 July, University of York.

Adam, B. and C. Groves. 2007. *Future matters: action, knowledge and ethics*. Leiden and Boston: Brill.

Akrich, M. 1992. The de–scription of technical objects. In *Shaping technology/building society: studies in sociotechnical change*, eds. W. Bijker and J. Law, 205–44. Cambridge, MA: MIT Press.

Alexander, J., B. Giesen, and J. L. Mast. 2006. *Social performance: symbolic action, cultural pragmatics and ritual.* Cambridge: Cambridge University Press.

Amsterdamska, O. 1990. Surely, you must be joking, Monsieur Latour! *Science, Technology and Human Values* 15: 495–504.

Arnold, E., S. Kuhlman, and B. van der Meulen. 2001. A singular council: evaluation of the RCN. Technopolis.

Asdal, K. 2002. Forskningsråd og kunnskapsmakt. In *Makt– og demokratiutredningen*, eds. S. Meyer and S. Myklebust, 102–24. Oslo: Gyldendal.

Asdal, K. 2004. *Politikkens teknologier. Produksjoner av regjerlig natur*. PhD Thesis, University of Oslo, Norway.

Asdal, K., C. Borch and I. Moser. 2008. The technologies of politics. *Distinktion* 16: 5–10.

van Asselt, M. B.A. 2007. Critical challenges in future telling. Paper presented at 'Negotiating the future', 7 June, University of Oslo, Norway.

van Asselt, M.B.A., J. Mesman, and S. A. van't Klooster. 2007. Dealing with prognostic uncertainty. *Futures* 39, no. 6: 669–84.

Barré, R. and M. Keenan. 2008. Revisiting foresight rationales: what lessons from the social sciences and humanities? In *Future–oriented technology analysis – strategic intelligence for an innovative economy*, eds. C. Cagnin, M. Keenan, R. Johnston, F. Scapolo, and R. Barré, 41–52. Heidelberg: Springer Verlag.

Barry, A. 2001. *Political machines: governing a technological society.* London and New York: Athlone Press.

Barry, A. 2002. In the middle of the network. In *Complexities: social studies of knowledge practises*, eds. J. Law and A. Mol, 142–65. Durham and London: Duke University Press.

Barry, D. and M. Elmes. 1997. Strategy retold: toward a narrative view of strategic discourse. *Academy of Management Review* 22, no. 2: 429–52.

Beaulieu, A. Scharnhorst, A. and P. Wouters. 2007. Not another case study: a middle–range interrogation of ethnographic case studies in the exploration of e–science. *Science, Technology & Human Values* 32, no. 6: 672–92.

Beck, U. 1992. *Risk society: towards a new modernity*. London: Sage.

Beck, U., A. Giddens, S. Lash, eds. 1994. *Reflexive modernisation: politics, tradition and aesthetics in the modern social order*. Cambridge, UK: Polity Press.

Beck, U., W. Bonss, and C. Lau. 2003. The theory of reflexive modernisation: problematic, hypotheses and research programme. *Theory, Culture & Society* 20: 1–33.

Beery, J., E. Eidinow and N. Murphy, eds. 1992. *The Mont Fleur scenarios: What will South Africa be like in the year 2002?* DEEPER NEWS® Global Business Network.

Berkhout, F. 2006. Normative expectations in system innovation. *Technology Analysis & Strategic Management* 18, no. 3/4: 299–311.

Bibel, W. 2005. Information technology: key technologies for Europe. Expert group report, EU Commission, DG Research, the science and technology foresight unit, http://cordis.europa.eu/foresight/kte_expert_group_2005.htm (accessed February 2010).

Bijker, W. B., T.P. Hughes and T.J. Pinch, eds. 1987. *The social construction of technological systems: new directions in the sociology and history of technology*. Cambridge, MA: MIT Press.

Bishop, P., A. Hines, and T. Collins. 2007. The current state of scenario development: an overview of techniques. *Foresight* 9, no. 1: 5–25.

Bloor, D. 1974. Popper's mystification of objective knowledge. *Science Studies* 4: 65–76.

Boaventura, J.M.G. and A.A: Fischmann. 2008. Is your vision consistent? A method for checking, based on scenario concepts. *Futures* 40, no. 7: 597–612.

Böhle, K. 2002. Defining the European Commission's role in the ERA of foresight. *Technikfolgenabschätzung* no. 2: 136–41.

Böhle, K. 2003a.On key issues of foresight: participation, prioritisation, implementation, impact. *Technikfolgenabschätzung* 12, no. 2: 32–8.

Böhle, K. 2003b. Foresight somewhere in the expanse between futures and technology assessment. *Technikfolgenabschätzung* 12, no. 2: 5–10.

Boltanski, L. and L. Thévenot. 2006. *On justification: economies of worth,* transl. C. Porter. Princeton: Princeton University Press.

Bood, R. 2002. Exploring the future as social practice. Paper presented at 'Probing the future: developing organizational foresight in the knowledge economy', 11–13 July 2002, University of Strathclyde Graduate School of Business, Glasgow, UK.

Borup, M., N. Brown, K. Konrad, and H. Van Lente. 2006. The sociology of expectations in science and technology. *Technology Analysis & Strategic Management* 18, nos. 3/4: 285–98.

Brown, N., A. Nelis, B. Rappert, A.Webster, F. Anton, C. Cabello, L. Sanz-Menéndez, A. Lohnberg, and B. van de Meulen. 1999. Organising the present's futures – towards an evaluation of foresight, knowledge flows and the coordination of innovation. http://www.iesam.csic.es/proyecto/formwp1.pdf (accessed February 2010).

Brown, N., B. Rappert, and A. Webster, eds. 2000. *Contested futures: a sociology of prospective techno–science*. Aldershot, UK: Ashgate.

Brown, N. 2000. Organising/disorganising the breakthrough motif: Dolly the cloned ewe meets Astrid the hybrid pig. I*n Contested futures: a sociology of prospective techno–science*, eds. N. Brown, B. Rappert, and A. Webster, 87–108. Aldershot, UK: Ashgate.

Brown, N., B. Rappert, A. Webster, C. Cabello, L. Sanz-Menéndez, F. Merkx, B. van de Meulen. 2001. Foresight as a tool for the management of knowledge flows and innovation. Final report of the FORMAKIN project, TSER programme, European Commission. http://www.york.ac.uk/res/satsu/specificpapers/FORMAKIN%28VOL1%29.PDF (accessed February 2010).

Brown, N., and M. Michael. 2002a. From authority to authenticity: governance, transparency and biotechnology. *Health, Risk and Society* 4, no. 3: 259–72.

Brown, N. and M. Michael. 2002b. Transparency – the very idea. From authority to authenticity. Paper presented at 'Transparency and corporate governance', London.

Brown, N. 2003. Hope against hype – accountability in biopasts, presents and futures. *Science Studies* 16, nos. 2/3: 3–21.

Brown, N., and M. Michael. 2003. A sociology of expectations: retrospecting prospects and prospecting retrospects. *Technology Analysis & Strategic Management* 15: 3–18.

Brown, N. 2005. Shifting tenses: reconnecting regimes of truth and hope. *Configurations* 13, no. 3: 331–55.

Brown, N., C. Douglas, L. Eriksson, E. Rodriguez, S. Yearly, and A. Webster. 2005. Researching expectations in medicine, technology and science: theory and method. Paper presented at conference on 'Researching expectation – theory & method', 18–19 July, University of York.

Brown, N. and A. Kraft. 2006. Blood ties: banking the stem cell promise. *Technology Analysis & Strategic Management* 18, nos. 3/4: 313–27.

Bruun Jensen, C. 2005. Citizen projects and consensus building at the Danish board of technology: on experiments in democracy. *Acta Sociologica.* Special issue on science, power, and democracy 48, no. 3: 221–35.

Burr, V. 1995. *An introduction to social constructionism*. London and New York: Routledge.

Cairns, G, Wright, G., Bradfield, R., Van der Heijden, K., and Burt, G. 2004. Exploring e–government futures through the application of scenario planning. *Technology Forecasting and Social Change* 71, no. 3: 217–38.

Callon, M. and J. Law. 1982. On interests and their transformation: enrolment and counter–enrolment. *Social Studies of Science* 12: 615–25.

Callon, M. 1986. Some elements of a sociology of translation: domestication of the scallops and the fishermen of Saint Brieuc Bay. In *Power, action and belief: a new sociology of knowledge? Sociology Review Monograph*, ed. J. Law, 196–233. London: Routledge and Kegan Paul.

Callon, M. 1987. Society in the making: the study of technology as a tool for sociological analysis. In *The social construction of technical systems: new directions in the sociology and*

history of technology, eds. W. E. Bijker, T. P. Hughes, and T. J. Pinch, 83–103. Cambridge, Mass. And London: MIT Press.

Callon, M. 1991. Techno–economic networks and irreversibility. In *A sociology of monsters? Essays on power, technology and domination, sociological review monograph 38*, ed. J. Law, 132–61. London and New York: Routledge.

Callon, M. 2002. Writing and (re)writing devices as tools for managing complexity. In *Complexities: social studies of knowledge practises*, eds. J. Law and A. Mol, 191–217. Durham and London: Duke University Press.

Callon, M. and F. Muniesa. 2003. Les marchés économiques comme dispositifs collectifs de calcul. *Réseaux* 6, no. 122: 189–233.

Callon, M. and F. Muniesa. 2005. Economic markets as calculative collective devices. *Organization Studies* 26, no. 8: 1229–50.

Callon, M. and J. Law. 2005. On qualculation, agency, and otherness. *Environment and Planning D: Society and Space* 23, no. 5: 717–33.

Cañellas–Boltà, S. and R. Strand. 2006. Reflexivity and modesty in the application of complexity theory. In *Interfaces between science and society*, eds. A. Guimarães Pereira, S. Vaz and S. Tognetti, 100–17. Sheffield, UK: Greenleaf Publishing.

Castells, M. 1996/2000 (2nd edn). *The rise of the network society, the information age: economy, society and culture,* vol 1. Cambridge, MA and Oxford, UK: Blackwell.

Chia, R. 2004. Re–educating attention: what is foresight and how is it cultivated? In *Managing the future: foresight in the knowledge economy*, eds. H. Tsoukas, and J. Shepherd, 21–37. Oxford, UK: Blackwell Publishing.

Coates, J. 2000. Scenario planning. *Technological Forecasting and Social Change* 65: 115–23.

Cuhls, K., and L. Georghiou. 2004. Evaluating a participative foresight process: futur – the German research dialogue. *Research Evaluation* 13, no. 3: 143–53.

Cunliffe, A. 2003. Reflexive inquiry in organizational research: questions and possibilities. *Human Relations* 56, no. 8: 983–1003.

Cunliffe, A. 2005. The need for reflexivity in public administration. *Administration & Society* 37, no. 2: 225–42.

Czarniawska–Joerges, B. 1992. Budgets as texts: On collective writing in the public sector. *Accounting, Management and Information Technologies* 2, no. 4: 221–39.

Dannemand-Andersen, P. and M. Borup, M. 2006. Strategy processes and foresight in research councils and national research programmes. Paper presented at 'EU–US seminar: international Seville seminar on future–oriented technology analysis', 28–29 September, Seville. http://www.risoe.dtu.dk/rispubl/art/2006_29_conf_paper.pdf (accessed February 2010).

Dannemand-Andersen, P., M. Borup, T. Finnbjörnsson, E. Vals, and T. Malmér. 2007. Foresight in the Nordic research and innovation council systems. Risø National Laboratory DTU. http://www.risoe.dk/rispubl/reports/ris-r-1613.pdf (accessed February 2010).

Dawe, A. 1970. The two sociologies. *British Journal of Sociology* 21, no. 2: 207–18.

Dequech, D. 1999. Uncertainty, conventions and short-term expectations. *Brazilian Journal of Political Economy* 19, no. 3:67–81.

Deuten, J. and A. Rip. 2000. The narrative shaping of a product creation process. In *Contested futures: a sociology of prospective techno–science*, eds. N. Brown, B. Rappert, and A. Webster, 65–86. Aldershot, UK: Ashgate.

DeWalt, K. and B.R. DeWalt. 2002. *Participant observation: a guide for fieldworkers*. Walnut Creek, CA: AltaMira Press.

Dietz, J. and H. Forfang. 2003. *Scenariebasert strategiutvikling i forskningsrådet – en mulig tilnærming*. Oslo: Handelshøyskolen BI.

Dobbinga, E. 2001. *Weerbarstigheid van organisatiecultuur: een organisatie–antropologische studie naar betekenisgeving aan moderne managementinstrumenten (*The rise and fall of a scenario study: stubbornness of organisational culture). Delft: Eburon.

Dobbinga, E. and P. van Notten. 2002. A crunch of gears: scenarios and organisational cultures. *Scenario and Strategy Planning* 3, no. 6: 24–6.

Dugdale, A. 1999. Materiality: juggling sameness and difference. In *Actor network theory and after*, eds. J. Law and J. Hassard, 113–35. Oxford: Blackwell Publishing.

Effin: Efficiency through user involvement. 2002–2007. Research project between SINTEF and TIK, http://www.sintef.no/Projectweb/EFFIN/English/ (accessed February 2010).

Elvebakk, B. 2003. *Virtual chemistry: a phenomenological analysis*. PhD thesis. University of Oslo, Norway.

Erawatch: DG Research, European Commission, Joint Research Centre/IPTS and Cordis. 2009. National profile Norway. http://cordis.europa.eu/erawatch/index.cfm?fuseaction=ri.content&topicID=4&countryCode=NO (accessed February 2010).

Ericson, R. 2005. Publicizing sociology. *The British Journal of Sociology* 56, no. 3: 365–72.

Etzkowitz, H. 1989. The brief rise and early decline of radical sociology at Washington University: 1969–1972. *The American Sociologist* 20, no. 4: 346–52.

Fagerheim, W. 2003. Foresight i Norge 2003, Report commissioned by the RCN, http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1226485720664&pagename=foresight%2FHovedsidemal, (accessed February 2010).

Fahey, L. and R.M. Randall. 1998. *Learning from the future: competitive foresight scenarios*. New York: John Wiley & Sons.

Flyvbjerg, B. 2006. Five misunderstandings about case–study research. *Qualitative Inquiry* 12, no. 2: 219–45.

For–Learn online foresight guide. (2005–7). European Commission's Joint Research Centre, Institute for Prospective Technological Studies (JRC–IPTS). http://forlearn.jrc.es/guide/0_home/index.htm (accessed February 2010).

Frodeman, R., J., Thompson Klein, and C. Mitcham, eds. Forthcoming. *Oxford Handbook of Interdisciplinarity*. Oxford: Oxford University Press.

Fuller, T. 1999. Future studies and foresight. In *Rescuing all our futures. The future of futures studies,* ed. Z. Sardar, 134–45. Westport: Praeger Publishers.

Fuller, T. and P. de Smedt. 2008. Modernisation of foresight methodology: reflexivity and the social construction of knowledge, a note to authors in COSTA22. European Science Foundation. http://www.costa22.org/articles.php (accessed February 2010).

Fuller, T. and K. Loogma. 2009. Constructing futures: a social constructionist perspective on foresight methodology. *Futures:* 41, no 2: 71–79.

Funtowicz, S. and J. Ravetz. 1993. Science for the post–normal age. *Futures* 25, no. 7: 739–55.

Garfinkel, H. 1967. *Studies in Ethnomethodology*. Englewood Cliffs, NJ: Prentice-Hall.

Gaßner, R. and K. Steinmüller. 2005. Scenarios that tell a story; normative narrative scenarios – an efficient tool for participative innovation–oriented foresight. New horizons and challenges for future–oriented technology analysis. Proceedings of the EU-US scientific seminar: new technology foresight, forecasting & assessment method.

Georghiou, L. 2001. Third generation foresight: integrating the socio–economic dimension. Paper presented at 'International conference on technology foresight – the approach to and potential for new technology foresight'. National Institute of Science and Technology Policy, Japan. www.nistep.go.jp/achiev/ftx/eng/mat077e/html/mat0771e.html (accessed September 2009).

Georghiou, L., J.C. Harper, M. Keenan, I. Miles, and R. Popper, eds. 2008. *The handbook of technology foresight: concepts and practice*. Cheltenham, UK and Northampton, Mass., USA: Edward Elgar.

Georghiou, L. and J. C. Harper 2008. Policy transfer and learning. In *The handbook of technology foresight: concepts and practice*, eds. L. Georghiou, J.C. Harper, M. Keenan, I. Miles, and R. Popper, 319–41. Cheltenham, UK: Edward Elgar.

Giddens, A. 1998. Risk society: the context of British politics. In *The politics of risk society*, ed. J. Franklin, 23–34. Cambridge: Polity Press.

Gjøen, H. 2001. *Gasstanker: en sosiologisk studie av visjoner og virkelighetskonstruksjoner knyttet til bruk av naturgass i Norge*. PhD thesis. NTNU, University of Trondheim, Norway.

Godet, M. and F. Roubelat. 1996. Creating the future: the use and misuse of scenarios. *Long Range Planning* 29, no. 2: 164–71.

Greene, J.C. 2000. Understanding social programs through evaluation. In *Handbook of qualitative research,* 2nd edition, eds. N.K. Denzin and Y.S. Lincoln, 981-99. Thousand Oaks, CA: Sage.

Grin, J., F. Felix, and B. Bos. 2004. Practices for reflexive design: lessons from a Dutch programme on sustainable agriculture. *International Journal of Foresight and Innovation Policy* 1, nos. 1–2: 126–49.

Grin, J. 2006. Reflexive modernisation as a governance issue, or: designing and shaping re–structuration, In *Reflexive governance for sustainable development*, eds. J–P. Voß, D. Bauknecht, and R. Kemp, 57–81. Cheltenham UK and Northampton, Mass.: Edward Elgar.

Grunwald, A. 2004. Strategic knowledge for sustainable development: the need for reflexivity and learning at the interface between science and society. *International Journal of Foresight and Innovation Policy* 1, nos. 1–2: 150–67.

Guimarães Pereira, Â., S. Vaz, and S. Tognetti, eds. 2006. *Interfaces between Science and Society*. Sheffield, UK: Greenleaf Publishing.

Guimaraes Pereira, Â., R. von Schomberg, and S. Funtowicz. 2007. Foresight knowledge assessment. *International Journal of Foresight and Innovation Policy* 3, no 1: 53–75.

Hackett, E.J., O. Amsterdamska, M. Lynch, and J. Wajcman. 2007. *The handbook of science* and *technology studies*. Third edition. Cambridge, MA: MIT Press.

Hagen, A., and S. Asmervik. 2003. If planning is everything maybe it's everything? New possibilities and roles in municipal and local planning. Paper presented at Nordic conference, 14–16 August, Lillehammer.

Haraway, D. 1985/1991. A cyborg manifesto: science, technology, and socialist-feminism in the late twentieth century. In *Simians, cyborgs and women: The reinvention of nature*, 149–181. New York: Routledge, and London: Free Association Books.

Haraway, D. J. 1988. Situated knowledges: the science question in feminism and the privilege of partial perspectives. *Feminist Studies* 14, no. 3: 575–99.

Haraway, D. J. 1997. Facts, witnesses, and consequences. In *Modest_Witness@Second_Millenium. FemaleMan©_Meets_OncoMouse*^{TM}, New York: Routledge.

Hayles, N.K. 2002. *Writing machines*. Cambridge: The MIT Press.

van der Heijden, K., Bradfield, R., Burt, G., Cairns, G., and Wright, G. 2002. *The sixth sense: accelerating organisational learning with scenarios*. Chichester and New York: John Wiley.

van der Heijden, K. 1996/2005. (2nd edn). *Scenarios: the art of strategic conversation*. New York: Wiley & Sons.

Hine, C. 2007. Multi–sited ethnography as a middle range methodology for contemporary STS. *Science, Technology, & Human Values* 32, no. 6: 652–71.

Hobbs, D. and R. Wright. 2006. *The Sage handbook of fieldwork*. London and Thousand Oaks, CA: Sage Publications Ltd.

Horn, C. L. 2000. *Professional dreamers – ambiguity in the practice of scenario planning*. Master thesis. Roskilde University, Denmark and University of Maastricht, the Netherlands.

Jasanoff, S. (2010, forthcoming). A field of its own: the emergence of science and technology studies. In *Oxford Handbook of Interdisciplinarity*, eds. R. Frodeman, J. Thompson Klein, and C. Mitcham. Oxford: Oxford University Press.

Jenssen, S. 1996. *Without a textual place: identity, technology and desire in contemporary science fiction*. University of Oslo: Bibliotek for humaniora og samfunnsvitenskap.

Jenssen, S. 2007. The demand for dialogue: studying the influence of organisers in public foresight. *International Journal of Foresight and Innovation Policy* 3, no. 4: 403–19.

Jenssen, S. 2009. Foresight and governance: how good can it get? The case of stakeholder image construction in a municipal vision project. *Technology Analysis & Strategic Management* 21, no 8: 971–86.

Jenssen, S. 2010. Municipal visions: reflexive futures between paradigm and practice. *Futures – the journal of policy, planning and futures* studies 42, no 4: 345–354.

Jewell, T., K. Uchupalanan, and C. Sripaipan. 2001. Authority, legitimacy and credibility of technology foresight studies. NISTEP study material, no. 77: 215–20.

Johnston, R. 2002. The state and contribution of international foresight: new challenges. Paper presented at 'EU–US seminar: the role of foresight in the selection of research policy priorities', 13–14 May 2002, Institute for Prospective Technological Studies (IPTS), Seville, Spain.

Johnston, R. 2008. Historical review of the development of future–oriented technology analysis. In *Future–oriented technology analysis – strategic intelligence for an innovative economy*, ed. C. Cagnin, M. Keenan, R. Johnston, F. Scapolo, and R. Barré, 17–24. Heidelberg: Springer Verlag.

Karlsen, J. E. and H. Karlsen. 2007. Expert groups as production units for shared knowledge in energy foresights. *Foresight* 9, no.1: 37–49.

Keenan, M. and E. Uyarra. 2002. Why regional foresight? An overview over theory and practice. Paper prepared for the STRATA –ETAN expert group action on mobilising the regional foresight potential for an enlarged European Union, European Commission, DG Research. ftp://ftp.cordis.europa.eu/pub/foresight/docs/1–whyregionalforesight.pdf (accessed February 2010).

Kern, S. 1983. *The culture of time and space 1880 – 1918*. London: Weidenfeld & Nicolson.

van't Klooster, S., and M. B.A. van Asselt. 2006. Practising the scenario–axes technique. *Futures* 38, no. 1: 15–30.

van't Klooster, S.A. 2007. *Toekomstverkenning: ambities en de praktijk, een ethnografische studie naar de productie van toekomstkennis bij het Ruimtelijk Planbureau (RPB)* (Future telling: ambitions and practice. An ethnographic study into the production of future knowledge at the Netherland's Institute for Spatial Research RPB). Delft: Eburon.

Koch, L. 2006. Past futures: on the conceptual history of eugenics–a social technology of the past, *Technology Analysis & Strategic Management* 18, nos. 3/4: 329-44.

Konrad, K. 2006. The social dynamics of expectations: the interaction of collective and actor–specific expectations on electronic commerce and interactive television. *Technology Analysis & Strategic Management* 18, nos. 3/4: 429–44.

Konrad, K., and J.P. Voß. 2006. Sustainability foresight: reflexive governance in the transformation of utility systems. In *Reflexive governance for sustainable development*, ed. J-P. Voß, D. Bauknecht and R. Kemp, 162–88. Cheltenham UK and Northampton, Mass.: Edward Elgar.

de Laat, B. 2000. Scripts for the future: using innovation studies to design foresight tools. In *Contested futures: a sociology of prospective techno–science*, eds. N. Brown, B. Rappert and A. Webster, 175–208. Aldershot, UK: Ashgate.

Langley, A. 1999. Strategies for theorizing from process data. *Academy of Management Review* 24, no. 4: 691–710.

Lash, S. 1994. Reflexivity and its doubles: structure, aesthetics, community. In *Reflexive modernization. Politics, tradition and aesthetics in the modern social order*, eds. U. Beck, A. Giddens and S. Lash, 110–73. Cambridge, UK: Polity Press.

Lash, S. 2003. Reflexivity as non–linearity. *Theory, Culture & Society* 20, no. 2: 49–57.

Latour, B. and S. Woolgar 1986. *Laboratory life: the construction of scientific facts* (2nd edn). Princeton, NY: Princeton University Press.

Latour, B. 1988. The politics of explanation: an alternative, in *Knowledge and reflexivity: new frontiers in the sociology of knowledge*, S. Woolgar ed., 155–76. Sage Publications, London.

Latour, B. 1993. *We have never been modern*, transl. C. Porter. Cambridge, Mass: Harvard University Press.

Latour, B. (Jim Johnson a.k.a. Bruno Latour). 1995. Mixing humans and non-humans together: the sociology of a door-closer. In *Ecologies of knowledge*, ed. S. Leigh Star, 257–78.

Latour, B. 1999. On recalling ANT. In *Actor network theory and after*, eds. J. Law and J. Hassard, 15–25. Oxford: Blackwell Publishing.

Latour, B. 2003. Is Re–modernisation occurring – And if so, how to prove it? A commentary on Ulrich Beck. *Theory, Culture & Society* 20: 35–48.

Latour, B. 2004. Why has critique run out of steam? From matters of fact to matters of concern. *Critical Inquiry* 30, no. 2: 225–48.

Latour, B. 2005. *Reassembling the social: an introduction to actor-network-theory*. Oxford: University Press.

Law, J. 1987. Technology and heterogeneous engineering: the case of Portuguese expansion. In *The social construction of technological systems: new directions in the sociology and history of technology*, eds. W.E. Bijker, T.P. Hughes, and T.J. Pinch, 111–34. Cambridge, MA: MIT Press.

Law, J. 1994. *Organizing modernity*. Oxford: Blackwell Publishing.

Law, J. and J. Hassard. 1999. *Actor network theory and after*. Oxford: Blackwell Publishing.

Law, J. 2000. On the subject of the object: narrative, technology, and interpellation. *Configurations* 8, no. 1: 1–29.

Law, J. 2003a. Making a Mess with Method. Published by the Centre for Science Studies, Lancaster University. http://www.lancs.ac.uk/fass/sociology/papers/law-making-a-mess-with-method.pdf (accessed February 2010).

Law, J. 2003b. Ordering and obduracy. Published by the Centre for Science Studies, Lancaster University. http://www.lancs.ac.uk/fass/sociology/papers/law-ordering-and-obduracy.pdf (accessed February 2010).

Law, J. 2004a. Enacting naturecultures: a note from STS. Published by the Centre for Science Studies, Lancaster University. http://www.lancs.ac.uk/fass/sociology/papers/law-enacting-naturecultures.pdf (accessed February 2010).

Law, J. 2004b. Matter-ing, or how might STS contribute? Published by the Centre for Science Studies, Lancaster University. http://www.lancs.ac.uk/fass/sociology/papers/law-matter-ing.pdf (accessed February 2010).

Law, J. 2007. Actor network theory and material semiotics, version of 25 April 2007. http://www. heterogeneities. net/publications/Law2007ANTandMaterialSemiotics.pdf (accessed March 2010).

van Lente, H. 1993. *Promising technology: the dynamics of expectations in technological* developments. PhD thesis. Enschede: University of Twente.

Van Lente, H. 2000. Forceful futures: from promise to requirement. I*n Contested futures: a sociology of prospective techno–science*, eds. N. Brown, B. Rappert, and A. Webster, 43–63. Aldershot, UK: Ashgate.

Lewis, D. 1969. *Convention: a philosophical study*. Cambridge MA: Harvard University Press.

Leydesdorff, L. and H. Etzkowitz.1998. The triple helix as a model for innovation studies. *Science & Public Policy* 25, no. 3: 195–203.

Liebl, F. 2004. Organizational foresight as strategic knowledge management: a frame of reference. Paper presented at '2nd international conference on organizational foresight', University of Strathclyde, Glasgow.

Ling, T. 2002. Decision making in the public sector. *Scenarios in public policy*, ed. G. Ringland*,* 124–131. Chichester: John Wiley & Sons.

Loveridge, D. 2004. Experts and foresight: review and experience. *International Journal of Foresight and Innovation Policy* 1, no. 1/2: 33–69.

Loveridge, D. and P. Street. 2005. Inclusive foresight. *Foresight* 7, no. 3: 31–47.

Loveridge, D. 2009. *Foresight: the art and science of anticipating the future.* New York and London: Routledge.

Luhmann, N. 1994. How can the mind participate in communication. *Materialities of communication*, eds. H. U. Gumbrecht and K.L. Pfeifer, 371–87. Stanford, California: Stanford University Press.

Lukacs, G. 1971. *History and class consciousness*. Cambridge: MIT Press.

Marcus, G.E. 1995. Ethnography in/of the world system: the emergence of multi–sited ethnography. *Annual Review of Anthropology* 24: 95–117.

Martin, B. and J. Irvine. 1989. Research foresight: priority–setting in science. London: Pinter.

Martin, B. 1995. Foresight in science and technology. *Technology Analysis & Strategic Management* 7, no.2: 139–168.

Martin, B. 2001. Matching societal needs and technological capabilities: research foresight and the implications for social sciences. *Social sciences and innovation, OECD proceedings*, 105–115. Paris: OECD.

Marx, K. and F. Engels 1998 [1848]. *The communist manifesto; new interpretation*, ed. M. Cowling. New York: New York University Press.

May, G. 2006. Preferred futures: yours, mine or theirs. Paper presented at 'Future matters: futures known, created and minded', 4–6 September, Cardiff University.

Michael, M. 2000. Futures of the present: from performativity to prehension. I*n Contested futures: a sociology of prospective techno–science*, eds. N. Brown, B. Rappert, and A. Webster, 21–39. Aldershot, UK: Ashgate.

Miles, I., M. Keenan, J. Gavigan, F. Scapolo, F. Farhi, D. Lecoq, M. Capriati, T. di Bartolomeo, G. Clar, and C. Svanfeldt. 2002. *Practical guide to regional foresight in the United Kingdom*. European Commission, DG Research. http://foretech.online.bg/docs/CGRF.pdf (accessed February 2010).

Miller, R. 2007. Futures literacy: a hybrid strategic scenario method. *Futures* 39, no. 4: 341–62.

Mintzberg, H. 1994. *The rise and fall of strategic planning*. New York: Free Press.

Mol, A. 2002. The *body multiple*: *ontology in medical practice.* Durham and London: Duke University Press.

Mol, A. and J. Law. 2002. Complexities: an introduction. In *Complexities: social studies of knowledge practises*, eds. J. Law and A. Mol, 1-22. Durham and London: Duke University Press.

Moser, I. and J. Law. 1999. Good passages, bad passages. In *Actor network theory and after*, eds. J. Law and J. Hassard, 196-219. Oxford: Blackwell Publishing.

Moser, I. 2003. *Road traffic accidents: the ordering of subjects, bodies and disability*. PhD thesis. University of Oslo, Norway.

Moser, I. and J. Law 2006. Fluids or flows? Information and qualculation in medical practice In *Information technology and people* 19, no. 1: 55–73.

Neumann, I. and E. Øverland. 2004. International relations and policy planning: The method of perspectivist scenario building. *International Studies Perspectives* 5, no. 3: 258–77.

van Notten, P., J. Rotmans, M. Van Asselt, and D.S. Rothman. 2003. An updated scenario typology. *Futures* 35, no. 5: 423–43.

van Notten, P. 2005.*Writing on the wall: scenario development in times of discontinuity*. Boca Raton, FL: Dissertation.com.

O'Connor, K. 2004. Devising a new approach to capitalism at home. *Anthropology Matters Journal* 6, no 2, http://www.anthropologymatters.com/ (accessed February 2010).

Parrinder, P. 1979. Delany inspects the word-beast. *Science Fiction Studies* 6, no. 19. http://www.depauw.edu/sfs/review_essays/parrind19.htm (accessed February 2010).

Pløger, J. 2001. Public participation and the art of governance. *Environment and Planning B: Planning and Design* 28, no. 2: 219–41.

Popper, R. 2008. Foresight methodology. In *The Handbook of technology foresight: concepts and practice,* eds. L. Georghiou, J.C. Harper, M. Keenan, and I. Miles, 44–90. Cheltenham, UK and Northampton, USA: Edward Elgar.

Rappert, B. 1999. Rationalising the future? Foresight in science and technology policy co–ordination. *Futures* 31, no. 6: 527–45.

Rask, M. 2008. Foresight – balancing between increasing variety and productive convergence. *Technological Forecasting and Social Change* 75, no. 8: 1157–75.

RCN. 2004a. Rett tid for fremtidens teknologier. (The right time for the technologies of the future). Interview with the Director of the department for future technologies. http://www.forskningsradet.no/no/Nyheter/Rett+tid+for+fremtidens+teknologier/1226485673706 (accessed February 2010).

RCN. 2004b. Homepage of the UTSIKT foresight project (including a presentation in English). http://www.forskningsradet.no/no/Artikkel/UTSIKT+Utviklingsmuligheter+og+strategivalg+for+IKT/1182736869702 (accessed February 2010).

RCN. 2004c. PowerPoint presentation of the scenarios created in the UTSIKT foresight project. http://www.forskningsradet.no/CSStorage/Flex_attachment/UtsiktSammendragScenarier.ppt#1, (accessed February 2010).

RCN. 2004d. Nytt løft for IKT forskningen (A new effort for ICT research). Interview with the project leader of the ICT foresight project UTSIKT. http://www.forskningsradet.no/servlet/Satellite?c=Nyhet&cid=1226485674116&pagename=foresight%2FHovedsidemal (accessed February 2010).

RCN. 2004e. Policynotat: Vilje til satsing på IKT (The will to invest in ICT - research in information and communication technology 2003-2005). http://www.forskningsraadet.no/servlet/Satellite?c=Informasjonstekst&cid=1226485671044&pagename=foresight%2FHovedsidemal (accessed February 2010).

RCN. 2005a. Foresight project CREATE 2002-2005. (Information in Norwegian) http://www.forskningsraadet.no/no/Artikkel/Om+CREATE++foresight+og+dialog/1226485672152 (accessed February 2010).

RCN. 2005b. The UTSIKT project report (in Norwegian). http://www.forskningsradet.no/CSStorage/Flex_attachment/IKT-nett.pdf (accessed February 2010).

RCN. 2005c. Foresight report: 'Aquaculture 2020: transcending the barriers'. http://www.forskningsraadet.no/en/Newsarticle/Aquaculture+2020+Transcending+the+Barriers++As+long+as/1236685396567 (accessed February 2010).

RCN. 2006a. Egenvurdering av satsing på foresight (Report on foresight initiatives at the Research Council 2003-2005). Summary in English. http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1226485720664&pagename=foresight%2FHovedsidemal (accessed February 2010).

RCN. 2006b. Trenger vi nye former for tverrfaglighet og samspill? (Do we need new forms of interdisciplinarity and cooperation?) A research policy comment on five foresight projects (in Norwegian).

http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1226485720664&pagename=foresight%2FHovedsidemal (accessed February 2010).

RCN. 2007. The Norwegian research system. http://www.forskningsraadet.no/en/The+Norwegian+research+system/1138882276131 (accessed February 2010).

RCN. 2008a. RCN key figures 2008. Powerpoint presentation. http://www.forskningsradet.no/en/Key+figures/1138785841814 (accessed February 2010).

RCN. 2008b. Foresight programme website, updated April 2008. http://www.forskningsradet.no/servlet/Satellite?c=Page&cid=1226485657197&p=1226485657197&pagename=foresight%2FHovedsidemal (accessed March 2010).

RCN. 2008c. Large scale programmes. http://www.forskningsradet.no/en/Largescale+programmes/1186122420145 (accessed February 2010).

RCN. 2009a. Policy and strategy. http://www.forskningsraadet.no/en/Article/Other+strategic+plans+and+policy+documents/1196785853662 (accessed February 2010).

RCN. 2009b. Research programme VERDIKT: core competence and value creation in ICT. http://www.forskningsradet.no/en/Funding/VERDIKT/1215006645734 (accessed February 2010).

RCN. 2009c. Mot et nytt kunnskapsfelt: Foresight in Norway 2009. (Towards a new knowledge field: foresight in Norway 2009). Foresight report. Research Council of Norway.

Ringland, G. 1998. *Scenario planning*. Chichester: John Wiley & Sons.

Ringland, G. 2002. *Scenarios in public policy.* Chichester: John Wiley & Sons.

Risan, L. 2006. The duration of the present and the risk of not telling large stories. *EASST Review* 253. http://www.easst.net/review/oct2006/risan (accessed February 2010).

Rose, H. 2000. Science fiction's memory of the future. In *Contested futures: a sociology of prospective techno–science*, ed. N. Brown, B. Rappert, and A. Webster, 157-72. Aldershot, UK: Ashgate.

Salmenkaita, J.–P. and A. Salo. 2003. Emergent foresight processes: industrial activities in wireless communications. *Technological Forecasting and Social Change* 71, no. 9: 897–912.

Salo, A., Könnölä, T., and M. Hjelt. 2004. Responsiveness in foresight management: reflections from the Finnish food and drink industry. *International Journal of Foresight and Innovation Policy* 1, nos. 1–2: 70 – 88.

Sanz-Menéndez, L., and C. Cabello. 2000. Expectations and learning as principles for shaping the future. In *Contested futures: a sociology of prospective techno–science*, eds. N. Brown, B. Rappert, and A. Webster, 229–49. Aldershot, UK: Ashgate.

Sataøen, H. 2008. Building the hydrogen highway: the visions of a large-scale hydrogen project in Norway. *Sociological Research Online*, Volume 13, no 3.

von Schomberg, R., Â. Guimarães Pereira, and S. Funtowicz. 2005. Deliberating foresight knowledge for policy and foresight knowledge assessment. Working paper. European

commission services, European commission, Directorate–General for research, social sciences and humanities. ftp://ftp.cordis.europa.eu/pub/foresight/docs/deliberating_foresight2.pdf (accessed February 2010).

Schwandt, T.A. 2000. Three epistemological stances for qualitative inquiry: interpretivism, hermeneutics and social constructionism. *Handbook of qualitative research* (2nd edn), eds. N. K. Denzin and Y.S. Lincoln, 189–213. Newbury Park, CA: Sage.

Schwandt, D.R., and M. Gorman. 2004. Foresight or foreseeing? A social action explanation of complex collective knowing. In *Managing the future: foresight in the knowledge economy*, eds. H. Tsoukas, and J. Shepherd, 77–97. Oxford: Blackwell Publishing.

Schwartz, P. 1996. *The art of the long view: planning for the future in an uncertain world*. New York: Currency Doubleday.

Selin, C. 2008. The sociology of the future: tracing stories of technology and time. *Sociology Compass* 2, no. 6: 1878–95.

Shipley, R., and R.T. Newkirk. 1999. Vision and visioning: what do these terms really mean – a taxonomy of the terms vision, visioning, envision, visualize and visionary as used in planning literature over the last ten years. *Environment and Planning B*, *Planning and Design* 26, no. 4: 573–91.

Shipley, R. 2002. Visioning in planning: is the practice based on sound theory. *Environment and Planning A* 34, no. 1: 7–22.Shipley, R., B. Hall, R. Feick, and R. Earley. 2004. Evaluating municipal visioning. *Planning Practice & Research* 19, no. 2: 195–209.

Singleton, V. 2007. Irresponsible accountability? Tracing cattle, moving practices. The social and material practices of agriculture, farming and food production. Lancaster: Centre for Science Studies.

Slaughter, R.A. 2002. From forecasting and scenarios to social construction: changing methodological paradigms in futures studies, *Foresight*, 2002, Vol 4, no 3, pp. 26–31.

de Smedt, P. 2008. Strategic intelligence in decision making. In *Future–oriented technology analysis – strategic intelligence for an innovative economy,* eds. C. Cagnin, M. Keenan, R. Johnston, F. Scapolo, and R. Barré, 89–102. Heidelberg: Springer Verlag.

Squier, S. 2004. *Liminal lives: imagining the human at the frontiers of biomedicine*. Durham, NC: Duke University Press.

Star, S.L. and J.R. Griesemer. 1989. Institutional ecology, 'translations' and boundary objects: amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science* 19, no 3: 387– 420.

Star, S. L.1991. Power, technologies and the phenomenology of conventions: on being allergic to onions. *A sociology of monsters? Essays on power, technology and domination, sociological review monograph 31*, ed. John Law, 26-56. London and New York: Routledge.

Stark, D. 2000. For a sociology of worth. Working paper series. Center on Organizational Innovation, Columbia University and Santa Fe Institute.
www.coi.columbia.edu/pdf/stark_fsw.pdf (accessed February 2010).

Staton, M. 2008. Monstrous foresight. In *Future–oriented technology analysis – strategic intelligence for an innovative economy,* eds. C. Cagnin, M. Keenan, R. Johnston, F. Scapolo, and R. Barré, 53–68. Heidelberg: Springer Verlag.

Stirling, A. 2006. Precaution, foresight and reflexivity: reflection and reflexivity in the governance of science and technology. In *Reflexive governance for sustainable development*, eds. J–P. Voß, D. Bauknecht and R. Kemp, 225–72. Cheltenham UK and Northampton, Mass.: Edward Elgar.

Sztompka, P. 2007. The return to values in recent sociological theory. *Polish Sociological Review* 3: 247–61.

Thévenot, L. 2001a. Pragmatic regimes. In *The practice turn in contemporary theory*, eds. K. Knorr–Cetina, T. Schatzki, E. von Savigny, 56–73. London: Routledge.

Thévenot, L. 2001b. Organized complexity: conventions of coordination and the composition of economic arrangements. *European Journal of Social Theory* 4: 405–25.

Thévenot, L. 2002a. Which road to follow? The moral complexity of an equipped humanity. In *Complexities: social studies of knowledge practises*, eds. J. Law and A. Mol, 53–87. Durham and London: Duke University Press.

Thévenot, L. 2002b. Conventions of co–ordination and the framing of uncertainty. In *Intersubjectivity in economics*, ed. E. Fullbrook, 181–97. London: Routledge.

Thévenot, L. 2006. Convention school. In *International encyclopedia of economic sociology*, eds. J. Beckert and M. Zafirovski, 111–15. London: Routledge.

Thévenot, L. 2007. The plurality of cognitive formats and engagements: moving between the familiar and the public. *European Journal of Social Theory* 10, no. 3: 409–23.

Thorngate, W. 1976. Possible limits on a science of social behaviour. In *Social psychology in transition*, eds. J.H. Strickland, F.E. Aboud, and K.J. Gergen, 121–139. New York: Plenum.

Treimo, H. 2007. *Laks, kart og mening: det norske laksegenomprosjektet*. PhD thesis. University of Oslo, Norway.

Thygesen, H. 2009. *Technology and good dementia care: a study of technology and ethics in everyday care practice*. PhD thesis. University of Oslo, Norway.

Truffer, B., J.-P. Voβ and K. Konrad. 2008. Mapping expectations for system transformations: lessons from sustainability foresight in German utility sectors. *Technological Forecasting & Social Change* 75, no. 9: 1360–72.

Tsoukas, H. and Shepherd, J. eds. 2004. *Managing the future: foresight in the knowledge economy*. Oxford, UK: Blackwell Publishing.

Ughetto, E. 2007. Foresight as a triple helix of industry, university and government relations. *Foresight* 9, no. 5: 14–22.

Uotila, T. and H. Melkas. 2007. Quality of data, information and knowledge in regional foresight processes. *Futures* 39, no. 9: 1117–30.

Vandenberghe, F. 2006. The age of epigones: post–Bourdieusian social theory in France. In *Handbook of contemporary European social theory*, ed. G. Delanty, 69–81. London: Routledge.

Voß, J–P., D. Bauknecht and R. Kemp, eds. 2006. *Reflexive governance for sustainable development*. Cheltenham UK and Northampton, Mass.: Edward Elgar.

Voß, J–P., and R. Kemp. 2006. Sustainability and reflexive governance. In *Reflexive governance for sustainable development*, ed. J–P. Voß, D. Bauknecht and R. Kemp, 3–30. Cheltenham UK and Northampton, Mass.: Edward Elgar.

Wadel, C. 1991. *Feltarbeid i egen kultur: en innføring i kvalitativt orientert samfunnsforskning.* Flekkefjord: SEEK a/s.

Warnke, P. and G. Heimeriks. 2008. Technology foresight as innovation policy instrument: learning from science and technology studies. In *Future-oriented technology analysis - strategic intelligence for an innovative economy,* eds. C. Cagnin, M. Keenan, R. Johnston, F. Scapolo, and R. Barré, 71–87. Heidelberg: Springer Verlag.

Weber, K.M. 2006. Foresight and adaptive planning as complementary elements in anticipatory policy–making: a conceptual and methodological approach. In *Reflexive governance for sustainable development*, ed. J–P.Voß, D. Bauknecht, and R. Kemp, 189–221. Cheltenham UK and Northampton, Mass.: Edward Elgar.

Weber, M. 1949. *On the methodology of the social sciences*. Glencoe: Free Press.

Webster, A. 1999. Technologies in transition, policies in transition: foresight in the risk society. *Technovation* 19, nos. 6-7: 413–21.

Webster, A. 2007. Crossing boundaries: social science in the policy room. *Science, Technology & Human Values* 32, no. 4: 458–78.

Weick, K. 1979. *The social psychology of organizing*. Reading, MA: Addison–Wesley.

Whitehead, A.N. (1953) [1925] *Science and the modern world.* Cambridge: Cambridge University Press.

Whittle, A. and A. Spicer 2008. Is actor network theory critique? *Organization Studies* 29, no 4, pp 611–629.

Woolgar, S. 1988. ed. *Knowledge and reflexivity: new frontiers in the sociology of knowledge*, Sage Publications, London.

Wright, A. 2005. The use of scenarios in social construction of sense. Working paper no. 001/04. University of Wolverhampton, UK. http://www.wlv.ac.uk/PDF/uwbs_04%20WP001-04%20Wright.pdf (accessed March 2010).

Wynne, B. 2002. Risk and environment as legitimatory discourses of technology: reflexivity inside out? *Current Sociology*, Vol 50, no 3, pp. 459–77.

Øverland, E.F., ed. 2000. *Norge2030: fem scenarier om offentlig sektors framtid*. Oslo: Cappelen Forlag.

Unpublished material

1. Letter of invitation sent out by the project leader to potential participants, 8 July 2004.

2. Agenda first workshop: 'UTSIKT– Samlingen 16–17. september på Sundvolden Hotell, Krokkleiva', email sent by the project leader to all participants concerning the first participatory workshop on 8 September 2004.

3. Figure 3: The synthetisation of six scenarios into three, figure developed by facilitator, presented as PowerPoint to the writing group on 27 September 2004.

4. Three preliminary scenario drafts, disseminated among the writing group members on 7 October 2004.

    a. *eConsuming Norway*, version 7 October 2004
    b. *Out of Sync*, version 7 October 2004
    c. *The Spirit of the new ER*A, version 7 October 2004

5. Agenda second workshop: 'Opplegg samling 2', a document explaining the agenda of the second workshop sent to all participants on 15 October 2004.

6. Meeting report of the foresight project group, 24 November 2004

7. Vision document 'living lab' discussed at meeting of the project group on 9 December 2004.

8. Document on possible research topics of VERDIKT discussed at meeting of the project group on 9 December 2004.

9. Strategy document written by the RCN senior advisor: 'Hva vil vi med VERDIKT? Noen strategiske lærdommer fra UTSIKT' (What is our ambition for VERDIKT? Some strategic lessons from UTSIKT), discussed at meeting of the project group on 11 January 2005.

10. Meeting report of the foresight project group, 11 January 2005.

11. Meeting report of the foresight project group, 28 January 2005.