

ANNEX

Screening the foresight exercises undertaken in 12 countries

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grid of analysis

This grid of analysis is used for the screening process of foresight exercises. The idea is to summarise information on a large proportion of the public foresight activities that have taken place in 13 European countries.

The foresight exercises considered here aim at identifying emerging trends or technologies, possible futures, and are carried out by a public institution and/or contribute to the public policy process (i.e. Foresight exercises carried out by ministries, public research institutions, universities, Science Academy, trade associations, associations of engineers, industrial associations, regional or federal boards).

In each country, we organise the description of the various foresight exercises, considering the following aspects :

1. Overall description of each foresight exercise (and all foresight exercises carried out in a country)
2. Institutional design
3. Methods used
4. Modes of communication
5. Awareness rising
6. Results and impact

1. overall description

Scope : micro (an institution, a product, a very specific scientific field) ; meso (a large sector of economic activity, or of science and technology) ; macro (the economy and society at large).

Questions addressed : the question(s) is the foresight exercise is addressing

Geographical scale : whether it concern a region within a country, a country, a group of countries

Time scale : the time horizon of the exercise

Duration : period during which the Foresight exercise took place

Main contact person(s) : individuals knowledgeable about the exercise

Explicit objectives : objectives as stated in the official documents launching the exercise

Actual results / impact sought : for example : networks, new research programmes...

Underlying values : for example : respond to societal needs, search for niches markets...

Overall methodology : for example, Delphi, surveys, driving forces and scenarios ...

2. institutional design

Ordering body : The institution or the individual which launch the Foresight exercise. For example, the Prime Minister, the Minister of Research, the Minister of Science and Transport, the Minister of Industry, the chairman of an industrial association, the chairman of a research institution. Its responsibilities.

Steering committee: state the institutional origin of the members of the steering committee and its responsibilities.

Implementing agency : Name and state its responsibilities

Target audience for the Foresight exercise : for example, research community, funding bodies, specific government departments.

Consideration given to social needs

Target sectors : List target sectors / panels / areas covered.

Number and origin of persons consulted : for each panel, state the number of persons consulted and their origin

3. methods used during the foresight exercise

methods used for :

identifying areas and questions : for example, comparison with other countries

gathering background information : for example, literature surveys, seminars

choosing the categories of consultees

choosing the consultees : for example, co-nomination procedure

consulting the consultees : for example, Delphi questionnaire, working seminars, individual interviews

identifying driving forces : for example : Delphi

presenting future developments : for example, scenarios

identifying priorities

consensus generation:

4. modes of communication

Modes of communication between :

ordering body and steering committee

steering committee and implementing agency

implementing agency and consultees

among consultees

5. awareness rising

Modes of communication and type of information during :

Pre-foresight phase :

Foresight actors → Policy makers, business, research community and public at large
Policy makers, business, research community and public at large → Foresight actors

Foresight phase :

Foresight actors → Policy makers, business, research community and public at large
Policy makers, business, research community and public at large → Foresight actors

Post-foresight phase :

Foresight actors → Policy makers, business, research community and public at large
Policy makers, business, research community and public at large → Foresight actors

6. results and impact

Modes of presentation of :

analysis

results

recommendations

measurement and evaluation of impact

Austria

Dr. Carsten P. Krueck (VDI)

Exercises covered:

"Delphi Report Austria" (1998)

Other Initiatives and Studies Not Included in this Report

"The Austrian Report on Technology 1999" (1999)

Criteria for exclusion:

These studies are future-oriented but were not included as foresight studies for various reasons, among them:

- they often operate with an ad-hoc methodology;
- they are often secondary analyses of existing assessments;
- they are "critical technologies" or benchmarking reports (thus, narrower in focus than foresight studies);
- they are restricted to technological forecasting;
- they focus on one technology or one region, neglecting wider societal issues;
- they are pilot studies.

I would like to thank Dr. Georg Aichholzer for supplying substantial input to this report.

EXERCISE No. 1: "Delphi Report Austria" (1998)

Foreword:

The report comprises three parts produced by three different institutions resp. persons:

- A. "Technology Delphi Austria", produced by the Institute of Technology Assessment (ITA)
- B. "Society/Culture Delphi Austria", produced by the Institute for Trend Analyses and Crisis Research (ITK)
- C. "Austria 2013", written by Holger Rust.

The presented information refers mainly to the "Technology Delphi" because "the core of the Austrian Foresight programme is built around a Technology Delphi" [29].

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duraton	Main contact person(s)
1	Macro/Meso (i.e., global trends as compared to Austrian needs and capabilities)	<ul style="list-style-type: none"> • Time horizon of social, cultural, economic and political trends • Relevance of trend for Austrian society • Potential for realisation in 5, 15, 30 years • Degree of priority for Austrian research policy • Degree of priority for Austrian politics • Degree of conflict potential for Austrian society • Desirability of trend. 'Match' with value systems. (The questionnaire contents of the two Delphi exercises match. The questionnaires were executed in parallel.)	Austria	5, 15 and 30 years	1996-1998	Dr. Erfried Erker, Ministry of Science and Transport

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1	<ul style="list-style-type: none"> • In which fields of technology with high innovation potentials may Austria achieve a position of leadership and, thus, solidify and strengthen its long-term competitiveness? • To map social, cultural, economic and political trends in the Austrian society. • Determining priorities for innovation policy. • Anticipatory intelligence. • Direction-setting. 	<ul style="list-style-type: none"> • Involvement and networking of experts an impact in itself. • Six "Targeted Impulse Programmes" strongly inspired by Delphi Austria. • Internal assessment of BMWV estimates financial leverage effect at 110 million Euro (in late 1999). • Four independent Foresight projects triggered in the fields of vocational training, mobile communications, medical technologies, transport. <p><i>Summary</i> New research programmes and networks inspired and enhanced by Delphi. Notable response in the political administration.</p>	<ul style="list-style-type: none"> • Advice tailor-made to the Austrian situation • Meeting social demands. • Improving international competitiveness. 	<ul style="list-style-type: none"> • Delphi method (application-oriented): Panels, expert survey, conferences. • Decision Delphi for Technology Delphi • Rather decentralised, bottom-up approach. Selective, demand-, problem-, application-oriented. • Assessment of megatrends • Examination of attitudinal characteristics of responding experts by using a factor analysis. • Comparison of "megatrends"

		DRA important reference point for Science Ministry. Little response in the public sphere.		section in the German "Delphi '98" and "Technology Delphi Austria"
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2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1	Federal Ministry of Science and Transport (BMWV)	<ul style="list-style-type: none"> Financing 	Delphi Steering Committee: <ul style="list-style-type: none"> Representatives of the Research Ministry A former Minister of Health and Environmental Affairs A representative of the Austrian Academy of Sciences. 	Working out concept of the study in cooperation with implementing agency.	<ul style="list-style-type: none"> Technology Delphi: Institute of Technology Assessment (ITA), Austrian Academy of Sciences Society/Culture Delphi: Institute for Trend Analyses and Crisis Research (ITK) 	Working out concept of the study in cooperation with Steering Committee.	Experts but also the interested citizen.

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1	Central role for consideration of social needs	7 target sectors with 40 resp. 55 individual topics: <ul style="list-style-type: none"> Environmentally sound construction and new forms of housing (*); Life-long learning (*); Clean and sustainable production(*); Medical technology and support for elderly people (*); Health and Illness in Social transformation; Physical mobility; Feature-defined materials; Organic food; Ageing and Life Cycle; Structural Change of Work; Social Segmentation + 17 megatrend questions. * = The sector was addressed both in the "Technology Delphi" and in the "Society/Culture Delphi".	<ul style="list-style-type: none"> Broadly defined expert basis including social scientists, user representatives, NGOs, public administration civil servants. Number of consultees: <ul style="list-style-type: none"> Technology Delphi: 1st round: 1,638 responses (46%). 2nd round: 1,127 responses (71%) Society/Culture Delphi: 1st round: 1,764 responses (43%). 2nd round: 1,040 responses (64%)

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
1	<ul style="list-style-type: none"> • Desk research + • Analysis of existent technology foresight studies. • Strength/Weaknesses Analysis • Preparatory expert survey • Co-nomination • Consumer survey • Media content analysis. • Factor analysis of response to megatrend questions to identify typical response patterns (types) 		<ul style="list-style-type: none"> • Desk research • Informal sampling. 	Based on co-nomination in cooperation with the ordering body.	<ul style="list-style-type: none"> • Delphi questionnaire • Expert workshops • Questions prepared by the expert panels.

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
1	<ul style="list-style-type: none"> • Factor analysis to identify attitudinal characteristics of responding experts. • "Megatrends" section in Technology Delphi was adapted from German "Delphi '98" 		<ul style="list-style-type: none"> • Science/Culture Delphi: Preparation of "Meta dimensions" • Secondary analysis of Delphi results using a fixed grid of analysis ("Austria 2013") 	<ul style="list-style-type: none"> • Expert panels prepare Delphi questionnaire. • Afterwards, the expert panels discuss the results of the Delphi round.

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
1	Strong informal links between ordering body and implementing agency: Two rounds of brainstorming before study. Subject fields selected in cooperation.	<ul style="list-style-type: none"> • Discussion of methodological and procedural issues. • The Steering Committees gave the impetus to initiate the "Society/Culture Delphi". 	Moderated workshops in a cooperative climate.	Three to four workshops held for each target sector to develop the Delphi questionnaires.

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
1	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
	<p><i>Policy makers:</i></p> <ul style="list-style-type: none"> • Contacts upheld mainly by the members of the Steering Committee. • Good contacts to the then Science Minister, Caspar Einem. • Integration of other ministries insufficient. <p><i>Business:</i> Informal communication of expert panel members</p> <p><i>Science</i> The preparatory expert survey was developed with the support of two scientific funds.</p>				<p><i>Business:</i></p> <ul style="list-style-type: none"> • Presentation of results at various conferences • Communication with business seen as insufficient. <p><i>Public:</i></p> <ul style="list-style-type: none"> • A broad public relation campaign was prepared. • Little public awareness immediately after the study. 	

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1	Results presented in final reports.	<ul style="list-style-type: none"> • Workshops, presentations. • Various publications in scientific and popular journals. • Three major national conferences organised to present results. • Reports were the basis for a radio show. • Reports were the basis of numerous press and TV contributions. • Science Minister presented results to Parliament. • ITA presented results to other ministries. 	<ul style="list-style-type: none"> • Report cited in several official documents of the BMWV. Findings integrated into political statements and documents. 	<ul style="list-style-type: none"> • No formal evaluation but internal assessment of impact by Science Ministry. • Media response not formally investigated.

Belgium

Robby Berloznik, VITO

Exercises covered:

1. Belgian federal foresight study
2. KUL Research on Foresight methodology for the Flemish government
3. Prospective technological study in the programme PROMETHEE of the DGTRE
4. Prospective study for the 1999 Federal Report on Sustainable Development

1. OVERALL DESCRIPTION

Exercise	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
1. Belgian federal foresight study	The major scientific and social problems that must be addressed in the next 15 years at the federal level	Particular emphasis on sustainable development, the emergence of the information society and social cohesion	Belgium	2000 – 2015	January 2000 – July 2001	Robby Berloznik Vito Frédéric Heselmans CLEO-Université de Liège
2. KUL Research on Foresight methodology for the Flemish government	MICRO, MESO and MACRO	Developing An Integrated Methodological Framework	Flanders	Not Applicable	1998-2000	Prof. .K. Debackere; Prof. R. Veugelers; B. Van Looy; E. Zimmermann
3. Prospective technological study in the programme PROMETHEE of the DGTRE	Key technologies for the Future in the Walloon region	Identification of 40 key technologies.	Wallonia	2005-2010	1999-2000	Madame Carole Wiame (DGTRE)
4. Prospective study for the 1999 Federal Report on Sustainable Development	To perform a prospective study on the long term to characterize the uncertainties of the relations within the ecological and social system	What kind of inequities are considered to be livable with in the actual society? Which differences in income between industrialised and developing countries are tolerated? What level of	Belgium	- 2050		Nadine Gouzée (TASK FORCE SUSTAINABLE DEVELOPMENT)

		fulfilling someone's needs is chosen for each generation and in which way can we put limits from the point of view of the environment?				
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Exercise	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Belgian federal foresight study	<p>To obtain qualitative data on the mid-long term and long-term developments in the areas of technology and science as well as in the field of economy and society.</p> <p>To identify the strategically important domains for the federal science policy.</p>	Study still ongoing		<p><i>Focus groups</i>, composed of experts representing the different groups of societal actors (scientific community, industry and civil society) will be asked to identify the major developments in their respective fields, and to list the future strategic themes they see for the federal science policy.</p> <p><i>Mini-Delphi(2 rounds)</i>: the experts' opinions resulting from the working groups will be related to the results of a wider expert opinion poll in a Delphi-approach in order to reduce the divergence of ideas and reach a general consensus</p>
KUL Research on Foresight methodology for the Flemish government	Development Of An Integrated Methodological Framework For Examining Science And Technology			Integration Of Various Relevant Methodologies (including patent and bibliometric analysis, Delphi, scenarios, ...)
Prospective technological study in the programme PROMETHEE of the DGTRE	Development of a decision information tool for all actors concerned with prospective views on future technologies for the horizon 2010.	<p>Conference 28 january 2000 : the 40 key technologies for Wallonia</p> <p>Information tool for Walloon innovation policy (cluster policy)</p> <p>For each technology a card has been created with information of the degree of development, the</p>		Internal DGTRE panel based on international literature survey, extended, refined and validated by different expert panels

		application sectors, the market perspectives and the industrial and scientific positioning of the technology in Wallonia		
Prospective study for the 1999 Federal Report on Sustainable Development	The study makes an initial attempt to outline what could bring a modelling exercise to a reflection on sustainable development. In line with the choice of sustainable development topics in this report, the prospects have been defined on the basis of the perception of the risks imposed on society in connection with changing production and consumption patterns, of environmental risks for the atmosphere and the marine environment and of social risks connected with poverty and social exclusion..	Four major themes were identified: consumption and production patterns, poverty and social exclusion, protection of the atmosphere and the marine environment		

2. INSTITUTIONAL DESIGN

Exercise	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
Belgian federal foresight study	The Federal Office of Scientific, Technical and Cultural Affairs (OSTC)	To establish, at the federal level, initiatives aimed at developing the potential for providing research and development services in a Belgian, European and international context, with the purpose of socio-economic development and improving the living conditions of the population. Management of the federal competences in the field of culture and education.	Luk Van Langenhove Ward Ziarko Ruud Smits Barend Van der Meulen Rémi Barré	Chairman - Deputy Secretary General Science Policy Office Head of Statistics dept. SPO University Utrecht University Twente Observatoire des Science et Technologies	Vito CLEO-Université de Liège	To realise this foresight study	Belgian government & administration, in particular scientific institutions
KUL Research on Foresight methodology for the Flemish government	Flemish Science Policy Council		F. Colson	Eerste Opdrachthouder Awi (Wim)	K.U.Leuven, Leuven R&D, R&D Division Incentim		Flemish Government
			E. Monard	Secretaris Vrwb (Wim)			
			V. Lories	Afdelingshoofd Technologie En Innovatie (Awi)			
			J. Decuyper	Afdelingshoofd Wetenschappen (Awi)			

Prospective technological study in the programme PROMETHEE of the DGTRE	The Walloon Region (DGTRE) together with ECCE (Paris) and Lentic (Liege)	Embedded in the PROMETHEE (EC FEDER – innovation in Wallonia) project with an international advisory group supported by the University of Liege and ECCE, Paris	Mr Daniel Moers Prof. Luc Soete Jacques Brind'Amour M. Marco Causi	Nord Pas de Calais MERIT, Maastricht Vice-Minister of Québec Old advisor of the Prime Minister of the Italian Republic	ECCE (France) Lentic (Belgique)	Not Applicable	The Walloon Region
Prospective study for the 1999 Federal Report on Sustainable Development	Internal study by the Sustainable Development Task Force	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Belgium

Exercise	Consideration given to social needs	Target sectors	Number and origin of persons consulted
Belgian federal foresight study	Prime consideration in pre foresight	Not sectors, but themes: sustainable development, information society, social cohesion	Study still ongoing
KUL Research on Foresight methodology for the Flemish government	Not Applicable	Not Applicable	Not Applicable
Prospective technological study in the programme PROMETHEE of the DGTRE	Social needs was one of the big principles	Materials-chemicals Capital goods Information technologies Living and Foodtechnologies Environment-energy-transport-city	5 groups of 15 experts each
Prospective study for the 1999 Federal Report on Sustainable Development	Important aspect	Consumption and production patterns Poverty and social exclusion Protection of the atmosphere Marine environment	Not Applicable

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
Belgian federal foresight study	<p>Literature survey: analysis of a number of foreign foresight initiatives</p> <p>Consultation of the participating stakeholders to identify a range of relevant societal issues</p>	<p>Focus groups composed of experts representing the different groups of societal actors will be asked to identify the major developments in their respective fields, and to list the future strategic themes they see for the federal science policy.</p> <p>Mini-Delphi (2 rounds): the experts' opinions resulting from the focus groups will be related to the results of a wider expert opinion poll in a Delphi-approach in order to reduce the divergence of ideas and reach a general consensus.</p>	Consultation of the participating stakeholders	Co-nomination-procedure	Interviews, Focus groups, Mini-Delphi
KUL Research on Foresight methodology for the Flemish government	Integrated Methodological Framework	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Prospective technological study in the programme PROMETHEE of the DGTRE	The study started from a basis of already performed prospective studies in France en other countries.and from starting works done by DGTRE	Not Applicable	Not Applicable	Not Applicable	Workshops (Participatory)
Prospective study for the 1999 Federal Report on Sustainable	Definition of 'action perspectives' through the construction of scenario's. Integrated exercise of a	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Development	larger report on future sustainable development policies of the federal government				
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Exercise No. 1	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Belgian federal foresight study	Focus groups Mini-Delphi	Focus groups Mini-Delphi	Focus groups Mini-Delphi	Focus groups Mini-Delphi
KUL Research on Foresight methodology for the Flemish government	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Prospective technological study in the programme PROMETHEE of the DGTRE	Workshops	Workshops	Workshops	Workshops
Prospective study for the 1999 Federal Report on Sustainable Development	Not Applicable	Not Applicable	Not Applicable	Not Applicable

4. MODES OF COMMUNICATION

Exercise	Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Belgian federal foresight study	Follow up-meetings	Follow up-meetings Periodical reports	Letters E-mail Phone Internet work space	E-mail Phone Internet work space
KUL Research on Foresight methodology for the Flemish government		Steering Committee Meetings		
Prospective technological study in the programme PROMETHEE of the DGTRE				Workshops
Prospective study for the 1999 Federal Report on Sustainable Development	Not Applicable	Not Applicable	Not Applicable	Not Applicable

5. AWARENESS RISING

	Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
Belgian federal foresight study	Report: state of the art of the foresight-activities abroad, lessons for Belgium, recommendations for the implementation of the 2d stage		Report with the details of the foresight-study and the general conclusions		Final report with a comprehensive presentation of the methodological aspects and recommendations for organising future foresight exercises Presentation of Belgium's foresight project on national and international conferences Publications in national and international journals Closing conference to present the results of the Belgian foresight project	

6. RESULTS AND IMPACT

Exercise No. 1	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
Belgian federal foresight study	Final report At the end of the exercise, the know-how built up during the foresight-processes, will be transferred to OSTC. This transfer of know-how will allow the OSTC to organise future foresight activities	Final report Closing conference During a closing conference to be organized in the second half of 2001, the final report of the foresight project will be presented	Final report A profound evaluation of the performed foresight exercise will result in recommendations useful for future foresights	
KUL Research on Foresight methodology for the Flemish government				
Prospective technological study in the programme PROMETHEE of the DGTRE	Not Applicable	Final report List of the technologies and information are to be viewed on the internet. (http://mrw.wallonie.be/dgtre/)	Not Applicable	Not Applicable
Prospective study for the 1999 Federal Report on Sustainable Development	Report A part of the report is dedicated in detail to the way the analysis was performed.	Report The result of the study are integrated in the big report about the Federal plan for Sustainable Development of 1999	Report On the federal level, the integration of consultation on the different components of sustainable development (environmental, social and economic) takes place within the FCSD.	

Denmark

Annele Eerola (VTT)

Exercises covered :

1. Research strategy for Denmark
2. Technology Foresight (feasibility study)

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
1. Research strategy for Denmark	Meso		Denmark	5-15 years	1994-1997	
2. Technology Foresight (feasibility study)		Need for Technology Foresight in Denmark	Denmark		1998-1999	

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1. Research strategy for Denmark	Outlining the structure, objectives and framework for Danish research	<p>A lively debatt on the quality & relevance of Danish research after publishing the report "Research in perspective" in 1995 (a report prepared by consultants).</p> <p>=> establishment of 13 working groups consisting of research users</p>		
2. Technology Foresight (feasibility study)	<p>To contribute to discussion about the need for a Danish programme for Technology Foresight</p> <p>To assess strengths and weaknesses associated with various approaches of Technology Foresight</p> <p>To communicate the results to the Danish government and parliament</p>	<p>The final report recommends to government and parliament establishment of a preliminary three-year programme for Technology Foresight, with budget of DKR 25-30 million.</p> <p>In November 2000, the Government decided to ' earmark' 24 million Dkr to Technology Foresight in 2001-2004.</p> <p>Contents of the report:</p> <ul style="list-style-type: none"> - reasons for establishing the Foresight programme - experiences in other countries - specific technology-policy conditions in Denmark - proposal for a Danish programme 		

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1. Research strategy for Denmark	The Ministry of Research and Information technology				Consultants 13 working groups		
2. Technology Foresight (feasibility study)	The Danish Board of Technology		<u>Secreterial functions:</u> J. Ejlsted & L. Frelle-Petersen/ Danish Board of Technology M.Christiansen/ Danish Agency for Trade & Industry		Independent working group composed of politicians and experts, representing parliament, academia & engineering society, industry, companies & labour organisations		

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. Research strategy for Denmark	<ul style="list-style-type: none"> - Technological renewal & employment - Quality of life, environment & health - Cultural development <p>Society's needs for research, e.g.:</p> <ul style="list-style-type: none"> - Identity, history & culture - Economics, empl. & society - Culture, media, leisure & living - Health & disease, food & agriculture - Communication & media - Transport - Education 	<p>Research community & research users</p> <p>Political decision makers</p> <p>Society as whole</p>	
2. Technology Foresight (feasib. study)	<p>Consideration of long-term scientific and socio-economic developments emphasized.</p> <p>Utilization of the Danish tradition of active communication among experts, politicians and wider public recommended.</p>	Politicians and other interested parties	

6. RESULTS AND IMPACT

Exercise No.	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1. Research strategy for Denmark		White Paper on a National Research Strategy (1996)		
2. Technology Foresight		Arguments and proposal to government & parliament	Conclusions concerning the development of national-level foresight activities in Denmark	

The Technology Foresight policy initiative for the period 2001-2004 is located in the Ministry of Trade and Industry. The aim is to identify key fields of technology development in Danish companies and society. Technology Foresight is considered a part of a more comprehensive strategy of supporting the development of a sustainable society (so-called .dk21 strategy; see <http://www.dk21.dk>) and it builds on a number of previous actions. The National Research Strategy by the Ministry of Research and Information in 1994-1997, the cluster analyses by the Ministry of Trade and Industry from 1994 onwards and the strategic analysis of sensor technology in 1999, in the administrative field of the Ministry of Trade and Industry, are among the most important building stones. The Danish Technology Foresight will be directed towards research, education, regulation, consumer policy and technological infrastructure. The foresight exercise is also intended to intensify the contacts between private companies, public research and knowledge institutions. (Government reports 2000 /B. Holst-Jorgensen: "Making Sense of Technology Foresight in Denmark", Dec. 2000). Planning of the concrete steps is in process.

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
1. Norway 2030	Macro/Meso (Public sector)	<p>Transition from a oil-based industry to a mainland economy, esp. its consequences for</p> <ul style="list-style-type: none"> - national economy - public services <p>Role of public adm. in relation to private sector and civic society</p> <p><u>Key themes:</u></p> <ul style="list-style-type: none"> - Global development and external factors - Econ. adaptability - Values, culture and social behaviour - Social organisation and demographic challenges 	Norway	30 years	1998-2000	Erik F. Overland, Ministry of Labour & Government Adm., Dept. of Public Management Policy

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1. Norway 2030	<p>Strengthening the public administration's preparedness for readjustment and development in relation to long-term challenges</p> <p>Improving the basis for the strategic planning of the Ministries</p> <p>Greater degree of common understanding in the various Ministries</p> <p>Providing a reference frame for public adm., business and industry</p>	<p><u>Intended impact:</u></p> <ul style="list-style-type: none"> - Development of public administration & public services - Facilitating long-term thinking in the Ministries - Providing a common reference frame for public adm./business & industry 		<p>Scenario building, emphasis on identification of structural conditions (factors) and various forces of change (actors)</p> <ul style="list-style-type: none"> - Series of working seminars resulting in 4-5 partial scenarios for each key area. - Synthesizing partial scenarios as main scenarios <p>(Methodology was adopted from "Scenarios Europe 2010"-study/Forward Studies Unit of the European Commission.)</p>

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1. Norway 2030	Ministry of Labour and Government Administration		B.Denstad/ Ministry of Labour and Gov. Adm. (chair) O.W. Sandbekk/? (chair of the Ref. Group)		Ministry of Labour and Government Administration <u>Partners:</u> OECD International Futures Programme Forward Studies Unit of the European Commission Norwegian Directorate of Labour Norwegian Central Information Service Norwegian State Oil Company Statskonsult Norwegian Telecommunication Company - R&D		Norwegian Ministries (15) + other actors in Norwegian society? <u>Reference group:</u> - University repr. - Ministry of Trade & Industry - Ministry of Gov. & Regional Dev. - Ministry of Children and Family Affairs

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. Norway 2030	Focus on users when developing services Paying attention to job security Stimulating co-operation between civic society (third sector) and municipalities	Public sector	4 external resource persons directly involved in the work of 4 working groups

Finland

Annele Eerola (VTT)

Exercises covered:

1. Technology Vision

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
1. Technology Vision	<p>Meso</p> <p>Eight clusters:</p> <ul style="list-style-type: none"> - Bio & food cluster - Energy - Chemistry - Transport & infrastructure - Metals & machinery - Forest cluster - Construction - Telecommunication 	<p>Finnish needs and opportunities:</p> <ul style="list-style-type: none"> - welfare state and its components - future needs of society - opportunities provided by science & technology - business development - production and innovation system <p>External conditions:</p> <ul style="list-style-type: none"> - Mainstream techn. developments - Global economy 	Finland	10-20 years	1996-1997	Alpo Kuparinen & Pentti Vuorinen / Ministry of Trade and Industry, Technology dept.

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1. Technology Vision	<p>To produce a well-structured picture of needs and opportunities in central technology fields</p> <p>To generate a vision that would harness the resources & energies towards common objectives</p> <p>(The study was carried out as a preliminary stage for a high-level technology vision programme. Additional R&D funding was under discussion and it was important to generate visions for proper allocation of the money.)</p>	Foresight embedded in diverse future-oriented activities (e.g. new technology programmes adm. by Tekes).	<ul style="list-style-type: none"> - Societal needs - Benefits for the technology actors of the Ministry of Trade and Industry (Tekes, VTT, etc.) - Following the practices of other countries 	<p>The work was carried out in 8 working groups with 3-4 core group members and 15-30 experts in each.</p> <p>The core group members produced preliminary 'cluster papers' that were discussed and debated in a number of workshops/brainstorming sessions. Revised versions of 'cluster papers' were produced in the end of the process.</p>

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering group		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1. Technology Vision	Ministry of Trade and Industry	Financing, overall coordination	Alpo Kuparinen/ Ministry of Trade & Industry, chair Mats Andersson/ SITRA Jorma Hattula/ Academy of Finland Paula Nybergh/ Ministry of Trade and Industry Hannele Pohjola/ The Cofederation of Finnish Industry and Employers <u>Secretaries:</u> Pentti Vuorinen, Seppo Kangaspunta & Petri Pietiläinen/ Ministry of Trade and Industry <u>Experts consulted:</u> Erkki Ormala/ Science and Techn. Policy Council, Heikki Kotilainen/ Tekes, Tarmo Lemola/ VTT - GTS	"Foresight programme preparatory group" Steering the implementation. of the prel. stage, 'Technology Vision' Preparation of the project report (pages 1-40 of the final report) To some extent overlapping responsibilities with the impl. agency	Ministry of Trade and Industry, together with the working groups adm. by Tekes (members repr. companies, univ.& research institutes, Ministries, funding org, etc.) Secretaries from Tekes?	Carrying out the tasks at operational level	Ministry of Trade and Industry Ministry of Education Tekes VTT Industry (wider public)

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. Technology Vision	Factors contributing to welfare society considered in the study (e.g. health, living & leisure time, culture & learning, security, democracy and balanced social developments)	All industrial sectors	Panel members/reviewers (around 150 people, representing research, industry, public adm. and R&D funding)

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No.	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
1. Technology Vision	On the basis of a national 'cluster/Porter study', complemented with brainstorming in the preparatory group	Discussions with experts Document analysis <u>Information base:</u> - expertise & background information of the members of the working groups - recent studies on future developments in Finland - summary of technology foresight studies in other countries - "Technology 2000" by Tekes (prel. drafts)	Partly defined by the clusters	Delegated to Tekes who gathered & nominated the core groups, additional members with 'snow-ball techniques'?	Working seminars, review procedures, discussions during appropriate meetings

Exercise No.	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
1. Technology Vision	Worked out by the core groups, further specified during the working group meetings.	Cluster specific visions, argumentation in 'Tekes-rational style'. The verbal descriptions were constructed at least partly around the question list prepared by the 'steering group'.	No priorities defined between the clusters, subjective assessment within the cluster working groups.	Consensus building was not a problem, no divergent views were presented (The working groups represented mainly technology and technology-related expertise, end-users were not directly consulted. The present state/short-term developments got usually the most attention in the working group discussions.)

Potential problems observed during/after the process:

1. Welfare & environment clusters were not included as separate clusters
2. Possibilities of emerging new technologies were not systematically examined
3. Danger of omitting divergent views (consensus vs. 'group think')

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
1. Technology Vision	Personal communication, partial overlap between the members of the two groups	Personal communication, secretaries of the steering group participated in the work of the implementing agency	Most of the 'consultees' were active members of the working groups. In addition some review procedures were used.	Working group discussions

1 5. AWARENESS RAISING

	Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
	Foresight actors → Policy makers, business, research community (and public at large)	Policy makers, business, research community (and public at large) → Foresight actors	Foresight actors → Policy makers, business, research community (and public at large)	Policy makers, business, research community (and public at large) → Foresight actors	Foresight actors → Policy makers, business, research community (and public at large)	Policy makers, business, research community (and public at large) → Foresight actors
1. Technology Vision	Informal networking Discussions in the Science and Technology Council	Informal networking Discussions in the Science and Technology Council	Participants of the process as 'nodes of information', industry informed also via central organisations	Personal contacts, discussions in the contexts of various meetings	Final report sent for comments in summer 1997. Around 150 people from public sector, academia & research institutes, federations & associations/NGOs were included in the circulation & comment procedure.	Comments by 70-80 people from various organisations (about 50 % of those included in the circulation). Comments summarised by one of the secretaries Post-process seminar in February 1998 for the commentators and the participants of the technology vision project

6. RESULTS AND IMPACT

Exercise No.	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1. Technology Vision	Written report (Post-process seminar presentations)	Final report summarising the work of the eight working groups/A committee report delivered to the Ministry of Trade and Industry	A list of conclusions concerning the development of national-level foresight activities in Finland (among the conclusions: no urgent need to nominate a foresight committee, more important to encourage interaction in R&D)	(Not a relevant question)

Note:

After the post-process seminar in February 1998, significant organisational changes were made in the Ministry of Trade and Industry and in some other organisations responsible for the Finnish R&D policy. This has caused some discontinuity in the further development of the foresight-related activities. Some important steps have, however, been the conference "Foresight at Crossroads" during the Finnish EU Presidency, in November 1999 (the conference was organised by the Ministry of Trade and Industry and the Finnish Association of Graduate Engineers) and the needs assessment of technology foresight ordered from Prof. Ahti Salo, Systems Analysis Laboratory of Helsinki University of Technology, in autumn 2000. The assessment report was published in February 2001 (Salo, A., 2001: A Needs Assessment of Technology Foresight. Ministry of Trade and Industry, Studies and Reports 2/2001).

France

Marie Gasquet (OST)

Exercises covered :

1. CGP - Energy 2010-2020
2. Key technologies 2000
- 3 Key technologies 2005
4. Min Research – Delphi 1994
5. INRA - Forest, wood industry and linkages to territory
6. Research and environment : priority and emerging themes
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.

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 - Commissariat général du plan. *Energie 2010-2020 – Rapport final de l’atelier « Le contexte international »*. Paris : La documentation française, février 1998, 465 p.
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 - *Environmental futures : an update*. ESTO study . October 1999.
2. Key technologies 2000
 - Foray D [1998]. Réflexions méthodologiques et analyse d’expériences étrangères pour l’étude sur les technologies clés. Université de Paris Dauphine, Working paper IMRI 98/07.
 - Les 100 technologies clés pour l’industrie française à l’horizon 2000 + CD Rom

4. Min Research – Delphi 1994

Héraud J.A., Munier F, Nanopoulos K. Méthode Delphi : une étude de cas sur les technologies du futur. *Futuribles*, mars 1997, pp.33-53.

5. INRA - Forest, wood industry and linkages to territory

INRA-DADP, 1999. *Prospective : la forêt, sa filière et leurs liens au territoire*. Tome 1 : Synthèse et scénarios. Répercussions pour la recherche (257 p.).
Tome 2 : Rapport des ateliers (130 p.). Sous la direction de M. Sebillotte. Rapporteurs : B. Christofini, JF Lacaze, A Messéan, D. Normadin

6. Research and environment : priority and emerging themes

Ministère de l'Éducation Nationale, de la Recherche et de la Technologie, et Ministère de l'Aménagement du Territoire et de l'Environnement (1998).
Recherche et environnement. Thèmes prioritaires et thèmes émergents. Enquête internationale auprès de la communauté scientifique.

7. Prospective study of the social demand concerning environment and its translation in terms of R&D.

De la science autrement : étude prospective de la demande "environnement" et sa traduction en termes scientifiques et techniques à des fins de programmation de la R&D (1997). Etude réalisée par le BIPE Conseil, CDC consultants, et Insight Marketing IPSOS pour le Ministère de l'Aménagement du Territoire, l'ADEME et le CEA.

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<http://www.education.gouv.fr/realisation/recherche/cns.htm>
- Clubs CRIN <http://www.ecrin.asso.fr/>
- Prospective 2100 <http://2100.org> <http://gaudin.org> *2100, récit du prochain siècle*. Paris: Payot, 1990
- *Futuribles* (<http://www.futuribles.com>) which is a small firm headed by Hugues de Jouvenel which publishes a journal *Futuribles* and a bulletin *Vigie Info*, organises meetings and training sessions, carries out studies for the government, public and private institutions, as well as brings methodological support to on-going studies.
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Commissariat général du Plan. *Recherche et innovation : la France dans la compétition mondiale*. Rapport du groupe de travail présidé par Bernard Majoie. Paris, La Documentation Française, Novembre 1999, 440 pages. <http://www.plan.gouv.fr/gdt/rechercinnov.htm>
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1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale = horizon	Duration	Main contact person(s)
1. CGP – energy 2010-2020	meso – energy sector	the future of the energy sector in France	France, in world context	2010 and 2020	1996-98	P. Boisson (Chairman), N. Jestin-fleury (CGP) sub-groups chaired by : O. Appert, B. Dessus, F. Moisan, J-D. Lévi
2. Key technologies 2000	set of meso analysis	What are the important techno for national industry? What is the French position concerning these technologies? What should be technological priorities ?	France	2000-2005 Medium term (5-10 according to subjects)	1994-95	J.J. Duby (chairman) Dominique Deberdt and Philippe Bourgeois (Observatoire des technologies stratégiques) Consortium of consultants led by BIPE and BATELLE
3. Key technologies 2005	Meso = all industrial sectors	Same questions as in “Key technologies 2000”.	France	2005-2010 Medium term (5-10 years according to subjects)	1999-2000	Jean Jacquin (chairman) Philippe Bourgeois and Philippe Zenatti (Min of industry) Consortium of consultants led by Groupe CM International
4. Min Research – Delphi 1994	Meso : 15 technological fields	Time frame of realisation France's international position Necessity of international cooperation ; Possible impediments to development	France	30 years	1994	Min Research : Alain Quevreur BETA : JA Héraud 1 F. Munier
5. INRA - Forest, wood industry and linkages to territory	Meso = forest + wood sectors	The future of the forest and the wood industry in France, their linkages to the environment and the territory	France	2020 (medium term)	1995 - 1998	Michel Sebillotte et Bernard Cristofini INRA
6. Research and environment : priority and emerging themes	Meso = environment sector	What are the emerging themes in the field of environment ? How are environmental priorities articulated with one another ?	Global, with some specifications by world regions and various zooms on France		1993-1997	- Catherine Courtet (GEP environnement) - Jacques Theys (Min aménagement territoire) - Jean Luc Volatier (CREDOC)
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	Mesoo = environment sector	What is the social demand concerning environment ? What will be the demands by 2010-2020? What orientations for public research ?	France	2010-2020	1995 – 1998	- JM Poutrel (CDC consultants) - L van Tielcke (IPSOS)

1. OVERALL DESCRIPTION

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1. CGP - Energy 2010-2020	<ul style="list-style-type: none"> - To collect the perception of scientists regarding environmental problems and their interactions, to identify consensus and problems. - Provide information to public and private policy makers about the possible evolutions of energy markets. 	The Commissariat Général au Plan (CGP) has a permanent group on the energy sector. After this study, the CGP set up a Club “Energy, foresight and discussions” and organised conferences to facilitate the transfer of the results of research activities and studies from academics to decision makers.	Importance of energy sector for France : needs refereeing between economic, environmental and political considerations.	Expert consultations in 4 sub-groups: <ul style="list-style-type: none"> - The international context - The challenges of the long-term (beyond 2010-2020) - Three energy scenarios for France - What energy policy for France?
2. Key technologies 2000	<ul style="list-style-type: none"> To study technological dynamics To have a more systematic approach to priority setting. To bring elements for research policy making. To help French firms identifying critical technologies 	List of 105 key technologies, and 136 important technologies State Secretary for Industry : Reorganisation of the funding system for technological development and reorientation of funding	Importance of accompanying technologies (soft technologies)	Working groups made out of experts who use the notion “atouts and attraites” (winning cards and attractiveness) and notion of key factors of success. 5 working groups on techno demand, and 5 WG on techno supply.
3. Key technologies 2005	<ul style="list-style-type: none"> To help French firms in identifying the critical technologies they must develop To help French policy makers to define and set up the national technological policy. 	List of 119 key- technologies.	Importance of accompanying technologies (‘soft’ technologies)	Same methodology as in first exercise, but of a 2 nd circle of experts through Internet ; 8 thematic working groups + one transversal WG.
4. Min Research – Delphi 1994	Test Delphi method as it has been used in Japan (1991) and Germany (1993).	No impact. Has been considered as an experimental exercise and not followed.	Test of a method. Experimental exercise.	Two-round Delphi survey Comparison with Japan and Germany
5. INRA – Forest, wood industry and linkages to territory.	To give information to orient the research programme of INRA, and to give information to the actors of the forest-wood sector, and to the actors dealing with environment and territory management	<ul style="list-style-type: none"> - Collection of data and information on the sector. Help for the diagnostic on the forest and wood sector. - Better definition of INRA research programmes - New interactions among actors of the sector. 	<ul style="list-style-type: none"> - Foresight as a management tool - Imagine a wide variety of futures. 	Experts consultation during foresight workshops. Three groups : <ol style="list-style-type: none"> 1. Overall description of the sector 2. Materials, industries and markets, institutions, space management. 3. Research
6. Research and environment : priority and emerging themes	<ul style="list-style-type: none"> - To define and hierarchize problems. - To identify new and emerging problems in the realm of environment, and to translate them into research activities - To create a new form of dialogue between scientists, government representatives, policy makers and economic actors 	the ordering body did not follow up after the publication of results.	Globalisation : to get the opinion of researchers from all over the world in order to define priorities and identify emerging themes. The survey had to give information for decision making.	- Questionnaire sent to 14.500 researchers all over the world (closed and open questions).
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	<ul style="list-style-type: none"> - To identify the social demand concerning environment, - To appreciate this demand at the horizon of one generation, - To draw elements for orienting public research in the field of environment. 	First experience of a “social foresight”.	Social foresight : dialogue between researchers, social, economic and political actors is possible.	<ul style="list-style-type: none"> - Bibliography - Free forum with focus groups - Four “demand” workshops - One “supply and demand” workshop - Interviews with representatives of research institutions

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1. CGP - Energy 2010-2020	Prime Minister	Responsible for launching the study.	One main group and four sub-groups representing research, administ., energy sector, unions and other interested parties.		Commissariat Général du Plan	The service “énergie, environnement, agriculture, tertiaire” of the CGP followed the work of the groups and was responsible for the secretariat of some groups.	Prime Minister Policy makers. Decision makers.
2. Key technologies 2000	ministry of Industry	Help industrial development. Study is also a communication tool for the Minister	Steering committee of about 20 persons chaired by JJ Duby.	Methodology, Finalisation of list of key technologies +recommendations to Minister	OTS : Observatoire des technologies stratégiques of the ministry of Industry	Definition of methodology. Implementation. Publication of results. Participation in some WG as observers.	Minister of Industry Industry Public research institutions
3. Key technologies 2005	ministry of Industry		Steering committee of about 30 persons chaired by J. Jacquin	Methodology. Finalisation of list of key technologies +recommendations to Minister	OTS : Observatoire des technologies stratégiques of the State Secretary for Industry	Definition of methodology. Implementation. Publication of results. Participation in some WG as observers.	Minister of Industry Industries Public research institutions
4. Min Research – Delphi 1994	Min. of Higher Education - Research	Funding	No steering committee		BETA, Strasbourg University, CNRS	Analysis of Delphi survey	Ministry of research.
5. INRA - Forest, wood industry and linkages to territory.	- Conseil supérieur de la forêt et du bois. - INRA – National institute for agronomic research	Report had to be submitted to the chairman of INRA.	Group of 30 headed by M. Sebillotte (who was responsible for the study). All members were also experts.	- General organisation of the exercise. - Checking the final analysis.-	DADP – délégation à l’agriculture, au développement et à la prospective de l’INRA	DADP was responsible for the methodology, the organisation, the leadership of group discussions, and the writing the reports.	- Chairman of INRA - INRA research programmes - All actors of the forest, wood, and environments sectors
6. Research and environment : priority and emerging themes	- Min. of research. - Ministry of environment - EU commission (DG XI & DG XII)	Responsible for the launching of the 1 st international survey on environment.	- Prospective centre of the Min of Env. - CSI - GERPA - CREDOC		- CREDOC - Ministère de l’environnement - Centre de sociologie de l’innovation	Responsible for designing the questionnaire, sending it and analysing it.	Decision makers in France and in the EC.
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	- Ministry of environment - ADEME (agency for environment and energy conservation - CEA (Atomic energy commission)		Group of 18 persons	Advice on methodology.	- Bipe Conseil - CDC consultants - Insight marketing IPSOS	Design and implementation	Target : decision makers. Actual : The ordering bodies and a small group of experts.

2. INSTITUTIONAL DESIGN

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. CGP - Energy 2010-2020	Not much attention is given to social needs.	Target sector : energy Four sub-groups : 1. The international context 2. The challenges of the long term (beyond 2010-2020) 3. Three energy scenarios for France 4. What energy policy for France ? 5.	Representatives of research, administration, energy industry, unions and all interested parties
2. Key technologies 2000	Not much attention is given to social needs. Very technology and industry oriented	Health and environment Services and communication Transport Technologies du vivant Information technologies Energy Soft technologies Material and associated technologies	About 200 persons = 10 working groups X 20 persons
3. Key technologies 2005	More attention given to client than in 1st exercise. However, still very technology and industry oriented	Technologies du vivant, health, agrofood Information and communication technologies Material, chemistry Environment, energy Construction, infrastructure, building Transport, air transport, space Consumption goods and services Conception methods and technologies, production, management + Interactivity and quality	About 100 persons in working groups = 9 working groups X 12 persons. + about 600 persons on Internet.
4. Min Research – Delphi 1994	Not much attention given to social needs		
5. INRA - Forest, wood industry and linkages to territory.	Consideration was given to social needs as experts came from all kinds of institutions including associations of villages, of forest owners, of insurance, of cooperatives, of natural parks, etc.	Target sector : Forest and Wood industry in France	Steering committee : 30 people. They were also all experts in the groups. On top they were 56 other experts. Group 1 (overall description) – 6 experts Group 2 : Workshop 1 on materials - 18 experts Workshop 2 (industries & markets) – 19 experts Workshop 3 (institutions) – 14 experts Workshop 4 (space management – non market activities) – 20 experts Group 3 : (research) – 17 experts
6. Research and environment :	Some consideration is given to social needs in the answers as the most important problems for	Target sector : environment Questionnaire had five sections :	14.500 questionnaires sent – 1030 exploitable answers (7%): 33% France, 38% other European countries, 13% North

priority and emerging themes	the future (after climatic change) are considered to be demography and development, solidarity, ethics and citizenship.	<ul style="list-style-type: none"> - Priority problems concerning environment, - Hypothesis on the future of earth, - Emerging environmental problems in the 21st century, - Answers to priority problems concerning public research policies - Research themes of the person answering the questionnaire and environmental problems linked to his/her research themes. 	America, 9% Asia and Australia, 7% Africa. 27% from social sciences and humanities
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	A lot of consideration is given to social demand and needs : organisation of focus groups to gather opinions on expectations, organisation of demand workshops, face to face meetings with representatives of research institutions, supply-demand workshop to confront results. Analysis of social demand led to 71 new directions for R&D related to risks and technologies, biosphere, cities and transport, landscapes, decisions and evaluations.	Target sector. : environment	<ul style="list-style-type: none"> - A “free forum” made out of five “focus groups” of 15 people each : young people from Marseille, young mothers from Paris, upper middle class from Limoges, lower middle class with economic problems from Lorient, retired rural persons from Remiremont. - Four “demand” workshops with local and national elected representatives, NGO staff members, scientific experts, journalists, artists, representatives from industry, medical doctors, economists, engineers, farmers. - One “supply – demand” workshop.

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No.	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
1. CGP - Energy 2010-2020	Discussions between CGP and the chairman	Reports written by chairmen and secretaries of the sub-groups.	Consultees had to represent all major segments of society (except citizens). They are experts in their domains.	Personal contacts, networks, recommendations.	Group discussions.
2. Key technologies 2000	Consultation of experts and steering committee.	Meetings of experts in 10 working groups	According to working groups defined by experts and steering committee	consultant + services of the State Secretary for Industry → lists of experts. Experts coming from public research and industry (research, marketing, etc.)	Working groups discussions (20 persons) with one consultant to animate the discussions and take notes + a few interviews
3. Key technologies 2005	Consultation of experts and steering committee	“Veille technologique” Reports prepared by CREDOC. Meetings of experts in 9 working groups	According to working groups defined by experts and steering committee	Same as in 1 st exercise, but experts were readier to come because of the reputation of the 1 st exercise.	Working groups discussions (12 persons) with one consultant to animate discussions, and one consultant to take notes. + a few interviews + Internet
4. Min Research – Delphi 1994					
5. INRA - Forest, wood industry and linkages to territory.	Group discussions	Preliminary reports + comments by experts + group discussions.	Categories of experts were chosen to represent all the actors of the forest and wood sectors.	Within each group, consultees came from various types of institutions in order to have different points of view	Workshops
6. Research and environment : priority and emerging themes	Pre-study with 36 interviews to get questions (1993) 2 tests of the questionnaire + finding lists of experts (1994) Final preparation of the questionnaire and postal sending(1995) Analysis (1996)	Questionnaire with 5 sections. Questionnaire with closed and open questions (lexicographic analysis).		Lists of EC’s projects Lists of the ministries, large programmes, disciplinary associations, research organisations (14.000 names)	Written questionnaire.
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	Detailed bibliography. In the focus groups, questions were open	Bibliography, focus groups, group discussions, interviews.	Chosen by Insight Marketing IPSOS.	Chosen by Insight Marketing IPSOS	Focus groups Workshops Confrontation of supply and demand

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No.	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
1. CGP - Energy 2010-2020	Experts consultation	Three contrasted scenarios	Consensus, discussions	Important role of the chairman of the sub-groups, long discussions.
2. Key technologies 2000	15 domains were defined in questionnaire.			
3. Key technologies 2005	Method "atouts and attraits" (winning cards and attractiveness) and notion of key factors of success.	Book with general trends + key technologies (each one presented separately)	Discussions in working groups ; steering committee (and chairman) make the final choice.	Discussions
4. Min Research – Delphi 1994				
5. INRA - Forest, wood industry and linkages to territory.	Foresight workshops with experts. Two questions were identified: - Will wood remain the main product of the French forest ? - Will the production of the forest in France, and the use of its resources, remain compatible with the evolution of industry,	Two factors have been used and have led to four scenarios. There are : - Wood / no wood : what political orientation for the use of the forest space ? - Relationship between forest and wood industry : what economic relationships between the forest and the wood industry ?	Scenarios are prepared for discussion and awareness of decision makers.	Group discussions. Construction of a matrix giving details on each factor.
6. Research and environment : priority and emerging themes	Priority problems: consultees had to identify and rank 8 themes and mention interdependance : 2805 priority problems in French and 4962 in English. – Clusterisation → 11 groups of priority problems Emerging problems : 7 emerging themes	11 modes of action were presented to the respondents		
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	The focus groups and the "demand" workshops were used to identify 37 tendencies and 34 breaks (ruptures) which were classified into 5 themes : space management, everyday life, health, economic activities, social life	presentation of possible future research directions.	After all the discussions, 71 preliminary research directions (axes précurseurs de R&D) were identified and described in terms of context and relation to demand, scientific substance, disciplines, economic sectors, other related themes.	The objective was to gather new ideas, to understand social demand, to identify possible future research directions.

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
1. CGP - Energy 2010 –2020	No steering committee	No steering committee. Staff members of the CGP were secretaries to the sub-groups.	Discussions in meetings. Major role of the chairmen.	Discussions in meetings.
2. Key technologies 2000	Study as a tool of communication.	Members of implementing agency (OTS) are members of the steering committee.	Discussions in working groups	
3. Key technologies 2005	Study as a tool of communication.	Members of implementing agency (OTS) are members of the steering committee.	Discussions in working groups	
4. Min Research – Delphi 1994				
5. INRA - Forest, wood industry and linkages to territory.	Regular communication as the chairman and quite a few members of the steering committee were staff members of INRA	Chairman of the steering committee was also responsible for implementing the foresight	Consultees participated to groups and workshops.	Discussions during groups and workshops
6. Research and environment : priority and emerging themes	No steering committee. At the end of the survey, the ordering bodies lost total interest in the survey, and did not use it at all.	No steering committee	questionnaire	No communication among consultees.
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.		Some members of the implementing group were members of the steering committee.	Group discussions, interviews.. In the focus groups, the discussion leaders never used the word “environment”.	Discussions during focus groups and workshops; Some members of and the demand workshops had a workshop with representatives of research institutions.

5. AWARENESS RISING

	Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
1. CGP - Energy 2010-2020	Press release announcing launching of study	Little communication	Little communication	Publication of a report by La Documentation Française CGP : text + press releases on web.	Energy Club to discuss results and new studies.	
2. Key technologies 2000	State Secretary for Industry gives out funds		Each working group tend to work alone. Little interactions among groups		Book Presentation to regional bodies, regional development agencies, etc.	
3. Key technologies 2005	Many potential experts had heard from or benefited from the 1 st study		Creation of the group “Interactivity and quality” to interact and have a transversal point of view. Little communication with the rest of the State Secretary for Industry		Book	
4. Min Research – Delphi 1994						
5. INRA - Forest, wood industry and linkages to territory	No special communication beyond the participation of experts	No special communication beyond the participation of experts	No special communication	No special communication	INRA published a report and made a press release.	No special communication
6. Research and environment : priority and emerging themes					Press releases.	
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.						

6. RESULTS AND IMPACT

Exercise No.	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1. CGP - Energy 2010-2020	General report “Les chemins d’une croissance sobre” Four specialised reports : international context, long term challenges, 3 scenarios, what energy policy ?	Three scenarios : S1 : market society S2 : industrial state S3 : State protects environment Recommendations.	List of major conclusions : - Energy efficiency must be a priority for the policies - To respond to LT challenges demands action today - Build the transition between governance and markets - Build synergies between ST and LT	Nothing planned to measure and evaluate impact.
2. Key technologies 2000	Book with chapter on trends + list of key technologies (each one detailed, strengths, weaknesses, etc.)			selection of 50 technologies for funding Decision to carry out a 2 nd study to update the 1 st list.
3. Key technologies 2005	Book published on Oct 12, 2000			Too early to say.
4. Min Research – Delphi 1994				
5. INRA - Forest, wood industry and linkages to territory.	Two reports : One with the synthesis and the scenarios. One with the reports of the three groups.	Four scenarios : S1 (wood and separation forest / industry) : instable tendency S2 (wood and no separation forest / industry) : industry and multifunctionality S 3 (no wood and separation forest / industry) : all territory S4 (no wood and no separation forest / industry) : specialised forests	For each scenario, recommendations are made for research programmes.	Nothing planned, but reality can be compared to the scenarios.
6. Research and environment: priority and emerging themes.				
7. Prospective study of the social demand concerning environment and its translation in terms of R&D.	One report	List of possible new research directions with elements for each direction (context, themes, disciplines, sectors, other directions concerned) List of recommendations	recommendations : - to develop a social engineering adapted to environmental problems - to organise trans-disciplinarity - to fight discontinuity between research, engineering and studies - to establish a situation report on environmental R&D - to organise follow-up of this study	Nothing planned to evaluate impact

Germany

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Foresight Studies Addressed in this Report:

1. "German Delphi Report on the Development of Science and Technology" (1993)
2. "Delphi Report on the Development of Science and Technology. Mini-Delphi" (1994)
3. "Delphi Survey 1996 / 1998. Potentials and Dimensions of the Knowledge Society. Impacts on the Processes and Structures of Education and Training" (1998)
 - 3a. "Knowledge Delphi" (1998)
 - 3b. "Education Delphi" (1998)
4. "Delphi '98. A Study on the Global Development of Science and Technology" (1998)
5. "FUTUR. Shaping the Future Together" (2000 -)

Other Initiatives and Studies Not Included in this Report

- "Technologies of the 21st Century" (1991 - 1993)
- "Critical Technologies for the Information Age" (1995)

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- "Report on Germany's Technological Capabilities" (since 1995, latest report 1999)
- "Updated Report on Innovation in German Industry" (1998)
- "Pilot Study for a Prospection of Research in Selected Areas" (Science Council) (1998)
- Various studies commissioned by German federal states (*Laender*)

Criteria for exclusion:

These studies are future-oriented but were not included as foresight studies for various reasons, among them:

- they often operate with an ad-hoc methodology;
- they are often secondary analyses of existing assessments;
- they are "critical technologies" or benchmarking reports (thus, narrower in focus than foresight studies);
- they are restricted to technological forecasting;
- they focus on one technology or one region, neglecting wider societal issues;
- they are pilot studies.

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EXERCISE No. 1: "German Delphi Report on the Development of Science and Technology" (1993)**1. OVERALL DESCRIPTION**

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
2	Meso. (the entire spectrum of science and technology)	<ul style="list-style-type: none"> • Importance of a given topic • Time frame of realisation • Germany's international position • Necessity of international cooperation • Possible impediments to development 	Germany (and Japan) (Study accompanied by a twin study in Japan.)	30 years	12/1991 - 5/1993	Dr. Hariolf Grupp, Dr. Kerstin Cuhls, Fraunhofer-Institut für Systemtechnik und Innovationsforschung (FhG-ISI)

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
2	<ul style="list-style-type: none"> • Anticipatory intelligence. • Identification of technological potentials for the future. • Determining priorities for innovation policy. • Direction-setting. 	<ul style="list-style-type: none"> • Initial criticism from the scientific community. Delphi method feared as a tool for political planning and steering ambitions • Seen as very helpful by political administration but not turned into research programmes or new research departments. • Several German federal states (<i>Laender</i>*) used study for SWOT analyses • Results assimilated and extrapolated by strategic planning departments of various companies. • Discernible response in the media but also slight criticism for the Japanese element in the questionnaire. • Little response in the public at large. • Marked (although uneven) response in industry and associations. • The implementing agency was criticised for doing too little to market the study. • Delphi established as an accepted method. 	Knowledge for long-term orientation in innovation policy.	<ul style="list-style-type: none"> • Two-round Delphi survey • Comparison with a Japanese twin study.

* Laender = German federal states. Each of them is active in research policy.

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
2	Federal Ministry of Research and Technology (BMFT, later BMBF)	Funding.	No steering committee.		Fraunhofer Institute for Systems Technology and Innovation Research (FhG-ISI)		Experts. Political decision makers, R&D departments, scientists, industry.

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
2	<ul style="list-style-type: none"> • Social needs a subset of questions in a questionnaire largely devoted to technological factors. • "Society, Culture and Technology" one of 16 subject fields containing questions on: <ul style="list-style-type: none"> • Physical and psychological life functions • Environment and framework conditions • Everyday behavior • Education/training • Leisure/Hobby/Culture • Subject field "City Planning, Architecture, Housing" contained several questions on social needs. 	<ul style="list-style-type: none"> • New Materials and Processing; • Electronics and Information Technology; • Life Sciences; • Nuclear and Particle Physics; • Marine and Geo Sciences; • Raw Materials and Water Resources; • Energy; Ecology and Environmental Technology; • Agriculture, Forestry, Fishery; • Production; • Town Planning, Architecture, Housing; • Communication Technology; • Space Travel; • Transportation; • Medicine; • Society, Culture and Technology. 	<ul style="list-style-type: none"> • 40% of experts from academe, 35% from industry, 15% public sector, 10% non-profit sector • Number of consultees: 1st round: 1,056 responses (30%). 2nd round: 857 responses (82%)

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
2	<ul style="list-style-type: none"> Cooperation with Japanese twin team Questions taken from the fifth national technology forecast survey in Japan. Desk research 	<ul style="list-style-type: none"> Cooperation with Japanese twin team Desk research 		<ul style="list-style-type: none"> Desk research by ISI. Use of external address pools in the fields of biotechnology and energy. 	Two-round Delphi questionnaire

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
2				

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
2	Implementing agency allowed to operate with a high degree of autonomy.	---	Sporadic, ad-hoc communication and consultation.	[No communication. Consultees voted on given questionnaire.]

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
2	No mobilisation of interested parties.		<ul style="list-style-type: none"> Implementation or consultation was not planned explicitly. Developed spontaneously in the course of the exercise. ISI criticised for doing too little to sell the study to the relevant interested groups. [4] 			

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation and impact
2	<ul style="list-style-type: none"> • Report published • A book in a popular format was published. 		Study was presented by the Research Minister. The media took up the information.	<ul style="list-style-type: none"> • No formal evaluation. • Internal quality checks performed by implementing agency.

EXERCISE No. 2: "Delphi Report on the Development of Science and Technology. Mini-Delphi" (1996)**1. OVERALL DESCRIPTION**

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
3	Micro/Meso. (Scanning of eight technological sectors)	<ul style="list-style-type: none"> • Relevance of topic for: <ul style="list-style-type: none"> • Science and technology; • the economy; • the environment; • the Third World; • for society • When will the potential be realised? • Conditions for successful realisation: <ul style="list-style-type: none"> • Solution to scientific and technical problems? • Sufficient market demand? • Competitive price? • Assessment of framework conditions: Interest of industry; extent of government regulation; acceptance of technology; available public funding; international cooperation; R&D infrastructure; availability of trained personnel; starting conditions for innovations 	Germany (and Japan) (Study accompanied by a twin study in Japan.)	30 years	1994-1995	Dr. Kerstin Cuhls, Fraunhofer-Institut für Systemtechnik und Innovationsforschung (FhG-ISI)

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
3	<ul style="list-style-type: none"> • Identification of technological potentials for the future. • Testing and refinement of Delphi method. • Testing the approach of internationally comparative Delphis. 	<ul style="list-style-type: none"> • Limited impact because of trial character of the exercise. • A cover story by a leading German weekly news magazine resulted in some media interest. 	<ul style="list-style-type: none"> • Refinement of Delphi method • In-depth analysis of selected technology areas. 	<ul style="list-style-type: none"> • Two-round Delphi survey • Comparison with a twin study in Japan

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
3	Federal Ministry of Research and Technology (BMFT, later BMBF)	Funding.	No steering committee.		Fraunhofer Institute for Systems Technology and Innovation Research (FhG-ISI)	Planning and executing	Experts. Political decision makers, R&D departments, scientists, industry.

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
3	<ul style="list-style-type: none"> • Importance of demand factors for choice of selected target sectors. • Societal bottlenecks as starting point for questions. • The questionnaire itself focuses on technological/innovation factors. 	<p>130 questions on eight sectors</p> <ul style="list-style-type: none"> • Materials and Future Processing (Photovoltaics + Superconductivity) • Microelectronics and the Information Society (Cognitive Systems and Artificial Intelligence + Nanotechnology and Microsystems Technology) • Life Sciences and the Future of the Health System (Cancer Research and Treatment + Brain Research) • Prospects for a Cleaner Environment (Waste Processing and Recycling + Climate Research and Climate Technology) 	<ul style="list-style-type: none"> • 48% of experts from academe, 30% from industry, 5% public administration, 15% research institutions • Number of consultees: 1st round: 634 responses (76%). 2nd round: 459 responses (74%)

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
3	<ul style="list-style-type: none"> • Four of the target sectors had been identified as possible bottlenecks in the German S&T system by the previous Delphi study. • Topics chosen and questions formulated during a joint Japanese-German conference in Berlin. • Finalization of topics and questions by ISI and NISTEP. 	For each of the four target sectors (see left) a joint Japanese-German expert group was created to accompany the project.		<ul style="list-style-type: none"> • Experts selected on the basis of desk research by ISI and the BMFT. • Use of external data base for microsystems technology • Assistance by various scientific associations 	Two-round Delphi questionnaire

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
3	Experts were confronted with the assessments of their foreign counterparts.			

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
3	<ul style="list-style-type: none"> • Questionnaire and revised methodology worked out jointly by ISI, NISTEP (Japanese institute) and BMFT • Communication tighter than in previous Delphi study. 	---	Sporadic, ad-hoc communication and consultation.	Communication among a limited number of experts during a joint Japanese-German conference in Berlin.

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
3	Implementation or consultation was not planned explicitly. Developed spontaneously in the course of the exercise and after publication of report.					

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation and impact
3	Report published	No press conference (because of a prior cover story by a leading German news magazine)		<ul style="list-style-type: none"> • No formal evaluation. • Internal quality checks performed by implementing agency.

EXERCISE No. 3: "Delphi Survey 1996 / 1998. Potentials and Dimensions of the Knowledge Society. Impacts on the Processes and Structures of Education and Training" (1998)

Exercise No. 3a: "Delphi I" / "Knowledge Delphi"

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
4a	Meso/Macro (Scanning the entire spectrum of knowledge, learning and training a basic resource for the advancement of society)	<p>A. "The Spectrum of Knowledge" Assessment and rating of 388 fields of knowledge ("items") according to the following criteria:</p> <ul style="list-style-type: none"> • The relevance of the item for <ul style="list-style-type: none"> • Individual needs; • Techno-economic importance; • Cultural orientation; • political guidance; • comprehension of elementary principles. • The dynamics of the item: Extent of innovation to be expected in the next 25 years. • The linkage of the knowledge to other disciplines. • Diffusion of the knowledge into the canon of general education ("<i>Allgemeinbildung</i>") <p>B. "Basic Knowledge" Identification of fields of knowledge which may offer a basic, orientating function to citizens and society.</p>	Global and national scale	2020	1996 - 1998	Dr. Stefan Wolf, Prognos AG

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
4a	<ul style="list-style-type: none"> • Pool of ideas and directives for the future of the German educational system • Assessment and overview of knowledge trends, not forecasting in the strict sense. 	<ul style="list-style-type: none"> • Impact hard to pin down and assess. • The report was not quoted widely, neither in the media nor in scientific journals. • The Research Minister, Ms. Edelgard Bulmahn, endorsed the report. • The Research Minister announced that scenarios of "determinants and options of the knowledge society" would be developed from "Knowledge Delphi" and the "Education Delphi". These never materialised. • The report was published shortly after the general elections of 1998 which led to a change of 	<p>"A society that thrives on knowledge has to put its citizens in a position to cope with the information and knowledge deluge." [36]</p> <ul style="list-style-type: none"> • Knowledge as the basic resource of today's society • Providing orientation to help people assimilate and utilise knowledge • Life-long learning 	<p>Modified Delphi method in three stages:</p> <ul style="list-style-type: none"> • Expert workshop to prepare questionnaire; • questionnaire; • workshop with the respondents to the questionnaire. Discussion of the questionnaire results. <p>The second workshop</p>

		government. The ensuing massive changes made it impossible to market the report actively.	<ul style="list-style-type: none">• Interdisciplinarity• Study as "a door to discourse"	focused on comments by mavericks who dissented from the majority view expressed in the questionnaire.
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2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
4a	Federal Ministry of Education and Research (BMBF)	<ul style="list-style-type: none"> • Funding • ??? 	No steering committee.		Prognos AG	<ul style="list-style-type: none"> • Planning the study • Organising a conference • Preparation of a questionnaire 	Experts and the wider public

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
4a	In the centre of interest. Knowledge as a basic resource for society.	Five main fields of knowledge: <ul style="list-style-type: none"> • Life, Life Sciences, Ecosystems (76 items); • Scientific Essentials and Technology (82 items); • History, Culture, Meaning, Interpretation (75 items); • Man and Social Life (81 items); • Organisation of Society: Politics - Law - Economics (74 items). 	<ul style="list-style-type: none"> • Questionnaire: <ul style="list-style-type: none"> • 1,672 persons addressed, 842 interested, 691 responses • Two thirds from academe, one fourth from business and administration, the rest from the media.

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
4a	Formulation of items and main fields of knowledge: <ul style="list-style-type: none"> • Desk research by contractor • Final version produced by the editorial staff of Brockhaus (a leading publishing house for encyclopaedia in Germany) 	Desk research		<ul style="list-style-type: none"> • Desk research • Informal co-nomination ("snowball procedure") 	<ul style="list-style-type: none"> • Questionnaire (quantitative) • 57 experts discussed and interpreted results of the questionnaire --> additional qualitative results

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
4a				Moderated workshop

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
4a	---	---		

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
4a	No evidence so far.					

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation and impact
4a	Final report published.		Press statements published.	No evaluation.

EXERCISE No. 3: "Delphi Survey 1996 / 1998. Potentials and Dimensions of the Knowledge Society. Impacts on the Processes and Structures of Education and Training" (1998)

Exercise No. 3b: "Delphi II"/ "Education Delphi"

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
4b	Meso/Macro (Education/training as a basic resource of society; different sectors of education (school; continuing education; university education)	<p>Main questions:</p> <ul style="list-style-type: none"> • How <i>should</i> the education system in Germany develop in the future? • How <i>will</i> it most likely develop? <p>Specific questions: A set of educational trends are assessed.</p> <ul style="list-style-type: none"> • Is the trend likely? Is it desirable? • How important is it for the future of the education system? • Ranking of various hypotheses on the opportunities and risks of the trends. <p>General questions on:</p> <ul style="list-style-type: none"> • framework conditions for the educational system; • access to and permeability of the education system; • concepts, contents and methods of education; • teaching and learning; • location and time frames of learning; • quality control, evaluation, transfer; • societal functions, cooperation. 	Global and national scale	2005 +2020	1997-1998	Helmut Kuwan, Infratest Burke Sozialforschung, München; Eva Waschbüsch, Infratest Industria, München

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
4b	<ul style="list-style-type: none"> • Pool of ideas and directives for the future of the German educational system • Assessment and overview of knowledge trends, not forecasting in the strict sense • Initiate and intensify discussions. 	<ul style="list-style-type: none"> • Study marketed insufficiently by BMFT due to two reasons. The government changed at the end of 1998. The responsible civil servant in the ministry died. The responsible division of the ministry was involved in numerous other urgent topics and needed time to adapt to the situation. • The Research Minister announced that scenarios of "determinants and options of the knowledge society" would be based on the "Knowledge Delphi" and the "Education Delphi". These never materialised. However, a follow-up-study (onlineinterviews with experts of the "Education Delphi" sample) was conducted. • Notwithstanding these problems the study seems to have been a success. The study sparked interest and re-intensified political and public debate on education and training in Germany. • The first edition of the report (3,000 copies) was out of print after three weeks. • The study was translated from German into other languages, e. g., Korean. • The report is quoted repeatedly in BMBF statements as well as by the recently established "Forum Bildung", a body whose main aim is to support discussions on education in Germany. • There are still (February 2001) many demands for presentations on "Education Delphi" on occasions such as congresses, workshops etc. • Several universities and private research institutes have adopted the study to evaluate and reassess their curricula and procedures. • Requests for presentations/advice from Austria, Switzerland and Korea. 	<p>"A society that thrives on knowledge has to put its citizens in a position to cope with the information and knowledge deluge." [36]</p> <ul style="list-style-type: none"> • Knowledge as the basic resource of today's society • Orientation to help people assimilate and utilise knowledge • Life-long learning • Interdisciplinarity • Avoiding an increasing knowledge gap and social exclusion • Study as "a door to discourse" 	<ul style="list-style-type: none"> • Modified Delphi process in three stages: <ol style="list-style-type: none"> 1. 3 initial expert workshops to work out questions for survey 2. Questionnaire 3. 2 concluding expert workshops to reflect and condense the results of Delphi I and II. • Minority positions dissenting from the Delphi mainstream ("mavericks") were presented in the report. <p>Remark: The contractors had only eight months to complete the study.</p>

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
4b	Federal Ministry of Education and Research (BMBF)	<ul style="list-style-type: none"> • Funding • Developing the basic idea of the study 	No steering committee, only advisory board.	<ul style="list-style-type: none"> • Discussion of basic methodological and content-related questions; • Give advice and feed-back 	<ul style="list-style-type: none"> • Infratest Burke Sozialforschung (Coordinating contractor) • Fraunhofer-Institut für Arbeitswirtschaft u. Organisation (FhG-IAO) • Deutsches Institut für Internationale Pädagogische Forschung (DIPF) 	<ul style="list-style-type: none"> • Developing the study design, the questionnaire and the workshop concept; sampling of experts • Full responsibility for all methodology and content • Supervision and moderation of workshops; analysis and interpretation of data; final report; presentations; 	<ul style="list-style-type: none"> • Experts and the wider public • Government (education administration); • Education and training institutions; • Professionals in the education sector; • Scientific community

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
4b	In the centre of interest. Education and training as basic resources for society. Anticipating social risks, e.g., avoiding an increasing "knowledge gap" and social exclusion.	<p><i>Initial workshops on:</i></p> <ul style="list-style-type: none"> • General education • Vocational education • University sector <p><i>Concluding workshops on:</i></p> <ul style="list-style-type: none"> • Contents and methods of learning • Institutional and extra-institutional learning 	<ul style="list-style-type: none"> • Education experts in the wider sense. • Attempt to address as many different societal sectors and institutions as possible. • Experts from public and private education institutions (school, universities, vocational education etc.); from industry; educational administration; research plus "mavericks". No figures available. • Inclusion of a few pupil's or student's representatives. • 669 persons addressed; 457 returned questionnaire (68%)

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
4b	<ul style="list-style-type: none"> Mainly performed by contractors (given the considerable time pressure), based on know-how from variety of previous research projects by the contractors. Desk research Advice and feed-back from the ordering body (BMBF) Advice and feed-back from the Advisory Board 	<ul style="list-style-type: none"> Questionnaire Workshops 	<ul style="list-style-type: none"> Mainly: Internal Workshops of the three contractors Additionally: Advice and feed-back from the ordering body and the advisory board. 	Desk research by contractors, mainly by the DIPF.	<ul style="list-style-type: none"> Questionnaire Workshops Additional feed-back by mail, E-mail, telephone, etc.

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
4b	See above		<p>(1) <i>Quantitative Analyses:</i></p> <ul style="list-style-type: none"> a) Statistical analyses of means, percentages, etc. b) Sometimes: Ranking of Priorities c) Contrasting the dimensions "probability" and "desirability" to identify problem areas. <p>(2) <i>Qualitative Analyses:</i> Workshops, discussions.</p>	Moderated workshops

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
4b	<ul style="list-style-type: none"> • 3 meetings during the project • Contact by mail, E-mail and telephone 	---	---	<ul style="list-style-type: none"> • 4 internal workshops • About 10 internal personal meetings • Continuing communication and discussion during the project.

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
4b	Awareness raising very limited in the face of considerable time pressure. Awareness raising mainly on an ad-hoc basis, performed by the contractors, the advisory board and the ordering body.					

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation and impact
4b	<ul style="list-style-type: none"> • Final report published. • Coverage in newspapers like "Süddeutsche Zeitung", "Frankfurter Allgemeine" etc. • Contributions to books. • Papers in scientific and trade journals • Numerous presentations at congresses, conferences, trade fairs etc. mainly in the field of vocational education and continuing education focussing on discussions between scientists and professional actors (companies, education institutions, government agencies, political parties, trade unions) • Contributions to an internet website (http://www.forum-bildung.de) 	See left	See left	No evaluation.

EXERCISE No. 4: "Delphi '98. A Study on the Global Development of Science and Technology" (1998)**1. OVERALL DESCRIPTION**

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
5	Meso/Macro	<ul style="list-style-type: none"> • Importance of topics for <ul style="list-style-type: none"> • enhancement of human knowledge • economic development • societal development • ecological problems • work and employment • Time horizon for realisation • State of the art in science and technology? Which country is leading? • Which measures for improvement and advancement necessary? • Possible effects and reverberations of topic for environment, security, socio-cultural development • Assessment of 19 megatrends (cross-sectoral, socio-economic visions for the future) 	Global and national	30 years	1996 - 1998	Dr. Kerstin Cuhls, Fraunhofer-Institut für Systemtechnik und Innovationsforschung (FhG-ISI)

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
5	<ul style="list-style-type: none"> • Anticipatory intelligence. • Identification of technological potentials for the future. • Determining priorities for innovation policy. • Direction-setting. 	<ul style="list-style-type: none"> • Implementation phase planned but not enforced systematically due to the change in government (in late 1998) and the restructuring of the BMBF. Numerous isolated initiatives instead. • The political administration on the Federal and Laender* level seems to be the main user of the results. • Positive echo in industry associations and among large companies. Small and medium-sized appear less interested. • Strong response by the media. • Delphi results assimilated by big companies. They blend it with their own expertise to use it for strategic planning. • Impact on research policy: The study is one important source of information and often a point of reference for strategic documents. Delphi did not trigger new programmes or networks but it has influenced priorities in research policy-making, e.g., the "Leading Projects" policy scheme of BMBF. • Survey among 250 participants of an expert congress on Delphi in July 1998. <p>1.1.1 Questions and Answers</p> <ul style="list-style-type: none"> • Study of use for you? In general: About two thirds positive, about one third no interest. High interest in the Delphi sectors ICT, management/planning, chemistry. Less interest in the sectors of service, mobility and environment. • Immediate or long-term use? Little immediate use for planning. More for strategic and long-term planning. • Has it changed your perspective? In general: About one third say yes. High impact on world view in the fields of health, environment, energy and construction. • Fraunhofer Society used results for internal evaluation. • The Association of Engineers (VDI) used the results to create the structure for a new unit on microsystems technology. • ISI received several follow-on contracts by companies and Laender governments. 	<p>"Which technological options are most important in the future in order to ensure economic competitiveness, ecological preservation or restoration and social welfare?" [44]</p>	<ul style="list-style-type: none"> • Two-round Delphi survey • 19 "megatrend" questions • Part of topics and questions identical to the sixth Japanese Delphi report. • Comparison of Japanese and German results • (Factor analysis of "megatrend" questions)

* Laender = German federal states

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
5	Federal Ministry of Education and Research (BMBF)	<ul style="list-style-type: none"> • Funding of the process • Supervision of the process • Appointed the Steering Committee • Participation in the design of the Delphi questionnaire • Participation in choice of experts • Supervised the marketing of the study. 	Name: "Steering Committee" Members of SC: <ul style="list-style-type: none"> • 2 business managers • 1 science journalist • 1 representative of a scientific foundation • 1 banker • 1 consultant • 2 academics • 1 representative of a "Science Center" research institution 	<ul style="list-style-type: none"> • Worked as a kind of Board of Directors • Helped shape the agenda of the study (e.g., by proposing the inclusion of "mega-trend" questions) • Monitored the six expert committees which designed the areas/target sectors of the study. 	Fraunhofer Institute for Systems Technology and Innovation Research (FhG-ISI)	Planning and executing the study	<ul style="list-style-type: none"> • Science, industry, politics, R&D management • The interested public

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
5	<ul style="list-style-type: none"> • Individual questions in the questionnaire address social and demand factors, especially in target sectors such as "Service and consumption" or "Health". In general, however, the questions tend to focus more on technological innovations. • The questionnaire contains 19 so-called Megatrend questions, some of which explicitly address social needs and trends 	12 target sectors: <ul style="list-style-type: none"> • Information and communication, • Service and consumption, • Management and production, • Chemistry and materials, • Health and life sciences, • Agriculture and nutrition, • Environment and nature, • Energy and resources, • Architecture and living, • Mobility and transport, • Space, • Big science 	<ul style="list-style-type: none"> • 39% from industry, 38% from academe, 16% from public administration, 7% from research establishments. • 7,000 experts addressed. 2,400 responded. 2,000 fully collaborated.

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
5	<p><i>Definition of areas</i></p> <ul style="list-style-type: none"> • Areas partly derived from comparison with Japanese Delphi, partly from comparison with Delphi 93. • Brainwriting and brainstorming sessions among experts online and during meetings. • Definition of areas and questions by six expert panels combining 100 persons from industry, academe and other institutions. Expert panels produced proposals for topics in a brainstorming session and then revised the topics repeatedly in several rounds. • Each expert panel responsible for two fields to ensure interdisciplinary exchange. <p><i>Definition of questions</i></p> <p>Questions condensed from the expert discussions by ISI in conjunction with NISTEP (Japanese research institution) and BMBF.</p>	<ul style="list-style-type: none"> • Analysis of Japanese Delphi • Desk research • Taking up assessments of Mini-Delphi 	Informal assessment	<ul style="list-style-type: none"> • Experts from previous Delphi studies. • Informal co-nomination of experts • Desk research (use of research directories etc.) • The consultees included peripheral experts, i.e., experts acquainted with the target sector but not specialised in the specific topic. This served to contrast the assessments of specialists with the judgement of experts with a wider perspective. • Chosen by ISI and Research Ministry. 	<ul style="list-style-type: none"> • Definition of areas by six expert panels combining 100 persons from industry, academe and other institutions. Expert panels produced proposals for topics in a brainstorming session and then revised the topics repeatedly in several rounds. • Each expert panel responsible for two fields to ensure interdisciplinary exchange.

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
5				<ul style="list-style-type: none"> • Delphi procedure • Six expert panels produced proposals for topics in a brainstorming session and then revised the topics repeatedly in several rounds. • Each expert panel responsible for two fields to ensure interdisciplinary exchange.

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
5	<ul style="list-style-type: none"> Steering committee reported to the ordering agency. Ordering agency active in the choice of consultees. 	Implementing agency reported to the Steering Committee, submitted progress reports.	Expert groups worked quite independently. Implementing agency supported the expert group.	<ul style="list-style-type: none"> Brainwriting and brainstorming sessions among experts online and during meetings. Communication spontaneously in the course of preparing and completing questionnaires.

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
5	No systematic approach to communication.	<i>Science:</i> Reaction from scientific community initially sceptical. Delphi method feared as a tool for political planning and steering ambitions.		<i>Science</i> Relation to scientific community partly eased by a "Pilot Study for a Prospection of Research in Selected Areas" by the German Science Council in spring 1998. The study supported the use of foresight methods for careful research planning.	<ul style="list-style-type: none"> Implementation phase planned but not enforced systematically due to the change in government and the restructuring of the BMBF. Publication of a newsletter ("<i>Zukunft nachgefragt</i>") in a popular format to market the results. Organisation of an expert conference in July 1998. 	<ul style="list-style-type: none"> Several companies and industry associations requested an in-depth analysis of the study for their sectors.

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation and impact
5	Publication of report in two volumes. Vol 1 a summary in a popular design, Vol. 2 as scientific documentation.	<ul style="list-style-type: none"> • Two press conferences and one expert conference (in July 1998). • Publication of a newsletter ("<i>Zukunft nachgefragt</i>") in a popular format to market the results. • Cooperation with Chambers of Commerce • Two TV magazines used Delphi as a basis for a series of broadcasts. 		<ul style="list-style-type: none"> • No formal evaluation. • Progress reports to the Steering Committee worked as internal quality control.

EXERCISE No. 5: "FUTUR - Shaping the Future Together" (1999 -)

Introductory Remark:

- The project is in its starting phase. The information supplied below is preliminary.
- The information below does not represent the official position of the Federal Ministry of Education and Research (BMBF) nor of the VDI Technology Center (VDI-TZ).

The author assumes responsibility for the information.

- The information must be treated as confidential. Use of the information is subject to approval by the author.

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
6	Meso/Macro: Identification of technological and socio-economic trends for specific target sectors	<p>Target sectors "Mobility and Communication" and "Health and Quality of Life".</p> <p><i>Questions:</i></p> <ul style="list-style-type: none"> • <i>Range:</i> Which aspects, viewpoints, research trends, studies, experts have to be taken into account to deal adequately with "Mobility and Communication" in the future? • <i>Status Quo:</i> Which megatrends, strengths and weaknesses, challenges, opportunities and impediments can be discerned? • <i>Scenarios:</i> Design of forecasts, scenarios, alternative path-ways. • <i>Visions:</i> Discussion of visions with the public. Enquiry into the necessary preconditions for and consequences of these visions. • <i>Recommendations:</i> Formulation of recommendations and possible policy measures. Evaluation. 	Global and national scale	2015 - 2020 (no fixed time scale)	<ul style="list-style-type: none"> • FUTUR as such is open-ended. • Duration for one target sector = 18 months • Start of "Mobility and Communication" in late 1999. 	<ul style="list-style-type: none"> • Dr. Cornelia Haugg (BMBF) • Dr. Matthias Braun (VDI-TZ)

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
6	<ul style="list-style-type: none"> • Anticipation of future trends in technology and society (early warning) • Reliable basis for political and managerial decisions • Development of sustainable visions for the future • Improved dialogue between 	<p><i>In general:</i></p> <p>Too early to determine impact. Project in its starting phase.</p> <p><i>Preliminary results:</i></p> <ul style="list-style-type: none"> • Creation of a website as the basis for dialogue (www.futur.de) • Build-up of a pool of about 100 experts ("Network Partners") in the field "Mobility and Communication" as the nucleus of dialogue. • Response to several hundred personal and phone contacts: Idea 	<ul style="list-style-type: none"> • Exploration of social needs • Transparency of decision processes • Dialogue among experts and citizens • Developing visions and scenarios for the future of Germany 	<ul style="list-style-type: none"> • Moderated online dialogue • Moderated workshops • Use of scenarios, SWOT and backcasting possible to amend dialogue.

	science and industry • Creation of networks • Mobilising synergies in the German innovation system.	of dialogue and participative approach seen as interesting. Use of internet dialogue mostly perceived as positive but occasionally scepticism. Procedures seen as work-intensive.		• Participative elements (planned)
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2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
6	Federal Ministry of Education and Research (BMBF)	<ul style="list-style-type: none"> • Funding • Overall supervision of the process • Choice of target sectors in order to focus and speed up the dialogue. 	Planned but not yet appointed		VDI Technology Center, Düsseldorf (in conjunction with three other contractors)	<ul style="list-style-type: none"> • Operational conception and management of the process • Day-to-day management 	<ul style="list-style-type: none"> • All interested citizens.

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
6	Identification and articulation of social needs are the very reason for FUTUR.	<p><i>"Mobility and Communication"</i> (started) includes fields such as: traffic, transport, telematics, information and communication technology, E-Commerce, regional planning etc.</p> <p><i>"Health and Quality of Life"</i> (forthcoming) includes fields such as: physical and mental health and well-being, leisure, consumption and life styles, environmental security etc.</p>	<ul style="list-style-type: none"> • Core of about 100 experts ("Network Partners") for "Mobility and Communication" • Composition: 25% industry, 25% R&D management, 25% research establishments and academe, 10% political administration, 15% NGOs, associations, interest groups etc. • Concentric, step-wise enlargement of circle of "Network partners" via co-nomination and snowball dynamics.

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
6	<ul style="list-style-type: none"> • State of public debate on technology and innovation in Germany • Information needs of BMBF and German politics • Two expert workshops on the future of mobility and transport in 1998 ("Birlinghoven Workshops") 	<ul style="list-style-type: none"> • Previous German Delphi studies • Desk research • Two expert workshops on the future of mobility and transport in 1998 ("Birlinghoven Workshops") 	<ul style="list-style-type: none"> • The circle of "Network Partners" should be very broad. • Every person with documented knowledge and judgement in the target sector is eligible for "Network Partner". 	<ul style="list-style-type: none"> • A core of about 50 "Network Partners" was appointed by BMBF. • Desk research. • Co-nomination 	<ul style="list-style-type: none"> • Online discussion forum • E-Mail exchanges • Workshops

Exercise No	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
6	[Too early to specify in detail.]	[Too early to specify in detail.]	[Too early to specify in detail.]	Use of a professional consulting company with experience in mediation procedures to moderate workshops.

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee and other institutions	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
6	<ul style="list-style-type: none"> • Weekly meetings • Top-down relation 	---	<ul style="list-style-type: none"> • E-Mail exchanges • Circulation of newsletter for the "Network Partners" 	<ul style="list-style-type: none"> • Exchanges in an online discussion forum • Meeting and brainstorming during expert workshops

5. AWARENESS RAISING

Exercise No	Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
6	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors	Foresight actors ---> Policy makers, business, research community and public at large	Policy makers, business, research community and public at large ---> Foresight actors
	<ul style="list-style-type: none"> Delphi Newsletter "<i>Zukunft nachgefragt</i>" also used as a platform for FUTUR. Two expert workshops on mobility and transport. 	<ul style="list-style-type: none"> Response to Delphi as input to planning for FUTUR. Two expert workshops on mobility and transport. 	<ul style="list-style-type: none"> Continuous information via website, E-Mail, newsletter Presentation of FUTUR during conferences, trade fairs etc. 	<ul style="list-style-type: none"> Continuous input via website and E-Mail Personal communication during conferences, workshops, trade fairs, presentations etc. 	---	---

6. RESULTS AND IMPACT

Exercise No	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation and impact
6	[Too early to specify in detail.]	[Too early to specify in detail.]	[Too early to specify in detail.]	Evaluation group planned. Names of designated members confidential.

Ireland

Paul Ormerod (CEST)

Exercizes covered :

Irish foresight

OVERALL DESCRIPTION

Foresight Exercise 1	Scope	Questions addressed	Geographical Scale
Phase 1 of the Foresight programme	Eire wide within the interface between business, the science and technology base and government	To understand how technology will impact upon the social, economic and market trends that Ireland will face in the medium to long term (2015)	Eire wide

Time Scale	Duration	Main Contact Persons	Explicit Objectives
12 months	3.98 – 3.99	Brian Sweeney (Chairman Siemens Ireland Ltd) ICSTI Foresight Task force	The overall aim of the Foresight exercise is to secure sustained competitive advantage and enhanced quality of life by: <ul style="list-style-type: none"> • Understanding how science and technology will assist Ireland with its future needs • Specifically, to understand how investments in research, science and technology can assist Ireland's development as a knowledge society • Creating enduring networks that link business, the science base and government • Developing a culture of forward thinking about market & technology opportunities and threats

Actual results and impact	Underlying Values	Overall Methodology
<p>The timescale of 12 months recognised that the depth and detail associated with 3 and 5 year Foresight exercises could not be replicated. The main strength of the Irish exercise was the process of consultation, consensus and commitment in understanding its key industrial sectors.</p> <p>Since the exercise was completed 12 months ago it is difficult to establish what the impact of the programme has been. However, each of the eight panels reported the results of their findings in a clear and concise manner and the government is better placed to plan policies which will assist the country.</p>		<p>This was undertaken by analysis of eight industrial sectors or panels and included:-</p> <ul style="list-style-type: none"> • Chemicals and Pharmaceuticals • Information and Communication Technologies • Materials and Manufacturing Processes • Health and Life Sciences • Natural Resources • Energy • Transport and logistics • Construction and Infrastructure <p>Each of the panels performed a comprehensive survey of an industrial sector. The summary report of each panel consisted of at least three features addressing various short/medium/long term issues.</p> <p>Recommendations were made by each panel aimed at focusing upon the perceived needs of that particular industry. They include introducing awareness campaigns, calls for favourable tax regimes to promotion of small/medium enterprises.</p> <p>Strategic Technologies were aimed at improving the overall effectiveness of the particular industry, and included the uptake environmental sound (where applicable), flexible and automated technological processes which are geared to advancing current conventional technological processes.</p> <p>Enabling Policies/Mechanisms were arrived at after identification of recommendations and the strategic technologies which would be required. In effect, they constitute the framework by which the above two features can be achieved.</p>

INSTITUTIONAL DESIGN

Ordering body		Steering Committee	
<p data-bbox="185 339 264 363">Names</p> <p data-bbox="185 427 555 703">Three organisations were involved in the Foresight exercise: IDC Inter-Departmental Committee for Science and Technology; the Cabinet Sub-Committee for Science and Technology and the Irish Council for Science, Technology and Innovation (ICSTI).</p> <p data-bbox="185 735 555 826">However, overall responsibility was with Department for Science, Technology and Commerce.</p>	<p data-bbox="573 339 752 363">Responsibilities</p> <p data-bbox="573 427 1005 491">Coordination of the work of the 8 panels and the overall steering group</p>	<p data-bbox="1028 339 1229 363">Names</p> <ul data-bbox="1028 427 1460 746" style="list-style-type: none"> • Chemicals and Pharmaceuticals • Information and Communication Technologies • Materials and Manufacturing Processes • Health and Life Sciences • Natural Resources • Energy • Transport and logistics • Construction and Infrastructure 	<p data-bbox="1482 339 1662 363">Responsibilities</p> <p data-bbox="1482 427 1915 639">The responsibilities of each panel was to provide an in depth analysis of each area; to provide recommendations, identify strategic technologies and to develop enabling policies/ mechanisms which facilitate the objectives of the foresight programme.</p> <p data-bbox="1482 671 1915 762">In addition, each panel was convened to cover a number of related activities which spill over from area to another.</p>

Implementing agency		Target audience	Consideration given to social needs
Department of Science, Technology and Commerce	Encouragement of a wide variety of business research and trade/prof. Organisations in the development of focused Foresight activities for their stakeholders.	National /Ireland	To secure enhanced quality of life for people in Ireland
Irish Council for Science Technology and Innovation	To undertake Foresight activities in Ireland	Ireland	To understand how current and new technologies can be best be used/identified in promoting Irish industrial competitiveness and therefore social and economic performance.

Target Sectors	Number & origin of persons consulted
<ul style="list-style-type: none"> • Chemicals and Pharmaceuticals 	20 chemical and pharmaceutical panel members, whose backgrounds range from academia through to industrial/development chemists and phamacists
<ul style="list-style-type: none"> • Information and Communication Technologies 	22 panel members, whose backgrounds were typically of an industrial nature plus a small proportion of academics
<ul style="list-style-type: none"> • Materials and Manufacturing Processes 	22 panel members, predominantly from academia with a number of senior managers from industry
<ul style="list-style-type: none"> • Health and Life Sciences 	34 panel members, virtually all with PhDs, who had a predominantly academic background
<ul style="list-style-type: none"> • Natural Resources 	26 panel members, predominantly executives or senior mangers from industrial companies
<ul style="list-style-type: none"> • Energy 	17 panel members, from both organisations or industrial companies
<ul style="list-style-type: none"> • Transport and logistics 	16 panel members, from both organisations and private enterprises
<ul style="list-style-type: none"> • Construction and Infrastructure 	20 panel members whose backgrounds ranged from directors of companies through to planning individuals in organisations – councils, universities

METHODS USED DURING THE FORESIGHT EXERCISE

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees
<p>Technology Foresight Ireland was spearheaded by eight broadly based expert Panels established in March 1998 under the guidance of an ICSTI Task Force.</p> <p>The eight areas chosen were picked for their relevance to the Irish economy in influencing social, economic and market trends that would affect Ireland in the medium to long term within the confinements of the development of science and technology.</p>	<p>In the technology Foresight process the participants developed consensus on research priorities, creating a shared vision of the future they would like to achieve.</p> <p>The process was concerned with constructing a desirable but achievable long term future and with indentifying the critical strategic decisions which must be taken now to make the achievement possible.</p> <p>The methods which were used in collating information were focused within this strategic aim, and included selected workshops, seminars, forum discussions etc</p>	<p>The occupational background of the consultees was in line with the focus of each of the eight panels.</p> <p>For example, the health and chemistry based panels were populated, largely, by academics with a PhD background.</p> <p>By contrast, the information and communication panels was largely made up of experts from industry.</p> <p>In summary, the Task Force looked for individuals with an acknowledged expertise within the remit of the panel.</p>

Methods used for consulting the consultees	Methods used for identifying areas and questions
The consultees were given a broad remit within their specific sector; and were to report their findings to the ICTSI task force.	<p>The consultees, given the small no. in each panel, were asked to produce a report on the key technologies which would be required to influence the economic development of the sector.</p> <p>Identifying areas and suitable questions was done within the context of finding recommendations, strategic technologies and a favourable policy/mechanistic regime.</p> <p>For example, by cross examination of the chemical/pharmaceutical industrial sector which resulted in detailed analysis by a panel of experts, highly qualified recommendations were arrived at. Additionally, the strategic technologies that were necessary to achieve this were explored in some depth and the resulting policy framework and mechanisms which was necessary were also developed.</p>

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
A combination of statistical analysis combined with a good qualitative framework for interpreting the current global economic regime, enabled the panels to identify within each sector how technology can be harnessed to maximum benefit to the future economy.	<p>By linking together the four areas of academia, government departments, industry and organisations the panel findings were unanimous in that Ireland must continue to invest in R & D. This was highlighted as a weakness in the current economy.</p> <p>Policies aimed at improving the science & technological understanding of future workers in the economy was deemed an essential priority while at the same time understanding the need for increased expertise in the use of information and communication technologies.</p>	Those factors that can, credibly, improve the impact that science and technology can play on the improvement of the performance of the economy.	

MODES OF COMMUNICATION

<p>Modes of communication between ordering body and steering committee</p> <p>An official statement by the ministry for science, technology and commerce, instructing the ICSTI to manage a Foresight programme typifies how the respective bodies communicated.</p> <p>More a case of internal communication between Irish civil servants and ICSTI.</p>	<p>Modes of communication between steering committee and implementing agency</p> <p>By detailed report findings which consisted of recommendations, strategy technologies and policy recommendations between panel members and ICSTI.</p>	<p>Modes of communication between implementing agency and consultees</p> <p>As across</p>	<p>Modes of communication among consultees.</p> <p>By detailed workshops, fact finding missions and collective fora for discussion of the issues pertaining to each panel.</p>
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AWARENESS RAISING

Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
<p>Foresight actors > Policy makers, business, research, community and public at large</p> <p>None</p>	<p>Policy makers, business, research, community and public at large> Foresight actors</p> <p>Ad hoc</p>	<p>Foresight actors > Policy makers, business, research, community and public at large</p> <p>Collaboration among experts in the specific panels in discussion groups</p>	<p>Policy makers, business, research, community and public at large> Foresight actors</p> <p>Integral part of the panel committee, partook in the collaboration panel exercises</p>	<p>Foresight actors > Policy makers, business, research, community and public at large</p> <p>N/A</p>	<p>Policy makers, business, research, community and public at large> Foresight actors</p> <p>N/A</p>

RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
<p>The research that went into the work of the eight panels was fully analysed and is recorded in an overview of the ICSTI Foresight exercise.</p> <p>The results must be set against what the authors considered is a knowledge based economy. This theme is a recurring one in results.</p>	<p>In a summary report, the eight panels findings or recommendations were recorded and documented on internet.</p> <p>All three areas of analysis, recommendations, strategic technologies and enabling policy/recommendations were reported simultaneously.</p>	<p>In a summary report, the eight panels findings or recommendations were recorded and documented on internet.</p> <p>They were brief but concise, and should not be considered in isolation of the strategic technologies and policy recommendations that accompany them.</p>	<p>The exercise was completed in March 1999, and it is not possible to do so presently\.</p>

Netherlands

Nabila Chehab (TNO-STB) and Jan de Wilt (NRLO)

In the matrix some general foresight activities are described (a cluster of foresight studies following the same methodology) [g] and a few foresight studies on its own [s].

Exercizes covered:

1. Foresight Steering Committee (OCV) [g]
2. Technology Radar (TR) [s]
3. Sustainable Technological Development Programme (DTO) [g]
4. National Council for Agricultural Research (NRLO) [g]
5. Netherlands Study Centre for Technology Trends (STT) [g]
6. Royal Netherlands Academy of Arts and Sciences (KNAW) [s]
7. Advisory Council for Science and Technology (AWT) [s]

1. FORESIGHT STEERING COMMITTEE (OCV)**1.1. OVERALL DESCRIPTION**

Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
Meso (spectrum of S&T areas)	How can foresight in the Netherlands be conducted with support of all relevant parties? How can the research strategies in specific fields be improved?	The Netherlands	20-30 years	5 years (1993-1997)	Dr. A.D. Wolff-Albers (OCV)

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Creating support for foresight in the Netherlands and improving the research strategies at the organisational and field levels (setting directions, giving options for policy, anticipate new opportunities, advocate new initiatives, communicate and educate)	Giving foresight a permanent place in the Dutch science and technology policy framework. Identification of ten priority actions for Dutch research	Respond to societal needs, sustainable development, use S&T opportunities, participatory approach with multiple stakeholders	OCV Matrix, consisting of rows (education and training; sectoral interests, societal issues) and columns (current situation, scenarios, options, actions).

1.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
Ministry of Education and Science	Approving the foresight programme and the foresight reports, advising about the foresight results	Foresight Steering Committee, consisting of 13 members, most of them from the scientific community and the intermediate level.	Initiate and coordinate foresight studies and advise on the results.	Foresight committee per S&T field, 4-8 persons from research community and knowledge users	Ensure commitment of relevant parties in a specific field, information gathering, building scenario's, supplying options and diffusion the results.	Policy makers in government, academia, business, scientific community, societal interest groups
Consideration given to social needs		Target sectors		Number and origin of persons consulted		
Articulation of these needs is an explicit aim, using the OCV matrix dimensions; sectoral interests, societal (cross-sectoral) needs, educational needs		Physics, chemistry, mathematics, informatics, energy research, nature and environment, agricultural sciences, traffic/transport and infrastructure, production technology, microsystem technology, health research, labour, health and social security, humanities, educational sciences, art history, cognitive sciences, law, Dutch language and literature		30- 100 per foresight process, times 31 processes results somewhere between 1000 – 3000		

1.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
The advisory Council for Science and Technology selected the S&T areas. Criterium: the government had to take major decisions in these fields within a few years	Essay-writing, interviews, workshops, deskresearch	Persons who enjoy respect in their field, whose knowledge areas are complementary and who represent both knowledge users and the research community.	Co-nomination, direct stakeholders (stakeholder analyses)	(telephone and life) Interviews, (scenario) workshops, essays, round tables, strategic conferences, questionnaires, formal consultation and spontaneous reactions

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Scenario-exercises, brainstorming, desk research	Scenario's, moon-shot approach	Based on the OCV matrix	Strategic conferences, round tables, Formal consultation

1.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Formal consultations and reactions, formal assignment from ministry to OCW, visits by ministry officials to OCV meetings, OCV bureau contacts with ministry, draft reports	Formal consultations and reactions, formal assignment for OCV to committee, visits by OCV members to foresight committee meetings, OCV bureau to committee bureau support, draft reports	Workshops, conferences, interviews, participation in foresight committee	Informal contacts at workshops and conferences, and as part membership of foresight committee

1.5. AWARENESS RISING

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
Start conference, formal consultation	Start conference, desk research, meetings	(draft) reports, formal consultation	Scenario-workshops, round tables, conferences, desk research	Foresight reports, OCV end report, conferences, media	Formal reactions, strategic conferences

1.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
Foresight reports and synthesis report	Methodological and agenda-setting reports, synthesis report	Foresight reports with recommendations, conferences, formal dialogues, media	Self-evaluation, PhD study, evaluation in masters thesis, evaluation by AWT

1.2 Literature

Overleg Commissie Verkenningen, Een vitaal kennissysteem – Nederlands onderzoek in toekomstig perspectief, Juni 1996

<http://www.awt.nl>

2. TECHNOLOGY RADAR

2.1. OVERALL DESCRIPTION

Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
Meso: technology fields of importance for the Dutch business and industry are selected.	<ol style="list-style-type: none"> 1. Which technology areas will be of strategic importance for Dutch business and industry in the next ten year? 2. Which actions are necessary to strengthen the knowledge base in these technology areas? 	National scale (The Netherlands) ¹	10 years	1 year	Mr. Vijlbrief (Ministry of Economic Affairs)

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Improve long term strategic orientation, make a working document to start the discussion among different actors in the fields	Identification of strategic themes, strength and weaknesses of these themes, a follow-up of eight deepening workshops aiming of better interaction between private enterprises and knowledge institutes on basic and strategic research	Search for identification of strategic themes, identification of interaction between science and businesses and barriers therein	Desk research and interviews

¹ The foresight focussed on a national scale, which was placed in an international frame.

2.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
Ministry of Economic Affairs	Final responsibility for the execution and follow-up of the foresight	Steering committee consisting of representatives of the Ministry of Economic Affairs, Min. of Education, Culture and Research, the industry and the AWT	Facilitating the foresight process	Rand Europe, Coopers & Lybrand Technology Consultants, Innovation and Technology Management SA	Development and carrying out of the foresight	Dutch business and industry, universities and knowledge organisations

Consideration given to social needs	Target sectors	Number and origin of persons consulted
The foresight paid attention to the economic and technological needs of 22 business segments	<p>The business segments were: Agriculture and fishing; Mineral exploration, production and processing; Food and consumables; Textiles, clothing and leather; Timber, pulp and paper; Printing and publishing; Chemicals and polymers; Pharmaceuticals; Basic materials; Electrical and electronic components; Instruments and optics; Metal products and other manufactured products; Machinery and transport equipment; Utilities; Building and constructions ; Trade and retail; Leisure and entertainment; Transportation services; Information, software and telecommunication services; Financial services; Environmental services; Other services</p> <p>The technology areas were: Mechatronics; Bioprocess technology; Software engineering; Catalysis; Separation technologies; Gene technology; Polymers; Composites; Surface treatments; Production automation technologies; Energy saving technologies; Data and knowledge systems; Technologies for interactive and multimedia applications</p>	Almost 100 persons were interviewed coming from the business segments, research organisations and the universities.

2.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
The Ministry of Economic Affairs together with the implementing agencies determined the questions and decided that the foresight should cover the business areas of the Netherlands. The implementing body used the classification of the Dutch economy in business segments from ADL as a starting point of the foresight.	Deskresearch (national and international reports), interviews	From all business segments Dutch representatives were interviewed. So the different business segments define the categories of consultees.		Bilateral interviews

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Interviews and desk research.	Interviews	Quantitative analysis, expert judgement	Panel of 10 general experts in science and technology

2.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Network and personal contacts	Meetings and reports	Letters, general introduction letter of Ministry of Economic Affairs, interviews	Informal ?

2.5. AWARENESS RISING

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
No information available	No information available	No information available	No information available	In the yearly Technology lecture of the Ministry, the results were presented and organisations were invited to open the discussion. The workshops were announced.	Individual initiatives for a few follow-up workshops

2.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
Report part 5: Methodology	Report (part 1-4), in English and Dutch, several presentations, for example the Technology Lecture by the Minister of Economic Affairs	Reports, presentations (Technology Lecture)	Continuing activities: workshops on eight of the fifteen technology fields. Participants in the workshops were originating from business segments and knowledge organisations.

1.3 Literature

Dutch Ministry of Economic Affairs, Technology Radar, part 1-5, March 1998

<http://www.minez.nl>

3. SUSTAINABLE TECHNOLOGICAL DEVELOPMENT PROGRAMME (DTO)

3.1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
1. Interdepartemental Research Programme Sustainable Technological Development (DTO)	Macro translated to micro activities (scientific fields)	How can economic growth and sustainable development be realised and what is the role of technology development?	National scale	30-40 years	5 years (1993-97)	Mr. G.J. Fonk (DTO-KOV ²)

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Communication, new networks, focus on sustainable development in the year 2030	New innovation initiatives, research programmes (knowledge transfer programme, Economy-ecology-technology programme)	Respond to social needs; technology as a key to a sustainable economy; show the value of system innovations; multi-actor processes	Backcasting

3.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
Five ministries: Min. Of Environment, Min. of Agriculture, Min. of Economic Affairs, Min. Of Transport, Min. Of Education, Culture and Research.	Funding and initiating the foresight	A steering committee with representatives of the responsible ministries. A sounding board from policy, politics, research and business	Watching and controlling the foresight, as well as giving feedback. The steering committee is advised by the sounding board.	A special programme office was appointed.	Put the results into words; quality and guiding the progress of the foresight.	The executives in the knowledge organisations, government, business community, social organisations

Consideration given to social needs	Target sectors	Number and origin of persons consulted

² KOV=kennisoverdracht: knowledge transfer

The whole foresight is given its form by looking at the social needs and how technology can fulfil these social needs	Food, Transport, Housing, Water, Chemistry In all the worked out sectors, shareholders and stakeholders are taken into account. It is looked at the complete system, and looked for new combinations in order to achieve sustainability in all these themes.	Hundreds of people were consulted, originating from research, government, business community and social organisations
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3.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
In interdepartmental meetings the questions and areas were identified on the basis of technological possibilities in relation with sustainability	Desk research, workshops	Since it is a broad foresight which looks at society as a whole, consultees from all groups in society were part of the foresight.	Networks, co-nomination	Bilateral interviews/contacts, workshops

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Workshops & desk research	Backcasting, workshops and desk research	Backcasting	Workshops and discussion (implementations challenges)

3.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Bilateral meetings, papers	Periodical meetings and progress reports	Newsletters, seminars, bilateral contacts	Seminars, bilateral contacts

3.5. AWARENESS RISING

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
Intensive bilateral contacts, workshops, working plans, newsletters		Intensive bilateral contacts, workshops, seminars, newsletters, presentation of results, website		A special programme was set up for the knowledge transfer of the foresight. Workshops, an information desk, bringing together different parties to start new initiatives, cd-roms, website	

3.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
Presentations, workshops, newsletters, seminars, reports, manuals	Presentations, workshops, newsletters, seminars, reports	Presentations, workshops, newsletters, seminars, reports	15 projects directly resulted from this foresight. Policy makers at all levels are starting to work with transitions, technological system innovations and has become more sensitive for social fitting of technology. Long term thinking is another result of this foresight.

1.4 Literature

Interdepartmental Research Programme Sustainable Technological Development, STD vision 2040-1998, Technology, key to Sustainable Prosperity, 1997
<http://www.DTO-KOV.nl> (will be available at 10.10.2000)

4. NATIONAL COUNCIL FOR AGRICULTURAL RESEARCH (NRLO)

4.1. OVERALL DESCRIPTION

Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
Macro (trends) and micro (sector, S&T field)	What are the challenges for agribusiness, rural areas and fisheries and what can be the contribution of S&T in meeting these challenges?	The Netherlands (in an international context)	10-15 years	5 years (1995-99)	Dr. J.G. de Wilt NRLO

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Explore and develop ambitions and strategies for agricultural research from a long term perspective	Research and innovation programmes, creation and activation of new networks	Respond to societal needs, sustainable development, use S&T opportunities, participatory approach with multiple stakeholders	Essay writing, scenario elements (driving forces), workshops, SWOT- analysis, background studies

4.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
Council (with representatives from government, business, knowledge organisations and societal groups)	Approving the foresight programme and the foresight reports	Foresight committee (science, business, government and societal groups)	Developing and guiding the foresight process, drawing up the foresight report.	Project team (2-3 members of the foresight committee and an NRLO staff member)	Organisation of the foresight process	Public administration, businesses, scientific community, societal interest groups

Consideration given to social needs	Target sectors	Number and origin of persons consulted
Identifying the social needs and challenges is an explicit aim of the foresight exercise.	Business sectors: Agriculture, fisheries, rural areas S&T areas: sensortechnology, packaging, epidemiology, molecular biology, nanotechnology, Production ecology, data processing, aquaculture, policy sciences & ICT	About 800 from government, business, societal groups and knowledge institutions.

4.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
Interviews, brainstorming sessions, literature surveys	Interviews, conferences, essay-writing, studies	The four major categories: government, business, academia and societal groups were always included.	Co-nomination, web search	Interviews, workshops, essay-writing, questionnaires

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Brainstorming, essay-writing, interviews	What-if scenario's, visioning, backcasting	Workshops, voting	Action conferences, questionnaires

4.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Informal meetings	Bilateral contacts between members of Council and staff, the head of the staff Council is secretary of the Council.	Interviews, workshops, newsletters	Informal contacts at workshops

4.5. AWARENESS RISING

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
Bilateral contacts, starting conferences, newsletters, foresight plans		Workshops, interviews, newsletters, website, background reports, essays, scenario-exercises		Foresight report, action conferences, public debates, media (newspapers, tv, radio), bilateral contacts	

4.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
Background studies, essays, newsletters, website, media	Foresight reports, conference papers, workshops, newsletters, website, media	Foresight reports with proposals for action, action conferences, bilateral contacts, newsletters, media, website	Monitoring by NRLO, external impact assessment

Literature

NRLO, Agriculture and environment: Future initiatives for knowledge and innovation, report 98/20E, 1998

NRLO, Innovating with ambition - Opportunities for agribusiness and, rural areas and the fishing industry , report 99/17E, 1999

<http://www.agro.nl/nrlo/>

5. NETHERLANDS STUDY CENTRE FOR TECHNOLOGY TRENDS (STT)

5.1. OVERALL DESCRIPTION

Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
Micro (each foresight always focuses on one S&T theme)	What are important developments at the interface of technology and society? How do these developments affect long term policy making, both in the public and in the private sector?	The Netherlands and Belgium	10-15 years	2 years per exercise	Ir. J.H. van der Veen

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Create broad support for socio-technological developments	Knowledge fusion processes, two books per year, major conferences and follow-up	Think creatively, act cautiously	Knowledge fusion within networks

5.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
STT (board of STT)	Funding and appointing the director. Choose topics.	Steering group with 8 top-level people in the area of the chosen theme	Contents and design of the foresight	Working groups, which are installed by the steering group	Carrying out the foresight	Business, government, universities and knowledge institutes

Consideration given to social needs	Target sectors	Number and origin of persons consulted
STT is a public/private organisation	Depending on the theme chosen, but in general everyone who is concerned with the chosen theme of the foresight	40-70 per foresight

5.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
Feasibility study, interviews with top-level people	Interviews, meetings, traditional web-search	Matrix	Enthusiasm, commitment	Interviews, workshops, meetings, essays

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Literature, web, contacts	Trends, scenario's, business strategies	Meetings	Meetings, reviews of publications

5.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Through the STT-staff. A member of the board participates in the steering group	Meetings, reports, newsletter, e-mails	Workshops, meetings, paragraph writing	Workshops, meetings

5.5. AWARENESS RISING

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
Lobbying	Lobbying	Regular publication		Books, conferences, publications, interviews, presentations	

5.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
report, symposia	report, symposia	report, symposia	Monitoring the follow-up (technology policy, innovation and demonstration programmes, post- academic courses, platforms, fora)

Literature

<http://www.stt.nl>

6. ROYAL NETHERLANDS ACADEMY OF ARTS AND SCIENCES (KNAW) - BIOLOGY FORESIGHT

6.1. OVERALL DESCRIPTION

Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
Micro, it focuses on biology	<ol style="list-style-type: none"> 1. What are the most important developments in biology in an international perspective? 2. What are the most important national and international developments in the needs for biological research? What are possible contributions of biology to societal needs in the long term? 3. What should be the focus of biological research for the coming ten to twenty years? 	National scale	10 years	1,5 years (January 1996 - November 1997)	Mr. J. Kuiper (secretary of the foresight committee) Prof. Dr. K. Verhoeff (chairman of the foresight committee)

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Focus on the future, stimulate cohesion within the biology research area	Proposal for a biology plan; Meetings between the chairs	Science push	Desk research, interviews, scenario's

6.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
KNAW/ OCV	Final responsibility	There was no steering committee. The Biology Council of the KNAW acted as a sounding board	-	Foresight Committee Biology (VCB); all members are appointed on personal title.	Development and carrying out of the foresight	The Ministry of Education, Culture and Research, universities, funding organisations

Consideration given to social needs	Target sectors	Number and origin of persons consulted
This foresight pays attention to the social needs for biological research, as seen from science. It evaluates the funding programmes of the Dutch government and it assesses the quality of the Dutch biology research in comparison with international biology research.	The target sector is fundamental and applied biology research at universities, research institutes or research within business and industry.	39 people were consulted, originating from universities, sector councils, research institutes, business

6.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
In the earlier OCV foresight study, biology has been identified as a strategic area. A external report was written and discussed with representatives from the demand and supply side of biological research.	Interviews, reports, results from other foresight studies, information from faculties	The foresight committee decided to choose people from demand and supply side to be interviewed during the foresight.	Only the people in the implementing committee were consulted. They were chosen by the chairman, secretary and ordering body.	Interviews (bilateral)

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
If a trend was mentioned by several consultees during the interviews, it was been regarded as a driving force.	Scenario's: Three scenario's were developed and worked out within the foresight committee.	The foresight committee identified important themes on the basis of deskresearch and interviews. The scenario's were used in a conference to select the priorities.	Presentation during the conference, some meetings

6.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Progress-reporting and draft report		Reports, interviews, conference	Conference, informal contacts (not initiated by the foresight committee)

6.5. MODES OF COMMUNICATION

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
Starting-note, conference, newsletter	Discussion between the different parties. Feedback about the discussion on informal basis (letter, e-mail, telephone, personal contact) to OCV and KNAW.	Meetings with policy makers during the foresight, newsletter	Informal	Publications, newsletter of for policy makers at universities, schools, ministries, funding organisations, business sector	Requests for reports, questions on the foresight.

6.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
	Report and publication in different kind of newsletters.	Report officially offered to Minister of Education, Culture and Research	Most of the recommendations in the foresight have received a follow-up.

Literature

KNAW, Biologie: het leven centraal, november 1997

<http://www.knaw.nl>

7. ADVISORY COUNCIL FOR SCIENCE AND TECHNOLOGY (AWT), CONSTRUCTION FORESIGHT

7.1. OVERALL DESCRIPTION

Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
Micro in a macro perspective: the foresight is focused on construction.	<ol style="list-style-type: none"> 1. Is the knowledge-infrastructure sufficiently adapted to future changes? 2. Are the right subjects addressed with the right intensity? 3. Which subjects must be added? 	National scale	15-20 years	1,5 years (September 1998-march 2000)	Mrs. V.C.M. Timmerhuis (AWT)

Explicit objectives	Actual results and impact	Underlying values	Overall methodology
Addressing questions of society; looking into the future; raising awareness; changing the way of thinking	To early for that; only some indications: the Delft University is changing its research programme	Respond to societal needs	Scenario's

7.2. INSTITUTIONAL DESIGN

Ordering body		Steering committee		Implementing agency		Target audience
Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
AWT (Advisory Council for Science and Technology Policy)	Final responsibility for guiding the process of the foresight and publishing the foresight report	There has been no steering committee, only a foresight committee	Developing and carrying out the foresight and for the results	Projectteam, consisting of two members of the foresight committee and a representative of AWT-bureau	Working out ideas, organising the foresight	Research institutes, universities, construction sector

Consideration given to social needs	Target sectors	Number and origin of persons consulted
This foresight is based on societal needs.	Research institutes and universities concerned with construction, the construction industry	20 people from research institutes or universities in two roundtable meetings 120 people from knowledge institutes, universities and the construction sector in a voting conference

7.3. METHODS USED

Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
The AWT selected this theme after consultation of the construction sector. The question was if the development of knowledge was anticipating future challenges for the construction sector.	Reports, articles, press-cuttings, information within the heads of the foresight committee.	Selection criteria for the category: relation with and experience in the construction sector	The foresight committee used the members list of the ARTB (Advisory Council for Technology policy and construction industry).	2 roundtable meetings; 1 voting-conference

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
Scenario's (developed by the foresight committee itself), press-cuttings	Scenario's (Shell method).	The foresight committee identified priorities with the help of scenario's.	Consensus was not a goal of the foresight. Participants were consulted in a voting-conference.

7.4. MODES OF COMMUNICATION

Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
Progress-report was discussed in the council of the AWT. A representative of the council was part of the foresight committee.	The secretary and two other members of the foresight committee prepared and worked out big parts of the foresight, which were discussed in the foresight committee as a whole in regular meetings.	Reports, written information before the roundtable meetings or the voting conference.	Informal contacts at conference

7.5. AWARENESS RISING

Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
AWT discussed the plans with several organisations in this field. Information was also provided in the newsletter of the construction industry and the website of AWT.	Informal feedback to AWT; The Ministry asked AWT to carry out foresight with a focus on societal needs.	ARTB informed their members by newsletters, in meetings and in a conference with 3300 participants. Website AWT.	Informal reactions on information given.	The foresight was finished a few months ago, so this is too early to say!	Too early to say!

7.6. RESULTS AND IMPACT

Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
The analysis of the foresight is not described, only the results of all steps.	The results are presented in a report, available on the internet of the AWT. Interim results and final results are also presented on conferences and in a newsletter. The final report was presented to the Minister of Economic Affairs.	On the basis of the foresight study, the AWT and the ARTB will write their recommendations to the government.	Too early to say!

1.5 Literature

AWT, Bouwen op kennis, achtergrondstudie nr. 17, March 2000
<http://www.awt.nl>

Portugal

Marie Gasquet (OST)

Studies covered:

1. Engenharia e Tecnologia 2000

BIBLIOGRAPHY

Engenharia e Tecnologia 2000

<http://www.civil.ist.utl.pt/~et2000/index2.html>

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale = horizon	Duration	Main contact person(s)
1. Engenharia e Tecnologia 2000 = "ET 2000"	Macro = to understand the role that engineering and technology can play for the development of competitiveness of Portugal.	What are the threats and opportunities for Portugal ? What are alternative options for the development of business sectors ? What are the major knowledge base with a strong potential to support business development ? What are limitations for innovation ? What critical profiles of E&T ? Implications for education and training programmes ?	Portugal	2000 - 2020	July 1999 – November 2000	L. Valadares Tavares (director of ET 2000)

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1. Engenharia e Tecnologia 2000	To identify priority areas and strategies of development for engineering and technology. To contribute to the increase of competitiveness of Portuguese firms, adopting 2020 as time horizon. To set up a network for continuous process of monitoring and strategic analysis of E&T and of its relationship with business activities.	Undergoing	To put Portugal in the realm of competition. Alternatives scenarios to present the future of major economic sectors.	Demand oriented : to relate the progress of E&T with the competitiveness of the different economic sector. Scenario modelling Taxonomic model of knowledge (Galaxy model) Assessment of efforts (Trident model)

2. INSTITUTIONAL DESIGN

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1. Engenharia e Tecnologia 2000	- Academia de Engenharia (AE) - Associação Industrial Portuguesa (AIP) - Ordem dos Engenheiros		Representatives of the three ordering bodies + director of ET 2000		IST- Institut Superior Technico		Portuguese firms Portuguese education system.

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. Engenharia e Tecnologia 2000	A lot of consideration is given to demand.	<p>Five horizontal studies :</p> <ul style="list-style-type: none"> - Macro-societal scenarios - Macro-economic scenarios - Business dynamics - Environment - Innovation, technological marketing, and internationalisation - Young engineers and technologists <p>17 studies :by industrial sectors</p> <ul style="list-style-type: none"> - Environment - Energy - Food industry - Construction - Building materials - Electronics - Chemical industry - Metal and plastic products and manufacturing - Textiles and fashion - Automobile industry - Shoe industry - Engineering services - Transportation and distribution - Telecommunications - Information technologies - Financial services - Geographic information systems 	<p>About 500 experts coming from 300 institutions are involved. Experts come from Portugal and other countries.</p> <ul style="list-style-type: none"> - 15 experts - 9 experts, including 1 not from Portugal - 8 experts, - 17 experts, including 1 not from Portugal - 45 experts, including 8 not from Portugal - 15 experts <p>Experts for the studies by business sectors :</p> <ul style="list-style-type: none"> - 44 experts - 25 experts - 14 experts - 33 experts - 30 experts - 18 experts - 18 experts - 12 experts - 13 experts - 45 experts - 16 experts - 35 experts - 18 experts - 24 experts - 19 experts - 28 experts - 28 experts

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No.	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
1. Engenharia e Tecnologia 2000			Experts chosen among universities, industries, research centers. Some were researchers, other had managerial positions		

Exercise No.	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
1. Engenharia e Tecnologia 2000	<ul style="list-style-type: none"> - Impact matrix to understand the relationship between business products and E&T - Trend matrix to represent the relationship between major trends and each group of business products 	Scenarios	Development options matrix to identify areas of knowledge in E&T with a greater potential for development	?

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
1. Engenharia e Tecnologia 2000	??	??	Discussion groups	Discussion groups

5. AWARENESS RISING

	Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
1. Engenharia e Tecnologia 2000			Internet site presenting structure, methodology, calendar, results, etc. Regular Bulleting www.civil.ist.utl.pt/~et2000		Not yet in post-foresight phase	

6. RESULTS AND IMPACT

Exercise No.	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1. Engenharia e Tecnologia 2000	This phase has not yet been reached			

Spain

Marie Gasquet (OST)

1. Technological future – OPTI
2. - ANEP

bibliography

Technological future

OPTI (Observatorio de Prospectiva Tecnológica industrial). *Primer informe de prospectiva tecnológica industrial. Futuro tecnológico en el horizonte del 2015*. Madrid, 1999.

ESTO project. *A survey on prospective studies done on national/regional level in Spain and Germany, their results and their exploitation by policy makers*. August 1999

<http://www.opti.org>

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale / horizon	Duration	Main contact person(s)
1. Technological future - OPTI	<p>Meso</p> <p>8 industrial sectors : Information and telecommunication, Transport Basic and manufacture, Traditional sectors, Chemistry, Industrial environment, Energy, Agrofood.</p> <p>In each sector, 3 studies will be carried out (one in 1998, one in 1999, one in 2000)..</p> <p>A work programme was defined for each sector with one foresight study to be carried out each year in 1998, 1999, and 2000.</p>	<p>What technologies should the Government administration support ?</p> <p>What should industries concentrate on ? Where should they invest ?</p>	National scale	2015	<p>Launched in 1998.</p> <p>In each sector, one foresight study per year should be done.</p>	<p>Jesus Rodriguez Cortezo, EOI (School of industrial organisation)</p>
2. - ANEP	<p>Micro :</p> <p>Optics foresight Advanced materials Mobile communication Multimedia services Preservation of cultural heritage</p>		National scale		<p>Finished in 1997 Finished in 1995 Finished in 1995 Finished in 1995 Finished in 1998</p>	

1. OVERALL DESCRIPTION (page 2)

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1.Technological future	<p>To carry out work in technological foresight in 8 industrial sectors and in 3 sub-sectors of each sector (24 studies in total)</p> <p>The Ministry of Industry and Energy (MINER) wanted elements to define its policies and to support decision making in companies.</p>	<p>Undergoing.</p> <p>Results of the foresights carried out in 1998 are available, and those carried out in 1999 are starting to be available.</p>	<p>Search for industrial competitiveness.</p> <p>Another study called INIDES (identification of technological needs in spanish companies) is also undergoing. It is technological watch and not foresight. However there is little linkages between the 2 initiatives.</p>	<p>Delphi surveys</p>

2. INSTITUTIONAL DESIGN (page 1)

Exercise No	Ordering body		Steering committee		Implementing agency		Target audience
	Name	Responsibilities	Name	Responsibilities	Name	Responsibilities	
1. Technological future	Spanish Ministry of industry and energy – MINER	Creation of OPTI			<p>OPTI (Industrial Observatory of Technological Foresight) which was created in 1998. network of technological centers :</p> <p>Coordinator : EOI (School of industrial organisation)</p> <p>8 participating technological centers :</p> <ul style="list-style-type: none"> - ICT (Instituto Catalan de tecnologia) → info and communication. - INASMET (centro tecnologico de materiales) → transporte - AINIA (instituto tecnologico agroalimentaria) → agrofood - INESCOP (instituto espanol del calzado y conexas → traditional sectors - ASCAMM → basic and manufacture sectors - CIEMAT (centro de investigaciones energeticas y medioambientales → energy - CITMA → energy - IQS (instituto de quimica de Sarria) → chemical sector 	Each technological center is responsible for its sector.	- The Ministry of industry and energy – MINER - Industries
2. ANEP	Ministry of education and culture				ANEP – Spanish agency of evaluation and foresight		

2. INSTITUTIONAL DESIGN (page 2)

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. Technological future	The foresight wants to look at social needs and their impact on industrial sectors. Panel members come from industries and the society.	<ol style="list-style-type: none"> 1. Information and telecommunication (ICT) → Digital industry. Delphi survey on 60 topics: uses, applications, social topics, regulation topics, internet, technologies. 2. Transport (INASMET) → aeronautical sector. Delphi survey on 45 topics : air transport systems, materials, airframe design, electronic and communication 3. Basic and manufacture (ASCAMM) → New technology to manufacture metallic components. Delphi survey on 109 topics : machining, electro erosion, laser processing, plastic deformation cutting, casting, sinterization, thermal treatments 4. Traditional sectors (INESCOP) → design. Delphi survey on 29 topics : design methodologies, input data systems, software of design, rapid prototyping, quality control in design, communications and network, virtual reality. 5. Industrial environment (CITMA) → management and treatment of industrial wastes. Delphi survey on 51 topics : characterisation, minimisation, recycling and valorisation, treatment and disposal. 6. Energy (CIEMAT) → renewable energy. Delphi on 54 topics : biomass, wind energy, photovoltaic, thermal solar, mini hydraulic 7. Agrofood (AINIA) → technologies of food preservation. Delphi on 42 topics: high pressures, bio preservation, vacuum boiling, irradiation, micro filtration microwaves, IV gama, electrical pulses, ultrasounds 8. Chemical (IQS) → Fine chemistry. Delphi survey on 35 topics : legal topics, ecological topics, technological topics, social and economical topics. 	<p>260 experts (1st round), 50 experts (2nd) : 83% industry, 6% administration, 5% universities, 2% research, 4% others.</p> <p>58 experts (1st round), 27 experts (2nd): 59% industry, 17% research, 14% administration, 5% universities, 5% others</p> <p>220 experts (1st round) ; 64 experts (2nd) : 53% industry, 20% research, 19% universities, 8% administration</p> <p>210 experts : 58% teams, 20% research, 13% design, 6% marketing, 3% others</p> <p>159 experts (1st round) 55 experts (2nd) : 58% management of wastes, 17% research, 12% industry, 13% administration</p> <p>200 experts (1st round) and 93 experts (2nd): 44% industry, 16% research, 10% universities, 13% administration, 7% other.</p> <p>164 experts (1st round) ; 48 experts (2nd) : 43% industry, 29% academic, 14% research, 7% management</p> <p>117 experts (1st round), 59 experts (2nd) : 95% industry, 2% research, 2% universities</p>

3. METHODS USED DURING THE FORESIGHT EXERCISE (page 1)

Exercise No.	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
1. Technological future	<p>The 8 sectors were chosen according to their importance in GNP and in employment, to the effect of technologies on society, their impact on industry and services, ...</p> <p>Within each study, the themes were chosen according to demand, scientific developments, and intermediary developments</p>	<p>Desk research Delphi questionnaires</p>	<p>Experts chosen among universities, industries, research centers. Some were researchers, other had managerial positions</p>	<p>According to their attendance to congresses, to fairs, etc, and to their publications</p>	<p>Delphi surveys : two rounds per area.</p>

3. METHODS USED DURING THE FORESIGHT EXERCISE (page 2)

Exercise No.	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
1. Technological future	<p>For each statement, experts were asked to answer the following elements :</p> <ul style="list-style-type: none"> - Importance: high medium, low, irrelevant - impact on economic development, life quality, employment - date of materialization: up to 2003, from 2003 to 2008, from 2009 to 2014, none - scientific position of Spain in respect to other countries (high, medium, low) : S&T, innovation, production, commercialisation - limits: social, technological, legal, economic, environmental - recommendations: collaboration with external enterprises, incorporation of S&T in enterprises, cooperation firms – research, support from administration, diffusion of results 	<p>Presentation of the commented results of all 8 Delphi in a report “Primer informe de prospectiva tecnológica industrial. Futuro tecnológico en el horizonte del 2015”.</p>	<p>Priorities will be identified after scenarios</p>	<p>Consensus will appear thanks to the Delphi questionnaires, but it will not be really generated.</p>

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
1. Technological future				

5. AWARENESS RISING

	Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
1. Technological future	Report written in September 1999 to present the studies, its methodology, the different sectors,		Boletines OPTI : No 1 : march 1999 No 2 No 3 No 4			

6. RESULTS AND IMPACT

Exercise No.	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1. Technological future	<p>Presentation of the sector</p> <p>Boletines OPTI No 3 presents the scenarios for the future in fine chemistry.</p> <p>Boletines OPTI No 4 presents the on-going work in the design sector</p>	Results of the Delphi + comments + scenarios	No recommendations are formulated	None

Sweden

Annele Eerola (VTT)

Exercises covered

1. Technology Foresight (Teknisk framsyn

1. OVERALL DESCRIPTION

Exercise No	Scope	Questions addressed	Geographical scale	Time scale	Duration	Main contact person(s)
1. Technology Foresight (Teknisk framsyn)	<p>Meso</p> <ul style="list-style-type: none"> - Health, medicine, care - Biol. natural resources - Society's infrastructure - Production systems - Information & communication systems - Materials & material flows - Service industries - Education & learning 	<p>Multidisciplinary scientific & techn. developments, incl.</p> <ul style="list-style-type: none"> - driving forces - revolutionary new technologies - areas of major changes <p>Questions in focus:</p> <ul style="list-style-type: none"> - Env. impacts - Customers & market demands - Costs - Globalisation & employment - Values & attitudes - Gender equality - Interplay people/systems/mgt - Regional issues 	Sweden	<p>10-20 years</p> <p>(Information and communications systems 5-10 years)</p>	<p>1998-2000</p> <p>Steering Committee formed in 1998</p> <p>Kick-off conference in January 1999</p> <p>Final conference in March 2000</p>	<p>Lennart Lübeck (gen. program mgr)</p> <p>Enrico Deiacco (secretary of SC)</p>

Exercise No	Explicit objectives	Actual results and impact	Underlying values	Overall methodology
1. Technology Foresight (Teknisk framsyn)	<ul style="list-style-type: none"> - To strengthen a futures-oriented approach in companies and organisations - To identify areas of expertise with potential for growth and renewal in Sweden - To compile information & design processes for identifying high-priority areas in which Sweden should build expertise 	<p><u>Panel work:</u> Assessments, analyses, proposals & recomm. by sub-areas, together with a list of central questions that require dialogue in the Swedish society</p> <p><u>Output:</u> Final Report Final Conference (March 2000) + regional conferences</p> <p><u>Intended impact:</u> indicating what course education and R&D should take to promote the development of Swedish society</p>	<p>Search for niches</p> <p>Respond to societal needs</p>	<p>8 panels with about 15 experts in each</p> <ul style="list-style-type: none"> - looking backwards - assessing the present state - future visions&strategies - testing robustness against 4 scenarios of env. dev.

Exercise No	Consideration given to social needs	Target sectors	Number and origin of persons consulted
1. Technology Foresight (Teknisk framsyn)	<p>Achieving positive social development mentioned as an important target</p> <p>Division into panel subject areas made on the basis of need and user perspectives (not fields of technology)</p>	<p>Companies</p> <p>Research organisations</p> <p>Funding bodies</p> <p>Society as whole</p>	<p>15 panel members in each panel, mainly from companies, universities, industrial federations (total 130 members)</p> <p>8 panels => see scope</p>

3. METHODS USED DURING THE FORESIGHT EXERCISE

Exercise No.	Methods used for identifying areas and questions	Methods used for gathering information	Methods used for choosing the categories of consultees	Methods used for choosing the consultees	Methods used for consulting the consultees
1. Technology Foresight (Teknisk framsyn)	<p>The panels worked according to an established project plan and a given methodology:</p> <ul style="list-style-type: none"> - Brainstorming relevant issues & ideas in panel meetings (trends, events, progress steps, problems, techn. conquests) - 200-300 issues /panel => 30-50 aggr. issues - Subjective assessment & priority setting => 5-15 key areas /panel 	<p>Panelists' expertise & background information</p> <p>Continuous data collection by panelists using their own contact networks</p> <p>Written documents:</p> <ul style="list-style-type: none"> - articles in professional journals & newspapers - reports by foresight excercises in other countries <p>Interviews/presentations by experts</p> <p>Visits to interesting sites</p>	<p>The panels had the option of outsourcing assignments according to the needs of each panel</p>		<p>For illustration of specific key issues:</p> <ul style="list-style-type: none"> - expert hearings - workshops - use of consultants

Exercise No.	Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
1. Technology Foresight/ Sweden	"analysing consequences and needs" "identifying critical issues, problems, driving forces & counter forces"	Visions & strategies compiled by the panelists Validity & robustness of the visions/strategies tested against 4 alternative scenarios of env. developments (basic scenarios given by general project mgt, adjusted by panelists; dialogue between panel key issues & scenarios)	Panelists' subjective assessment expressed in subgroups, discussions at consecutive meetings (5-10 meetings/panel)	Panel meetings, 2-day seminars, conferences Report reviews by various interest groups before publishing the results

4. MODES OF COMMUNICATION

Exercise No	Modes of communication between ordering body and steering committee	Modes of communication between steering committee and implementing agency	Modes of communication between implementing agency and consultees	Modes of communication among consultees
1.	The four initiator organisations represented in the SC	Project office attached to the SC to administer the project, headed by Program Manager. Communication to panels through Program Manager.	<p>Communication between the four initiator organisations and the panels: Most of the Project Managers were from IVA or NUTEK</p> <p>Communication between panels: Joint conference in August 1999 for coordination of the work of all eight panels</p> <p>Communication between panelists: Meetings and seminars within each panel</p>	

5. AWARENESS RISING

	Pre-foresight phase : Modes of communication and type of information		Foresight phase : Modes of communication and type of information		Post-foresight phase : Modes of communication and type of information	
	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors	Foresight actors → Policy makers, business, research community and public at large	Policy makers, business, research community and public at large → Foresight actors
1. Technology Foresight (Teknisk framsyn)	Interviews of 40 organisations Press releases Web-site Seminars	Feedback from interviews	Press releases Web-site: drafts of all panel reports posted on web site and all interested individuals invited to comment on them Seminars (in different parts of the country to acquire a broader view)	Comments from web site visitors Feedback from e.g. S&M enterprises, remote districts, immigrants, young people	Regional conferences to disseminate the findings around the country Project participants invited to present the project at various events Web site Informal conversations conducted by the participants considered as the most important method of rising awareness EU-seminar March 2001	

6. RESULTS AND IMPACT

Exercise No.	Modes of presentation of analysis	Modes of presentation of results	Modes of presentation of recommendations	Measurement and evaluation of impact
1. Technology Foresight (Teknisk framsyn)	The synthesis report and some of the panel reports include a general level analysis of future trends	<p>Written reports (synthesis report + 8 panel reports, all available in web)</p> <p>Final conference, March 2000</p> <p>Panel-specific OH-material (available in web; incl. general-level illustrations)</p> <p>Regional conferences:</p> <ul style="list-style-type: none"> - presentations by panels - theatre performances - press conferences 	<p>Written reports/conference</p> <p>Comments by conference participants summarised and sorted in three groups:</p> <ul style="list-style-type: none"> - Technology Foresight/ Important issues - Actions required (national policy, regional policy, industry management, sectoral central organisations, research & universities, school education) - Recommendation for national policy & research/academia 	The process (not the impacts) evaluated continuously by an Evaluation Committee reporting to the four organisations behind the project

United-Kingdom

Paul Ormerod (CEST)

Exercises covered :

Foresight Exercise 1

1. OVERALL DESCRIPTION

Foresight Exercise 1	Scope	Questions addressed	Geographical Scale
Phase 1 of the Foresight programme	UK wide within the interface between business, the science base and government	<p>How can industry, the science base and government be brought into a shared thinking space to uncover key priorities in relation to science and technology investments?</p> <p>How might these priorities then be classified according to attractiveness (benefits to UK and ability to harness the benefits) and feasibility for the above actors</p>	UK wide

Time Scale	Duration	Main Contact Persons	Explicit Objectives
Next 10-20 years (2005-2015)	1994-1998	Graeme Reid, Deputy Director, The Foresight Programme, Office of Science and Technology, Albany House, 94-98 Petty France, London SW1H 9SH. UK.	<p>“The overall aim of the Foresight programme is to secure sustained competitive advantage and enhanced quality of life by:</p> <ul style="list-style-type: none"> • Creating enduring networks linking business, the science base and government • Developing a culture of forward thinking about market & technology opportunities and threats • Establishing visions of the future, and identifying the developments in science and technology that will help the country meet its future needs; and • Acting on the priorities identified

Actual results and impact	Underlying Values	Overall Methodology
<p>The UK Foresight programme is considered by many independent commentators to be very successful, both nationally, and in comparison to other national initiatives.</p> <p>The original Delphi study was unique in UK terms, but the findings were not felt to have been used to their full potential. The original title of Technology Foresight was felt to be restrictive and a social and educational dimension was seen to be of importance. One of the most significant benefits seen was the establishment and use of networks establish cross sectoral and multi-community links. New innovation interfaces have been exploited and have generated insights which are being exploited to bring tangible benefits to the UK economy.</p> <p>The UK now has a clearer national consensus on priorities, strengths and skill base in the overlapping areas of SET and business and Government .</p> <p>The results have also been used to promote the UK position in negotiations on the 5th Framework within the EC RTD programme.</p>	<p>To ensure the competitiveness of UK industry and the UK Science Base, as well as the channelling of Government funds towards area likely to be of great significance to the UK in the future.</p>	<p>16 panels embarked on three stages:</p> <ul style="list-style-type: none"> • Review and consultation 1994-95, including market analyses, scenarios, sub-groups, surveys, regional workshops and a national Delphi survey (with around 10,000 people consulted). Panels published their reports identifying social, economic and market trends in the next 10-120 years and developments in SET and infrastructure required to best address future needs. The Foresight Steering Group drew these conclusions together to ID a number of generic priorities and cross sectoral themes (see diagram). Priorities were classified according to attractiveness and ability of UK to harness them and feasibility (expectation that UK science base could be at or near leading edge in obtaining these results). • Dissemination and implementation 1995-97 over 130,000 reports of panels recommendation were disseminated and over 600 events had taken place. Some professional & trade institutions and RTOs produced Foresight reports on their own sectors. Research funders focused over £350 million of funding on Foresight priorities. A Foresight Challenge fund raised £92 million which was committed to 24 major initiatives during 1996. The LINK programme also used Foresight findings to focus the launch of a £164 million programme supporting 18 new programmes. • Refinement, engaging business and planning Round II. 1997-98 Foresight panels continued to refine their findings and build on first reports. A number of regional initiatives were supported in research funding. The new government in 1997 bought Foresight into the centre of its business competitiveness policy, with an audit of Foresight across Government departments, and a ministerial Foresight group being established. A further round of Foresight, starting in 1999, was committed to and an extensive consultation exercise launched

INSTITUTIONAL DESIGN

Ordering Body		Steering Committee	
<p>1.5.1 Name Office of Science & Technology at the Department of Trade & Industry</p>	<p>1.5.2 Responsibilities Design and manage a Foresight programme, within the context of the major review of Government SET policy (titled Realising our Potential)</p>	<p>1.5.3 Names 16 leading individuals from industry, government, R&D organisations and academia under chairmanship of Sir Robert May, Chief Scientific Adviser to the Government</p>	<p>1.5.4 Responsibilities Oversee the establishment and workings of the 16 panels, and to synthesise their reports into overall recommendations to the key stakeholders</p>

<p><u>1.6</u> <i>Implementing Agency</i></p> <p>1.7</p> <p><u>1.8</u> <i>Names</i> National programme run by The Office of Science and Technology, which is part of the Department of Trade & Industry + Numerous trade assoc. and prof. Bodies e.g. The Royal Academy of Engineering, the UK Spring Manu. Assoc., The Royal Society of Edinburgh ran their own Foresight exercises for their stakeholders</p>	<p>1.9</p> <p>1.10</p> <p><u>1.11</u> <i>Responsibilities</i> Encouragement of a wide variety of business, research and trade/prof. organisations in the development of focused Foresight activities for their stakeholders</p>	<p>1.11.1.1 Target Audience National</p>	<p>1.12</p> <p>1.13</p> <p><u>1.14</u> <i>Objectives</i> To secure enhanced quality of life for people in the UK, through enhanced competitiveness and prioritised Govt. R&D spend</p>
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Target Sectors	Number & origin of persons consulted
Agriculture, Horticulture & Forestry Chemicals Construction Defence & Aerospace Energy Financial Services Food & Drink Health & Life Sciences IT, Electronics & Communications Leisure & Learning Manufacturing, Production & Business Processes Marine Materials Natural Resources & Environment Retail & Distribution Transport	Over 10,000 people with an interest in science, technology and industrial development were consulted. Their opinions and feedback were incorporated into reports published during the programme in 1995.

METHODS USED DURING THE FORESIGHT EXERCISE

Methods used for identifying areas and questions Delphi study Consultation papers inviting responses to Panels Workshops with various stakeholders Forum events to announce findings and solicit feedback and follow on questions for next round of Foresight	1.14.1 Methods used for gathering information Delphi study Group discussions Interviews Draft and final version reports	<u>Methods used for choosing the categories of consultees</u> Consultees were at two levels, those on the Panels and others. In the former case panel members were chosen by a process of identifying key players in industry, science base and senior public servants in relevant departments. In the latter case, the wider consultation, invitations to comment/contribute we sent to leading individuals and organisations, as well as the public being invited to participate/contribute their views, in effect an open process of consultation.
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<u>Methods used for consulting the consultees</u>	Methods used for identifying areas and questions
Invitations to contribute thinking. Delphi questionnaire Subsequent invitations to comment on draft reports.	Steering Group identified key areas for panel assembly, and chairmen for each panel. Each Panel then embarked on extensive sectoral reviews and consultations, involving market analyses, scenarios, sub-groups, surveys, regional workshops and the national Delphi survey

Methods used for identifying driving forces	Methods used for presenting future developments	Methods used for identifying priorities	Methods used for consensus generation
STEEP approach (using Science, Technology, Economic, Environmental and Political drivers) to understand the key influences in each sector during the next 10-20 years	Scenarios used extensively to elicit visions of the variety of possible futures	Key priorities were positioned within a grid which dealt with key priority areas, Intermediate areas and emerging areas, and positioned various opportunities along two dimensions of feasibility and relative attractiveness	Various consensus building exercises were used, such as workshops, iterative consultation (the Delphi study) and analysis of responses to consultation invitations

MODES OF COMMUNICATION

<u>Modes of communication between ordering body and steering committee</u>	<u>Modes of communication between steering committee and implementing agency</u>	<u>Modes of communication between implementing agency and consultees</u>	<u>Modes of communication among consultees.</u>
<u>Original government white paper "Realising our Potential" outlined the brief for the Foresight programme. Additional briefing documents for Steering Group members, Panel chairmen etc</u>		<u>Variety of approaches used. Questionnaires (Delphi), invitations to submit opinion etc. Responses to draft reports requested.</u>	<u>Dependent on individual panels and chairman's preferences, including face to face meetings, email document based consultations.</u>

AWARENESS RAISING

Pre-foresight phase: Modes of communication and type of information		Foresight phase: Modes of communication and type of information		Post-foresight phase: Modes of communication and type of information	
Foresight actors > Policy makers, business, research, community and public at large	Policy makers, business, research, community and public at large> Foresight actors	Foresight actors > Policy makers, business, research, community and public at large	Policy makers, business, research, community and public at large> Foresight actors	Foresight actors > Policy makers, business, research, community and public at large	Policy makers, business, research, community and public at large> Foresight actors