WP 1 – REVIEW AND ANALYSIS OF NATIONAL FORESIGHT

D1.1A – CASE STUDY

AUSTRIA – DELPHI AUSTRIA

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The FISTERA network is supported by the European Community under the FP5 specific program for research, technological development and demonstration on a user-friendly information society (1998-2000).

WHAT IS FISTERA?

FISTERA is a Thematic Network on Foresight on Information Society Technologies in the European Research Area.

The **FISTERA** network is supported by the European Community under the FP5 specific program for research, technological development and demonstration on a user-friendly information society (1998-2002).

The aim of the FISTERA Thematic Network is bring together on a systematic and extended basis, actors and insights in national foresight exercises on IST in the Enlarged Europe.

Main objectives:

- Compare results of national foresight exercises and exchange visions on the future of IST
- Provide a new forum for interactive consensus building on future visions for IST
- Contribute to the European Research Area through benchmarking and community building, by providing a dynamic pan European platform on foresight on IST

In order to meet these three key objectives, FISTERA will:

- Review and analyse the national foresight exercise outcomes (a country synthesis report)
- Build aggregate pan European Technology trajectories (a roadmap of potential developments of key emerging technologies)
- Map the European IST actor space (an analysis of the EU IST actor space)
- Provide an IST Futures Forum (strategically selected scenario exercises that will look at wider aspects of applications of IST)
- Disseminate the results to a targeted audience by various means (a dynamic website at the address http://fistera.jrc.es, an e-mail alert service, publications, conference presentations, a "road-show" of workshops and a final conference)

Network Membership:
Core partners (coordinators, work package leaders):

- JRC-IPTS (Institute for Prospective Technological Studies), part of the European Commission's Joint Research Centre, Scientific Coordinator of the network.
- FZK - ITAS (Forschungszentrum Karlsruhe GmbH in der Helmholtz-Gemeinschaft, Institut für Technikfolgenabschätzung und Systemanalyse), Germany.
- TILAB (Telecom Italia Lab – Scenarios of the Future), Italy.
- ARC/sr (ARC Seibersdorf research GmbH, Division Systems Research Technology-Economy-Environment, Seibersdorf), Austria.
- PREST (Policy Research in Engineering, Science and Technology) of the University of Manchester, United Kingdom.
- GCI (GOPA - Cartermill International), Belgium, Administrative and Financial Co-ordinator.

The group of **Members**, which is expected to grow over the duration of the contract, currently includes the following organisations: TNO-STB (The Netherlands), Danish Teknologisk Institut (Denmark), TecnoCampusMataró (Spain), Observatório de Prospectiva da Engenharia e da Tecnologia-OPET (Portugal), ARC Fund (Bulgaria), IQSOFT (Hungary), Tubitak (Turkey), The Researchers' Association of Slovenia (Slovenia), NMRC, University College Cork (Ireland) and BRIE-Berkeley University (USA). In addition, McCaughan Associates (McCA) runs a group of High-level Experts to the Network Management Committee.

FISTERA Web site: http://fistera.jrc.es/

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Summary

The main Austrian Foresight exercise was a combined technological/socio-cultural Delphi with each subdivided further into 7 fields, called “Delphi Austria”. The exercise ran from 1996 to 1998, employing a standard time horizon of 15 years. The society and culture Delphi also examined five and thirty year periods. The aim of the study was “to identify Austrian strength in R&D with sustained future potential”. The exercise employed the standard Delphi method with panels and a survey. A total of about 250 experts was involved in the panels with around 3,200 experts responding in the Delphi surveys. The Austrian example was chosen due to its broad inclusion of societal aspects.

IST applications were not treated in a separate section but as a cross-cutting technology within nearly every thematic field. In general, chances of Austrian leadership were seen by the respondents mostly in fields in which Austria already had a strong position, i.e. fields with high (not highest) technology built into mid-tech products of the highest quality. ‘Simulation technologies’ for specific applications were regarded as the most promising technology application of all.

Due to its comprehensive approach, Delphi Austria, provided some insights for foresight exercises with broad participation.

1 Background and Objectives

Since the early 1970s, after reaching a high-income stage, Austria could no longer increase productivity and wealth by importing technology and was compelled to develop her own technology policy, R&D, and foresight activities. Since the early 1980s, a more systematic and target-oriented policy was introduced, starting by launching programmes to support 'future technologies' (e.g. micro electronics, new materials, or computer-integrated manufacturing) without foresight exercises. In the late 1990s, a more specific 'National System of Innovation' (NSI) based upon a national foresight programme was regarded as needed and the Delphi Report Austria was commissioned.

Delphi Austria was initiated by the Austrian Federal Ministry of Science and Transport in 1996 and it was concluded in 1998 with the publication of the final reports (ITA 1998, ITK 1998). The budget was around 700,000 US-Dollars. Due to the specific Austrian situation - to concentrate and to search for research priorities - the objective of Delphi Austria was not to detect emerging technologies but to identify innovation potentials and niches within technology trends and possibilities for Austrian leadership within the next 15 years. Delphi Austria was envisaged to strengthen Austrian long-term competitiveness. A social problem-orientation was chosen with the underlying assumption that innovations solving existing real-world problems will find a market more easily.

Delphi Austria was regarded as a "search tool" to identify Austrian strengths in R&D, in particular to identify potentials and niches within technology, where Austria might find opportunities to achieve leadership within the next 15 years.

2 Organisation of the Foresight Exercise

The main feature of Delphi Austria is the combination of a Technology Delphi with a Society and Culture Delphi. Both parts of Delphi Austria overlapped with respect to 4 thematic fields (see Table 1). The thematic fields in Delphi Austria were selected mainly on the basis of preparatory studies, which encompassed an analysis of foreign Delphi studies, a strength/weakness analysis of the Austrian competitive situation, secondary analyses of existing (economic) studies, a survey among 370 experts, a consumer survey (1,000 persons questioned) and a media and trend analysis.

Technology Delphi	**Society and Culture Delphi**
Lifelong Learning	Lifelong Learning
Environmentally Sound Construction and New Forms of Housing	Environmentally Sound Construction and New Forms of Housing
Medical Technologies and Supportive Technologies for Elderly	Medical Technologies and Supportive Technologies for Elderly
Cleaner Production and Sustainable Development	Cleaner Production and Sustainable Development
Organic Food	Ageing and Life Cycle
Mobility and Transport	Structural Change of Work
Tailor-Made New Materials	Social Segmentation

Legend: The shaded overlapping thematic fields were also treated in an integrative analysis

Table 1: **Thematic Fields in the Parts of Delphi Austria**

3 Method and Procedure

In contrast to other small countries, Austria preferred the Delphi method to expert groups, scenario techniques etc. to avoid undue influence of opinion leaders or lobbyists, to allow drawing on the expertise of as many different persons as possible, and to motivate as many decision makers as possible to reflect about the future by answering the questionnaire and, by this, to directly influence the innovation process (Tichy 1999, p. 32). Delphi Austria was designed as a decision Delphi because it was used to prepare decisions and to influence social development rather than to forecast specific developments (Tichy 2001).

The questionnaire of the Technology Delphi contained a self-assessment of expertise for each statement, the statements/hypotheses describing the state of innovations, and questions to assess them (regarding innovativeness, importance, chance of realisation within 15 years, desirability, chance of Austrian thematic leadership in R&D, economic exploitation, organisational and societal implementation), lists of policy measures to be assessed, questions for suggestions for other innovations, and an assessment of 17 so-called 'megatrends'. For each thematic field, different experts were addressed. After the first round with 3,748 experts addressed and 1,638 responses, the questionnaire was revised. In the second round, 1,127 experts responded (response rate of 71 %).

The questionnaire of the Society and Culture Delphi also contained a self-assessment of expertise, statements/hypotheses of almost 400 social, cultural, economic and political trends, questions of relevance/importance for the Austrian society, desirability of the trend, potential for realisation in 5, 15, 30 years, degree of priority for Austrian politics, degree of priority for Austrian research policy, and the degree of conflict potential for Austrian society. In the first round, 4,102 experts were addressed and 1,764 answered. After revision of the questionnaire, 1,040 experts responded in the second round (response rate of 64 %).

The questionnaire were developed and analysed by the implementing bodies (ITA and ITK) and by 14 expert panels for each thematic field. The extensive involvement of experts in these procedural steps were considered as an innovative bottom-up approach by the organisers.

One of the reasons for introducing the 'mega-trend' section of Delphi Austria was to cross-check the Delphi responses for subjective biases of the experts due to particular world views and due to vested interests in a particular area (Aichholzer 2001b, p. 748).

4 IST in the Austrian Foresight Exercise

4.1 General findings on IST

Austria did not group IST under a separate heading neither in the Technology Delphi nor in the Society and Culture Delphi since the organisers of the foresight study felt that Austria would not play a major role in this area and preparatory studies had revealed that IST were not a top priority in the results of most European Delphi studies. Also analyses of patent statistics revealed no significant Austrian strength in this field.

Delphi Austria has since been criticised for this omission, in particular, from business representatives. A National Plan on R&D subsequently developed singles the Austrian ICT sector out as a "promising" field and there have subsequently been two "foresight"-like activities (Knoll et al. 1998) on mobile communications and the new economy (mafos, 2001). It has been suggested that the Delphi study was focused mainly on identifying fields where Austria

could play a “leading role” while it might have been more useful to look at those which could be important, for instance, in creating jobs.

IST were treated as cross-cutting technologies in nearly every thematic field ranging from education, work, production, mobility, medicine, ageing society, to material development. IST were seen to be involved in nearly all promising innovations and developments, but as independent technologies only in a few niches. The field with the most IST applications was “Lifelong Learning”, but the strongest impulses for IST innovations were expected in the field of “medicine”. In this field the recommended policy measures were foremost a high-capacity and cost-efficient telecommunication infrastructure. The mentioned IST applications, that were considered to have a significant or at least modest importance and/or potential for Austrian leadership or which were recommended as policy measure, can be summarized as follows:

- Simulation software for development and production, in particular for new materials and vehicles including trains, as well as the promotion of its development, in particular in environmentally sound production, as policy recommendations.
- Specific IST applications in the mobility field, i.e. integrated propulsion management systems (e.g. for reduction of fuel consumption), diagnostic systems for the early-detection of damage to rail vehicles and superstructures, intermodal electronic billing systems on chipcards, IST-based roadpricing systems, electronic guidance systems for public transport, systems for freight tracking, and intermodal information systems (about time tables, tariffs, etc.). Important policy recommendations encompassed intensified application-orientated and interdisciplinary research, software development, optimisation of data interconnections, securing openness and compatibility of cross-border IST systems, participation in EU standardisation and European co-operations, governmental promotion of IST applications by pilot studies, public procurement, or venture capital provision, as well as intensified public-private co-operation and establishing contact points.
- Information infrastructure, databases and appropriate media to improve the education and training system, i.e. to improve the access to, the functioning of and advice for education, individual self-learning, vocational training and on-the-job training, e.g. by access and selection systems, multimedia workplaces, high-end network access, interactive tele-learning - also for learning groups or disadvantaged people -, international interconnectedness of education institutions. The IST-specific training of educators and teachers was related to this. Expansion of high-end communication networks, cutting of telecommunication tariffs, support for user-friendly hardware and software, low-price access to content archives were policy recommendations.
- Information infrastructures for specific purposes on industry level to promote exchange of medical knowledge (networked health organisations), to facilitate exchange of knowledge for cleaner production or organic farming, to improve cooperative development (e.g. ‘virtual pools’ of companies), to provide a distribution channel and a network of capital-intensive technologies for SMEs in the field of environmental production, as well as to enable product co-development together with consumers via Tele-CAD.
- IST applications for medical purposes and the support of disabled or elderly people, such as the combination of IST and neurophysiology, intelligent diagnostics, rehabilitation technologies, eye-controlled and voice-controlled systems for handicapped and infirm people (‘intelligent support’ of sensory functions), or for medical prevention and early-warning. Policy measures to promote research in these fields were recommended, but also to secure privacy and data protection (health chipcard).
- Specific IST applications in the field of new materials, i.e. ceramic functional materials (as sensors, electronic systems with tailor-made micro-structures), online control for optimised production processes, optimised automatic welding, and tailor-made sensors. In this

field, the establishment of new laboratories, the influencing of EU research policies, European cooperation, and the utilisation of synergies with electronics appliers were recommended.
- Installing special-purpose databases, e.g. for environmental data, medical information, about services for elderly, and facilitating public access to these databases were seen as important policy recommendations.
- A great part of the future political discussion was expected to take place in electronic media. However, new media was also held responsible for widening the gap between informed and less-informed people.
- Concepts of home control technologies (i.e. monitoring systems) for specific purposes, in particular for emergency issues and surveillance of elderly, but 'intelligent offices' and 'smart homes' was regarded as less likely.
- Concepts of tele-working had moderate importance and chances of realisation.

The range of IST applications and related policy measures, which were considered in the Delphi exercises, crucially depended on the initial selection of thematic fields and the formulation of topics within the thematic fields. This may have led to the problem of neglected fields of IST and specific IST applications and services (e.g. the entertainment industry) and to the problem of the bias towards societal problems and relevant IST which were most prominent at the time of selection. As a general result of Delphi Austria, the technological and organisational innovations, which were regarded as important or promising by the respondents, mainly had a modest innovation level. The criticism of a modest innovation level also applies to the considered IST applications, which were considered as being also relatively less innovative. The modest level was a consequence of the lack of time for preparing the questions, the lack of interaction (no "pre-Delphi" seminars or workshops were done), and the problem of closed groups.

Delphi Austria was useful to assess public evaluations of a given set of societal and technological trends and the problem-solving functions of IST applications which were pre-selected by the organising bodies and expert panels. It was also useful to assess the domestic R&D, economic and organisational capability to contribute IST applications for these specific fields, and also to assess the experts' evaluations of a given set of recommended policy measures. However, the creative and discovering acts were mainly in the initial formulation and selection of IST applications.

4.2 Analysis of National Strengths and Weaknesses

The minor IST role in Delphi Austria was mainly a result of the preparatory studies. They were conducted to indicate fields of Austrian strength in order to concentrate on those fields in the Delphi questionnaire. Therefore, some of the preparatory studies can be seen as analyses of strengths and weaknesses:

- The analysis of the Japanese, German, French, British Delphi studies to separate and evaluate world-wide technology trends
- A strength/weakness analysis of the Austrian competitive situation by both the secondary analysis of existing economic studies and a survey among 370 experts (39 % average response rate) to get a first impression of potential fields of success

The secondary analysis of the foreign Delphis stated that IST are regarded as less important than one could expect from the public discussion. The technologies mentioned were (ITA 1998 Part 1, p. 44f.):

- Software is considered as important among the IST, in particular automatic protocol-based conversion technologies and test methods for fast and reliable programme development. Those software technologies, together with artificial intelligence, were expected in the next five years.
- Databases with adaptive elements, scientific-technical translation systems, and automatic retrieval from books are expected in the next decade.
- Highly selective sensors and interfacial engineering as well as intelligent micro systems on a single chip seemed likely to be realised in less than ten years.
- Among the nanotechnologies the studies evaluated, processing technologies were more important than materials.
- In telecommunication, protocols and conversion technologies were considered more important than the spread of digital broadband technologies.
- In services, tele-learning and tele-cooperation had the greatest interests of the experts.
- The implicitly most important trend was seen in achieving nearly unlimited broadcast capacity by improved fibre optic technology and by digitalisation of radio and TV broadcasting. This might have led to price decreases and possibilities in personal communication, remote sensing and monitoring and tele-medicine.

The survey among the 370 Austrian experts asked for the relative technological strengths and weaknesses of Austria both in science and in technology application. In science, Austrian strengths were firstly seen in environmental technologies and in materials as well as possibly in IST at lower levels. In technology applications, IST were not mentioned as a strength. The experts emphasised financial tightness, limits in funding, the political framework conditions and regulations as reasons for the unsatisfying technological position of Austria (ITA 1998 Part 1, p. 46f.). However, other studies attributed this position to lacking prioritising and organisational and educational deficits (Tichy 1997).

The strength/weakness analysis with the help of a secondary analysis of economic studies showed that Austria has improved her overall competitive situation, has even gained market shares in some fields of high technologies, has improved the quality of her exports and has increased active and passive direct investments. However, Austria has also some significant problems. She has competitive products mainly in fields of medium technological level and on regionally close markets, but she is not yet considered as an attractive location for high technologies and products for the world market. Instead of a stringent technology profile with specific advantages in a few products, Austria has a diversity of different products (ITA 1998 Part 1, p. 47). The authors deduced a need for priority-setting and qualification based on disaggregated analyses. Statistics of patent application showed a good position of electronics in absolute numbers, but a minor position relative to the number of employers and relative to the total number of patents in Austria and in Europe (ITA 1998 Part 1, p. 48). Regarding the ratio of high technologies to the total exports of goods, electronic parts had a ratio of 2 %, which was around the EU average. Other electronics, such as computer and business machines (1 %), consumer electronics (0.5 %) and telecommunications were below EU average (ITA 1998 Part 1, p. 49). Competition indicators stated that only television sets were competitive in the cluster ‘entertainment/leisure time’ (ITA 1998 Part 1, p. 49).

A subsequent examination of the results of Delphi Austria regroups the Delphi hypotheses into frequently used industrial classifications, among others, the 2-digit ÖNACE classification. In this, a specific IST group which is termed ‘Computers and related activities’ (ÖNACE 72) was analysed regarding the respondents’ evaluations. It should be mentioned that the manufacturing of computer hardware is not included in the subsection 72 of ÖNACE or NACE, but IST-related services, i.e. hardware consultancy, software supply, database processing, database

activities, maintenance and repair of office, accounting and computing machinery, and other computer related services. The IST service group 'computer and related activities' constructed in this way ranged among the evaluation classes with the highest innovativeness and importance, but only with a fair chance of realisation. The probabilities of Austrian leadership in this field in research and development as well as in organisational implementation were rated as modest. The probability of leadership in economic exploitation gained only one of the lowest ranks of the respondents' evaluation (Tichy 2000, pp. 415-422).

4.3 IST Visions

No explicit IST vision was developed in Delphi Austria going beyond the multiple IST applications envisaged in the fields of education, work, production, mobility, medicine, ageing society, and material developments that lead to future potentials. The so-called 'Megatrends' analysis of the Technology Delphi concern two IST applications: the establishment of tele-learning in the training system, which was regarded as realistic by the Delphi respondents, and tele-working from home by two-third of the labour-force, which was considered as unrealistic (ITA, 1998 Part 1, pp. 83ff.). In the Society and Culture Delphi, new media is regarded to widen the gap between informed and less-informed people and the political discussions take place in electronic media.

5 Other Important Results of Austrian Foresight

One of the main general results of the Technology Delphi was the asserted dominance of organisational innovations over technology innovations. For instance, in the thematic field 'life-long learning' three quarter of innovations were regarded as organisational innovations.

Chances of Austrian leadership were seen by the respondents mostly in fields in which Austria already had a strong position, i.e. fields with high (not highest) technology built in mid-tech products with highest quality. 'Simulation technologies' for specific applications were regarded as the most promising technology application of all.

The broad inclusion of societal aspects was one of the innovative elements of this foresight exercise. Therefore, the description of the main results of the societal trends is provided in the following:

- a further segmentation in all societal areas (i.e. work, housing, prevention, health, information, gender) will take place,
- the state retains the control function, e.g. in environmental and education policy,
- an increase in the importance of civil society through new forms of community activities is likely,
- risk and responsibility will be shifted from society to individuals,
- an outsourcing of services from centralised institutions to decentralised networks will come,
- individual fundamental needs (work, education, housing) will be reduced,
- demographic change effects the 'inter-generation agreement' ('Generationenvertrag') as well as construction and housing, and
- the nation state retains importance as political actor, but is complemented by additional political levels, i.e. the regions and the European Union.

The proposed policy measures which were regarded as important had the character of broad networking-orientated measures including organisational aspects, rather than individual promotion measures. In detail, the policy recommendations encompassed the promotion of coop

eration between research and companies, and among themselves. Also pilot projects and experiments were recommended. They should have a mandatory participation of research and industry and first of all, being organisation-orientated, address the low trust in this kind of solutions and improve developments at the interface between technologies and organisations. Furthermore, the establishment of new institutions (i.e. Competence Centres) and the promotion of regional cluster-building was suggested.

By those responsible for the study, Delphi Austria was regarded as having a significant impact on Austrian technology policy with concrete impacts (Aichholzer 2001a, p.23). For instance, it inspired the so-called 'Target Impulse Programme', including the establishment of Competence Centres. However, the actual relationship between Delphi Austria and the establishment of the Competence Centres remains unclear since 8 of the 18 competence centres operating in February 2003 were involved in IST R&D and an additional 2 in specific IST applications (mainly simulation). Additionally, subsequent research programmes were direct promotion programmes for IST R&D, e.g. the Impulse Programme 'Forschung, Innovation, Technologie: Informationstechnologien' (FIT-IT). Furthermore, the organiser of Delphi Austria claimed that Delphi Austria can be seen as an input to the formulation of the so-called "Green Paper on Austrian Research Policy 1999" and stimulation of cluster building. Delphi Austria was considered to have triggered subsequent analyses partly with foresight character focussing on mobile communication and the 'new economy'. The involvement and networking of participants was regarded as a positive impact in itself, although some observers deny that Delphi Austria led to the emergence of a foresight culture. An informal internal assessment by the Ministry of Science and Transport stated that 110 Million Euro were invested in public R&D initiatives, which were recommended or confirmed by results of Delphi Austria.

A national plan R&D presented by the Austrian Council on R& D contained a single reference to Delphi Austria, so there are also doubts concerning its influence.

With regard the organisation of Delphi Austria, the organisers learned a number of lessons (Aichholzer 2001):

- It is advantageous to locate foresight programmes as close as possible to the most relevant actor in RTD policy.
- A lean steering committee for fast and flexible decisions is favourable.
- The late integration of other ministries and major political actors was problematic.
- Attitudes towards foresight after Delphi Austria were ambivalent: decision-makers in technology policy had a positive attitude, while business and research had a mixed one due to the criticism of IST neglect
- The follow-up activities (implementation) were considered to be suboptimal, in particular the insufficient planning of dissemination of the results.

A subsequent examination of the Delphi Austria results deals with the hypothesis of experts' over-optimism in foresight studies. It finds that the degree of optimism with regard to realisation, innovativeness, and potential leadership in economic exploitation is positively correlated with the degree of expertise that is self-assessed by the participating experts. To avoid over-optimism among top-experts in foresight studies, it is suggested that foresight-exercises should base on a fair mixture of experts of different grades with different types of knowledge and affiliation, and not only on the top specialists in the respective field (Tichy 2002).

6 Literature

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Annex 1: Tabular Overview

"Delphi Austria", 1996 to 1998 / Austria		
Categories, Criteria & Questions	**Answers**	**Comments**
Project promoter / initiator	– Austrian Federal Ministry of Science and Transport	– The former Ministry of Science and Transport is now the Ministry of Education, Science and Culture and the Ministry of Transport, Innovation and Technology
Agency or organization responsible for the foresight activity	– Institute of Technology Assessment, Institute of Trend Analysis and science journalist Holger Rust	
Scope / areas covered	– 10 thematic fields, 4 of them overlapped in Technology Delphi and Society and Culture Delphi	
Time horizon	– in general 15 years, additionally 5 and 30 years in Society and Culture Delphi	
Societal dimension	– extensive inclusion of societal trends and aspects	
European dimension	– not explicitly, but mentioned at several points	
Major explicit objectives	– to identify innovation potentials and niches within technology trends and possibilities for Austrian leadership within the next 15 years	– the identification mainly took place in the field selection and the statement formulation – subsequent Delphi steps verified or falsified selected trends and possibilities
Second order objectives and indirect effects	– to improve anticipatory intelligence – to use results for determining priorities and direction setting – to take into account the broader societal context of technological innovation	– involvement and networking of participants was seen as positive impact in itself
Impact	– self-assessed broad impact on formulation of research programmes and on establishment of Competence Centres, stimulation of cluster building and triggering further 'foresight' studies	– involvement and networking of participants as positive impact in itself
Target groups	– decision makers in policy and business as well as the general public	
Participation	– experts selected from science, business, NGO etc. for each thematic fields: around 240 in active roles, around 8000 addressed by questionnaire, around 2,200 answers analysed	– criticism of closed groups
Major Characteristics	– combination of Technology Delphi with Society and Culture Delphi, – broad definition of 'expert' – primarily designed as a Decision Delphi – high 'degree of finalisation', especially of policy recommendations	

Methodology	– preparatory studies – expert panels for preparing and analysing questionnaire – Technology Delphi and Society and Culture Delphi with 2 rounds each – integrative analysis for overlapping fields	– Delphi Austria was regarded as an example of an advanced and broad Delphi approach – criticism of modest innovation level due to lack of time for preparing the questions, lack of interaction (no "pre-Delphi" seminars or workshops were done), and problem of closed groups
In which way have IST been included and treated in the FS exercise?	– IST not considered in a separate thematic field, but as cross-cutting technology in many IST applications in nearly every thematic field	– criticism of neglecting IST formulated by business representatives
Strengths/opportunities weaknesses/threats identified in IST	– in general no strength in the production and development of IST (specific hardware or software) was seen, but potentials for leadership in several IST applications	– most promising IST applications in simulation – most impulses for IST developments in the field 'medicine' – overall modest innovation level of considered IST applications – IST consideration depending on initial selection
Dissemination	– reports published in several forms, also made available at Ministry's Website, workshops, conferences, several secondary analyses	– most secondary analyses were conducted by the organisers themselves – criticism of sub-optimal dissemination to business