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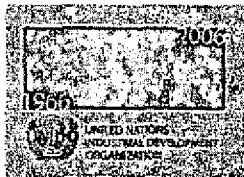
MEB-TÜBİTAK Türkiye Sanayi Sevk ve İdare Enstitüsü

Training Course on Technology Foresight for Organizers

Gebze, Turkey
20-24 November 2006

Final Report

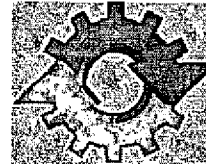
United Nations Industrial
Development Organization



Turkish International
Cooperation and
Development Agency



Turkish Ministry
of Industry and
Trade



The Scientific and
Technological Research
Council of Turkey







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Preface

This report presents the results of the five-day training course on technology foresight for organizers held on 20-24 November 2006 in Gebze, Turkey. The course is the first module of 2006-2007 training program for organizers of national/ regional technology foresight (TF) exercises. The program was held with the contribution and initiatives of United Nations Industrial Development Organization (UNIDO), The Turkish International Cooperation Administration (TICA), Turkish Ministry of Industry and Trade and The Scientific and Technological Research Council of Turkey (TUBITAK) at the premises of Turkish Institute for Industrial Management (TUSSIDE)





Summary

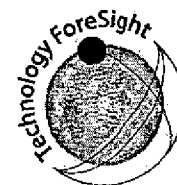
The main objective of the training course is to provide the professionals responsible for organizing and conducting foresight exercises with the critical mass of expertise in order to enable them to launch national and regional foresight activities in Central and Eastern Europe (CEE) and the Newly Independent States (NIS) in Central Asia, Middle East and Northern Africa.

The expected outcomes of this course had been defined as in the following:

- Around 30 experts from selected countries and 5-10 experts from Turkey (host country) trained on organizing and conducting technology foresight programs in their countries
- Definition of the framework for TF exercises at national and regional levels
- Improved awareness on the importance of TF for strategic decision making for industrial and technological development
- Supply examples of current TF applications, providing an opportunity for developments and to discuss their outcomes.

The course was accomplished with the number of 30 participants from the selected countries (Afghanistan, Albania, Azerbaijan, Bangladesh, Belarus, Bosnia and Herzegovina, Burkina Faso, Ethiopia, Georgia, Iraq, Kazakhstan, Kyrgyzstan, Macedonia, Moldova, Mongolia, Nigeria, Pakistan, Palestine, Romania, Russian Federation, Serbia and Montenegro, Sierra Leone, Sudan, Tajikistan, Turkmenistan, Ukraine, Uzbekistan) and representatives from Turkish agencies and Turkish graduate students on 20-24 November 2006 at TUSSIDE, located in Gebze, Turkey.

The course programme (please see Appendix A) has been designed as introducing foresight as a tool to shape the future, defining scope and focus of foresight exercises, presenting methods used in illustrative examples and case studies. Also, the participants have had the opportunity of simulating a foresight exercise during the course. The presentations of lecturers and the practical exercises done by participants in groups are available at the end of the report (please see Appendix B). In addition, there were some workshops on personal and group motivation related with creativity.



The participants were provided with the materials such as UNIDO Technology Foresight Manual (CD-Rom and printout), workbook and hand-outs of working material. At the end of course they were honored with the certificate of course completion.

The training course was offered free of charge for all selected participants (*please see Appendix D*) for five days at TUSSIDE.



Conclusion

With the course, targeted awareness on foresight has been reached, experiences from different countries and organizations have been shared, stimulating discussions on foresight exercises and cases have been arisen.

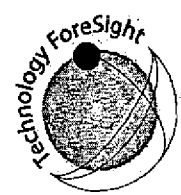
It is hoped that the programme composed of four modules will contribute to further developments on foresight studies and provide more sustainable and innovative development in countries.





Appendix





Appendix A- Course Programme

Training Course on Technology Foresight for Organizers 20-24 November 2006

Sunday 19 November 2006

- 19:00-20:00** Registration and Welcome Reception
- 20:00-20:30** Introducing the Programme, the Participants and the Practical Sessions
Serhat Cakir, Scientific and Technical Research Council of Turkey (TUBITAK)
- 20:30-21:30** Getting to know each other workshop
Inanc Ayar, TUSSIDE

Monday 20 November 2006

- 08:30-09:00** Opening Ceremony
*Representatives of:
TUBITAK, TICA, UNIDO, Governments of Hungary, Czech Republic and Slovak Republic, MIT.*
- 09:00-10:00** Introduction to Technology Foresight
Michael Keenan, PREST, University of Manchester, United Kingdom
- 10:00-10:30** Coffee/Tea Break
- Block I: Role of Foresight in Science, Technology and Innovation Policy Formulation
- 10:30-11:30** Role of Foresight in Strategic Thinking and Policy Formulation
Attila Havas, Institute of Economics, Hungarian Academy of Sciences, Hungary
- 11:30-12:30** Technology Policy and Innovation System
Ricardo Seidl da Fonseca, UNIDO, Austria and Campbell Warden, EARMA
- 12:30-13:30** Lunch
- 13:30-14:30** Foresight in Policy cycles: case of Romania
Campbell Warden, EARMA and Adrian Curaj, Ministry of Education and Research, Romania
- 14:30-15:30** Group work on the case of Romania
Campbell Warden, EARMA and Adrian Curaj, Ministry of Education and Research, Romania
- 15:30-16:00** Coffee/Tea Break
- 16:00-17:00** Foresight in a multi-country context: the fishery case in Latin America
Ricardo Seidl da Fonseca, UNIDO, Austria
- 17:00-18:00** Group work on the case
Moderator: R. Seidl da Fonseca, UNIDO, Austria
- 18:00-19:00** Dinner
- 19:00-.....** Personal and Group Motivation Workshop
Inanc Ayar, TUSSIDE



Appendix A- Course Programme (continued)

Tuesday 21 November 2006

08:30-08:50 **Harmony Workshop**
Inanc Ayar, TUSSIDE

Block II: Technology Foresight Process

09:00-10:00 **Scope and Focus of Foresight Exercises (Part 1)**
Attila Havas, Institute of Economics, Hungarian Academy of Sciences, Hungary

10:00-10:30 **Coffee/Tea Break**

10:30-11:30 **Scope and Focus of Foresight Exercises (Part 2)**
Ozcan Saritas, PREST, University of Manchester, United Kingdom

11:30-12:30 **Organizing and Managing a Foresight Exercise**
Michael Keenan, PREST, University of Manchester, United Kingdom

12:30-13:30 **Lunch**

13:30-14:15 **Vision 2023: Rationale and Scope**
Serhat Cakir, Scientific and Technical Research Council of Turkey (TUBITAK)

14:15-15:00 **Group work on the Turkish case**
Moderator: S. Cakir, TUBITAK, Turkey

15:00-15:30 **Coffee/Tea Break**

15:30-18:00 **Practical Exercise**

18:00-19:00 **Dinner**

19:00-... **Creativity Workshop I**
Inanc Ayar, TUSSIDE

Wednesday 22 November 2006

08:30-08:50 **Harmony Workshop**
Inanc Ayar, TUSSIDE

Block III: Technology Foresight Methods

09:00-10:00 **Overview of Foresight Methods**
Michael Keenan, PREST, University of Manchester, United Kingdom

10:00-11:00 **Ideas Generation and Brainstorming**
Tahsin Erkan Ture, International University of Sarajevo, Bosnia and Herzegovina

11:00-22:00 **Cultural and Social Event**



Appendix A- Course Programme (continued)

Thursday 23 November 2006

- 09:00-10:00 STEEP and SWOT Analyses**
Tahsin Erkan Ture, International University of Sarajevo, Bosnia and Herzegovina
- 10:00-11:00 Setting Priorities**
Ozcan Saritas, PREST, University of Manchester, United Kingdom
- 11:00-11:30 Coffee/Tea Break**
- 11:30-12:30 Japanese Foresight Programmes**
Kumi Okuwada, National Institute of Science and Technology Policy, Japan
- 12:30-13:30 Lunch**
- 13:30-14:00 The Latest Japanese Delphi**
Kumi Okuwada, National Institute of Science and Technology Policy, Japan
- 14:00-14:30 The Turkish Delphi**
Haluk Geray, Ankara University, Turkey
- 14:30-16:00 Group Work on Turkish Delphi**
Moderator: Haluk Geray, Ankara University, Turkey
- 16:00-16:30 Coffee/Tea Break**
- 16:30-18:00 Group Work on Project Plan (organizational aspects and methods)**
Moderator: Tahsin Erkan Ture, International University of Sarajevo, Bosnia and Herzegovina
- 18:00-19:00 Dinner**
- 19:00-... Creativity Workshop II**
Inanc Ayar, TUSSIDE

Friday 24 November 2006

- 09:00-10:00 Scenario Planning**
Ozcan Saritas, PREST, University of Manchester, United Kingdom
- 10:00-11:00 Understanding Different Foresight Techniques**
M. Keenan, A. Havas, O. Saritas
- 11:00-13:00 Practical Exercise: completion of the project plan**
- 13:00-14:00 Lunch**
- 14:00-15:00 Testing of Knowledge Acquired During the Course**
- 15:00-15:30 Coffee/Tea Break**
- 15:30-16:00 Networking Technology Foresight Initiatives**
Ricardo Seidl da Fonseca, UNIDO
- 17:30-18:30 Awarding diplomas, final discussion and closing ceremony**



Appendix B - Completed Projects

GROUP A

ISANLUSTAN Foresight

- Fictitious developing country, semi-periphery country,
- Geographical level: national
- Development: semi-periphery
- Size: 30-40 M
- Natural resources: rich non-renewable, but reserves last for 20 years
- Geographical location: no sea
- Political system: young and fragile democracy, civil society is not very strong
- Economic system: primary sector exports, 70% of GDP

ISANLUSTAN Foresight

- Promising country but it is high time to think about changes, so that the democracy can mature...
- Social system: high inequalities, tension,
- Human capital: primary OK, secondary OK for male students female students high drop out, tertiary education levels: good but elitist,
- Subjects for higher education: generalist, not focused on local needs
- Subjects for R&D: 0.2-0.3%, 50-50 (general subject run by state vs. sectoral research by MNC), low-medium quality of research
- Academia-industry linkages: weak linkages (split)
- Ownership structure: 50-50 (state vs. foreign)
- Geo-politics: neutral

Focus & Objectives

- SOCIETAL FOCUS
Our vision is driven by the aim to contribute to the solution of socio-economic problems of our country and to put the country onto a new track through strategy recommendations on S&T and other related domains.
- OBJECTIVES
A smooth transition from a primary/ natural resource dependent country towards socially/economically/environmentally sustainable development path.

Users & Horizon & Themes

- CLIENTS/USERS
Government (100%) / universities, R&D institutions, private firms (beneficiaries who can take action), government,
- TIME HORIZON
20 YEARS
- THEMES
search for the new resource (renewable),
search for the new position,
search for the how of the transition (new model)

Structure

- Phase A:
 - 3 panels
 - New resources
 - Transition
 - New model
 - Diversity Panel
- Phase B:
- Depend on Phase A

Methods

- Phase A:
 - STEEPV
 - SWOT
 - Vision building
 - Literature study
 - Brainstorming
 - Crosspanel activity
- Phase B: Same as Phase A + Delphi
- Different level of analysis more specific



Appendix B - Completed Projects (continued)

GROUP A

Budget (don't forget!)

A simple line drawing of a mountain range with a valley, located at the bottom of the box.

Participants

- Phase A (diverse, creativity)
 - Sci-fi writers
 - Journalists
 - Futurists
 - etc.
- Phase B (concentrated)
 - Experts
 - Scientists

A simple line drawing of a mountain range with a valley, located at the bottom of the box.



Appendix B - Completed Projects (continued)

GROUP B

Group B

Alternative Energy Sources to Hydrocarbons
Foresight Exercise for Turkey

Rationale Behind

- Impact of hydrocarbons on the environment
- Limited/decreasing level of existing hydrocarbon energy resources
- Growing need for energy
- Clean energy
- Peaceful energy sources

Expected Outcomes

- Raising awareness
- Trends, drivers, vision, scenarios, issues
- Networking/dialogue between stakeholders on the subject
- Mature/Emerging/Key/Critical Technologies
- Update and gather database about existing infrastructures and researchers

Focus and Objectives

- **Focus** : Techno-economic
- **Objectives**
 - to determine solutions to reduce the dependency of Turkish economy on hydrocarbons
 - identify clean and feasible alternative natural resources
 - Propose energy policies/strategies to promote and invite investors on alternative energy sources

Client and Stakeholders

- **Client** : Ministry of Energy
- **Stakeholders**
 - Ministries of
 - Energy, Environment, Industry
 - TUBITAK and its Research Institutes
 - Business and Industry
 - TUSIAD
 - National/International Oil and Energy Producers
 - Academia
 - NGO's

Time Horizon and Inputs

- **Time** : 18-24 months
 - Preparation : 1 month
 - Execution : 15-17 months
 - Reporting : 4-6 months
- **Inputs**
 - Vision2023 (+ other countries' studies)
 - National/International statistics, reports
 - Turkish Statistics Institute
 - OECD
 - EuroStat
 - Regulations
 - Political, Economic and Social Context, Roadmaps
 - International Expertise



Appendix B - Completed Projects (continued)

GROUP B

Actors and Coverage

- **Actors** :
 - All stakeholders
 - Industry that heavily depend on energy
- **Users** → same as Actors
- **Coverage**
 - Wind, Solar, Hydro, Geo-thermal energy alternatives to be focused on
 - New processes and materials to reduce dependency on hydrocarbons (e.g. fuel cells)

Existing Programs and Resources

- **Existing Programs** :
 - National Energy Program
 - EU-Programs, Legislations
 - Vision2023
- **Resources**
 - Time
 - Money mainly from
 - Min. of Energy, and perhaps
 - National donors and International funds
 - Human Resources
 - Infrastructure
 - Access to information databases

Support needed and where it can come from

- **Human Resources** : M of En. / TUBITAK
- **Infrastructure** : M of En. / TUBITAK
- **Information** : Databases, Academia
- **Time** : M of En.
- **Money**
 - M of En. + National or international sources
 - TUBITAK + Government funds
- **Political & Social** : NGOs, Media, Parties

Promotional Activities

- **Organizing promotional events**
 - press conferences
 - Internet site
 - symposiums
 - booklets
 - media coverage etc.

The Project Team

- **Leader / Owner of the Project (Minister?)**
- **Project Manager (Coordinator)**
- **Secretariat**
- **Communication Expert**
- **Public Relations Expert**
- **Foresight Experts**
- **Software Specialist(s)**
- **Consultants**

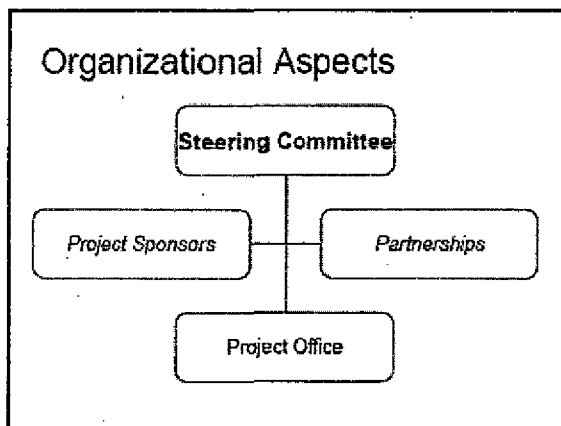
Methods

- **exploratory**
- **mixture of qualitative & quantitative**
- **STEEP and SWOT**
- **expert panels**
- **Delphi surveys**
- **brainstorming**
- **scanning**
- **scenarios**
- **roadmap**



Appendix B - Completed Projects (continued)

GROUP B



Participants

- a *representative panel* to be held to determine the participants and their roles
- mail correspondence with major stakeholders to invite participants

Communication

- Communication between stakeholders
- Communication with
 - participants
 - consultants
 - project sponsors
- Coordination of communication through the Project Office
 - details determined and design is made by the communication experts

Group B

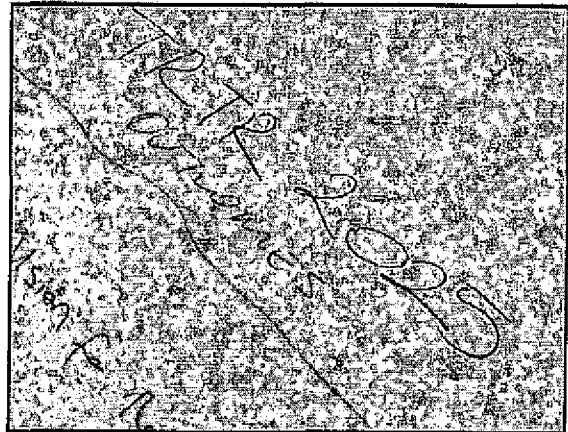
- **Questions, comments?**

groupB@tusside.unido.org

Appendix B - Completed Projects (continued)

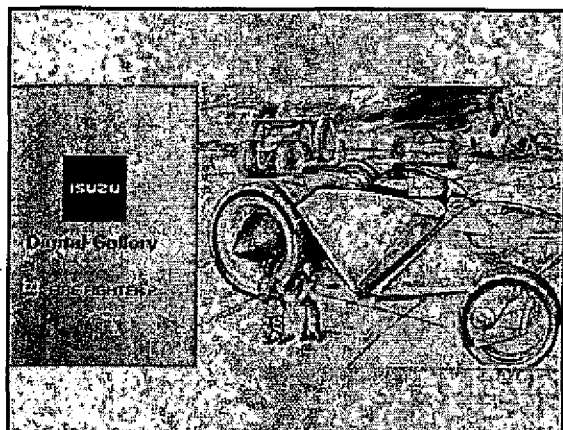
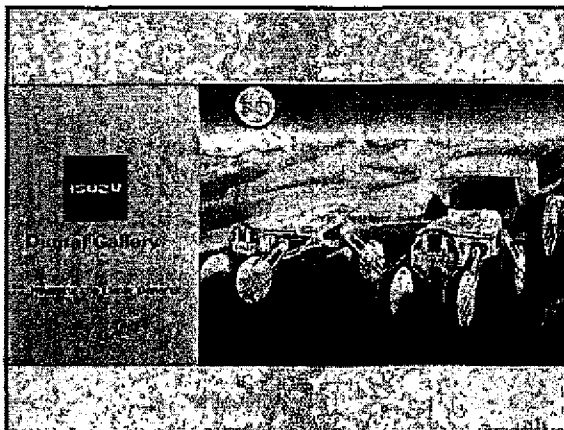
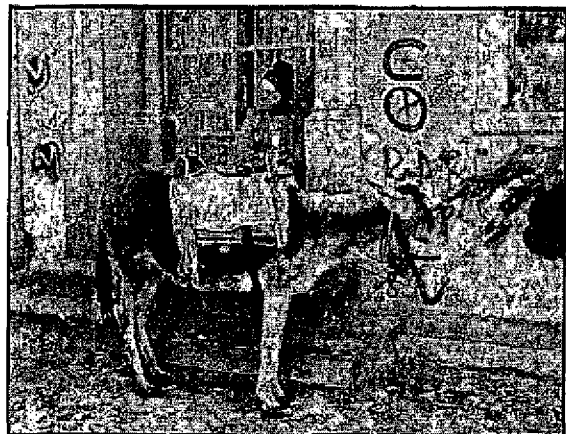
GROUP C

A SECTORAL
FORESIGHT EXERCISE
FOR AUTOMOTIVE
INDUSTRY
GROUP 3



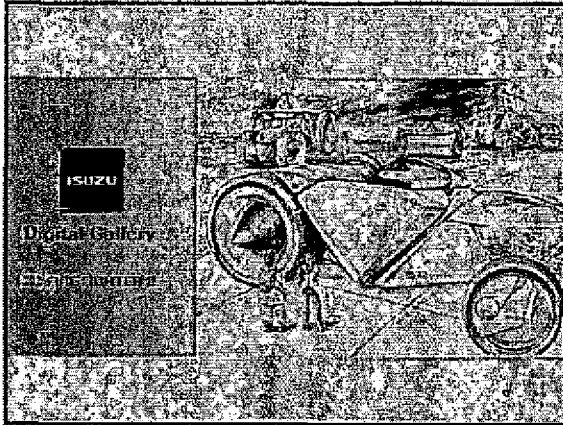
WHY TRTR 2025?

- ◆ One of the leading sectors of economy in Belarus
- ◆ Socially important: Big employer, growth promoter
- ◆ Environmental effect: Demand for cleaner production
- ◆ Technological competitiveness



Appendix B - Completed Projects (continued)

GROUP C

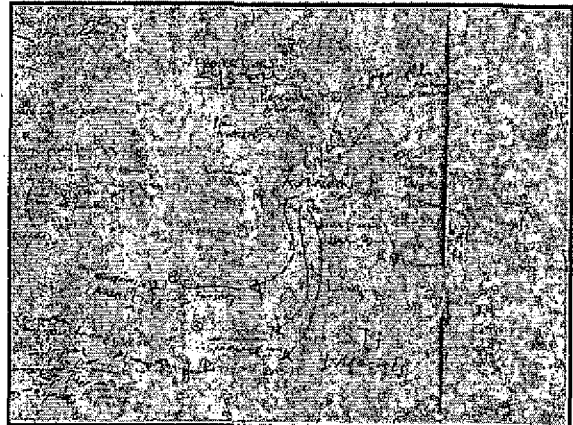


EXPECTED OUTCOMES

- ◆ Future vision for the industry
- ◆ Policy recommendations to the government, industry, research
- ◆ Priority areas
- ◆ New models and desing concepts

FOCUS

- ◆ Science
- ◆ Technology
- ◆ Innovation
- ◆ Markets

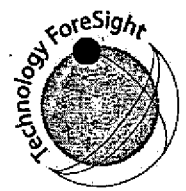


OBJECTIVES

- STI (Supply)
- ◆ - New models and desing concepts
 - ◆ -Alternative fuel (Natural gas powered vehicles)
 - ◆ -Lower energy consumption
 - ◆ -Improve new products
- MARKETS (Demand)
- ◆ -More comfortable cars
 - ◆ -Low cost vehicles
 - ◆ -Keeping the market share
 - ◆ -Expanding the market

TIME HORIZON

- ◆ Vision of industry: 2025



Appendix B - Completed Projects (continued)

GROUP C

ACTORS

- ◆ Government
- ◆ Automotive Industry
- ◆ Research Institutions
- ◆ Farmers (Inside and outside the country)
- ◆ Constructors (Inside and outside the country)
- ◆ NGOs (Environmental, health related)
- ◆ International Organizations (e.g. FAO)
- ◆ Other Countries and blocks (EU)
- ◆ Financial Institutions (Banks and insurance companies)

USERS

- ◆ Automotive Industry
- ◆ Labour Force (Automotive)
- ◆ Farmers
- ◆ Construction Companies
- ◆ Government (Policy makers)
- ◆ Technical Education (Engineering)

INPUTS

- ◆ Industry statistics (State institute of statistics)
- ◆ Other foresight exercises
- ◆ Market analysis report (Sectoral reports)
- ◆ Other competitive products
- ◆ Agricultural policy (National policy documents)
- ◆ Policies and strategies on the automotive industry
- ◆ Technological developments (Reports, research papers, academic works etc.)

RESOURCES

- ◆ The chamber of trade and industry prepare the FE
- ◆ Human (own human resources)
- ◆ Skills (own skills, skills from industry, from academia, other NGOs)
- ◆ Financial (international organization, the government, automotive industry, other users)
- ◆ Database
- ◆ Time (1 year)

QUALIFICATIONS NEEDED

- ◆ Champions
- ◆ Promoters
- ◆ Open minded people
- ◆ Project management (e.g. cash flow)
- ◆ IT Skills
- ◆ System engineering (for the integration of the ideas, findings and outcomes)

SORT OF PEOPLE

- ◆ Business administration
- ◆ Industry expertise
- ◆ Technical expertise in R&D
- ◆ Fund raising
- ◆ Financial management
- ◆ Good team work

Appendix B - Completed Projects (continued)

GROUP C

METHODS

1. UNDERSTANDING

- ◆ System thinking, trend analysis, stakeholder mapping, structural analysis, benchmarking, STEEP, SWOT

2. SYNTHESIS

- ◆ Brainstorming, scenario writing, relevance trees, wild cards, simulation, interaction diagnosis, analogies

METHODS

3. ANALYSIS & SELECTION

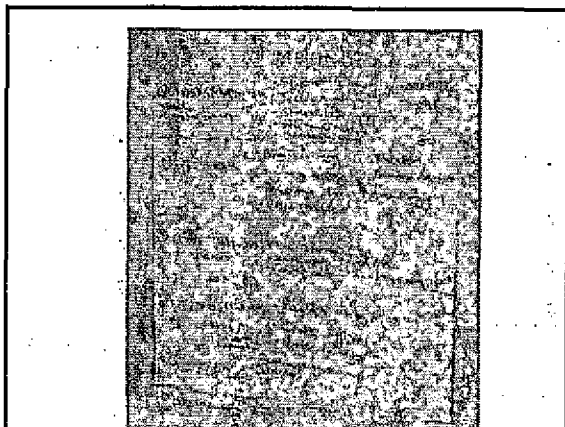
- ◆ Panels, Benchmarking, Conferences, Delphi, Prioritization

4. TRANSFORM

- ◆ Workshops with other experts, roadmapping, cross impact, interviewing

5. ACTION

- ◆ Roadmapping, seminars

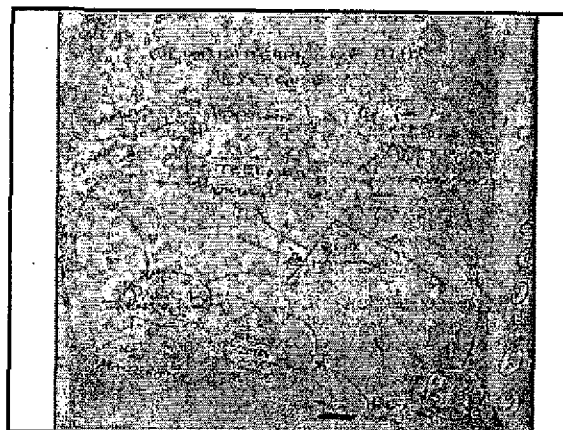


EXPERTISE NEEDED FOR METHODS

- ◆ Facilitator
- ◆ Organizers of logistics
- ◆ Experts on methods
- ◆ Secretary
- ◆ Champions
- ◆ IT skills
- ◆ Project manager
- ◆ Topic experts
- ◆ Wider society for consultation

ORGANIZING OF THE EXERCISE

- ◆ Steering Committee
(Representatives from automotive ind., government, NGO...)
- ◆ Panels
- ◆ Project manager
- ◆ External experts
- ◆ Participants app. mixture

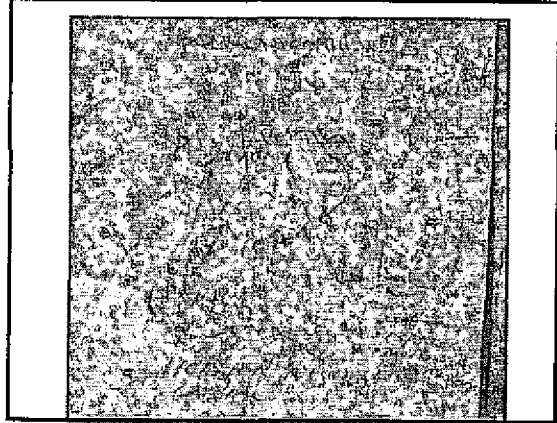


Appendix B - Completed Projects (continued)

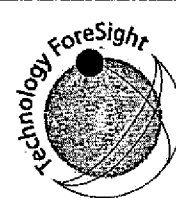
GROUP C

COMMUNICATIONS

- ◆ Public, panels, panel chair
- ◆ Relations are vertical and horizontal



Thank you for your
attention !



Appendix B - Completed Projects (continued)

GROUP D

Foresight Exercise
Group 4

Automotive Industry in emerging economies

- 1. Issue analysis
- 2. Stakeholders analysis
- S&T area mapping
- Mapping of related sectors
- others

Objectives

- Extending international cooperation
- Improve coordination of actors
- Identify priorities for R&D, investments
- Assess impact on future environmental processes
- Indicate future jobs
- Identify opportunities and possibilities
- Spillover effects of automotive industry on other industries
- To know the future trend of auto industry due to its importance

*Globalization context (objectives should reflect this)

Sponsors

Potential :

- UNIDO
- UNDP
- USAID
- GEF
- National governments
- Large MNEs...
- International (organizations)
- National (governments)

Stakeholders and users

- Sponsors
- Auto companies
- Sector representatives
- Related industries
- R&D community
- Consumers
- NGOs

37 types of stakeholders, 250 persons involved in each country (1750 persons)

Methods

- Global STEEPV
- Expert panels (solving tasks)
- Workshops and conferences (consensus, feedback)
- Market survey
- Delphi-method (forecast, technology)+(intern)
- SWOT-analysis
- Scenario-analysis (+international)
- Importance – feasibility analysis



Appendix B - Completed Projects (continued)

GROUP D

Expected outputs

- Trend identification
- HRD
- Input to policy formulation
- Research and development priorities
- Signal relevance
- International collaboration
- 'new' + 'strengthened' technology
- Input to other studies
- Spillover to the relative industries
- Infrastructure
- 'alignment' and 'mobilization'
- Expectations of vehicle/tech/society

Organizational structure

- International Steering Committee
- National Steering committee
- Managing Group/ Secretariat/ executive Committee

International Steering Committee

- National and international representatives (about 10 members)
- Technical committee (2 representatives from each country and 3-4 experts from international organizations)

Panels

- Task-oriented panels, including representatives of all stakeholders
- One big panel (discussion Forum, online, Steering Committee, workshop, conference)
- 5-7 panels, about 100 persons in the country

Coverage of Foresight

- Identifying structure/organization (procedures, System integrator and etc.)
- Types of priorities (research, Development and etc.)
- Objectives...
- Technical opportunities
- Tasks

Budget

- Meetings of International Steering Committee – 5
- Meetings of Technical committee – 9
- External Consultants
- National panels and workshops

Total = \$1.5 mln.



Appendix B - Completed Projects (continued)

GROUP D

National	International
STEEPV (panels)	STEEPV (deskwork)
Workshops on themes	Technical Committee
Forecast+ policy Delphi	
1st Delphi run at national level	Unified survey (Delphi)
Workshop after 1st round	Technical Committee
Second round Delphi	
Expert Panels	
SWOT analysis	
National scenarios	Global scenarios
National Steering Committee (priorities by the government)	International SC

THANK YOU!



Appendix C- Presentations

20 November 2006

Presentations (1)

2006 Technology Foresight Training Programme
Thanks to Technology Foresight for Support

An Introduction to Foresight

Dr. Michael Keenan
PREST, University of Manchester, UK

Michael.Keenan@manchester.ac.uk

Michael Keenan

2006 Technology Foresight Training Programme
Thanks to Technology Foresight for Support

Outline

- What is Foresight?
- Why is it used?
- Characteristics of Foresight exercises

Michael Keenan

2006 Technology Foresight Training Programme
Thanks to Technology Foresight for Support

What do we mean by Foresight?

- Martin (1995):- Foresight is "the process involved in systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits."
- Georgiou (1996):- Foresight is "a systematic means of assessing those scientific and technological developments which could have a strong impact on industrial competitiveness, wealth creation and quality of life."

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What is Foresight?

- Foresight refers to a set of systematic and purposeful processes of future-oriented deliberation between (innovation system) actors with a view to identifying actions to be taken today for a better future tomorrow
- Such processes are typically launched in the context of a programme of exercise, and usually lead to the identification of promising areas of strategic research (often interdisciplinary) for funding bodies to support
- Foresight exercises provide a space for deliberation and strategic conversations between (innovation system) actors. They seek to create a pool of knowledge and analyses to inform debates and to provide a resource for system actors to use. Through their processes, they also seek to align system actors in such a way as to achieve concerted mobilisation

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Forecasting, Planning, and Foresight

Foresight can use forecasts, as well as contribute to planning, but it should not be confused with either activity.

Forecasting tends to assume that there is one probable future, whereas Foresight assumes that there are numerous possible futures, and that the future is in fact there to be created through the actions we choose to take today.

As for planning, Foresight time horizons should be beyond the usual planning period. Time horizons will vary depending upon the issue or sector under consideration and the needs of the target audience. Time horizons typically vary between 3-30 years, but they may be even longer in some instances

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Five essential elements

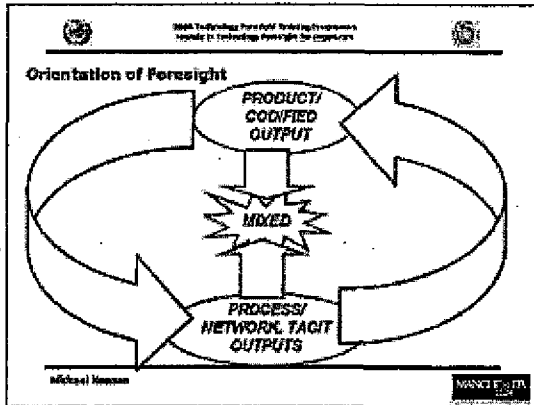
- Anticipation and projections of long-term developments
- Interactive and participatory methods of debate and analysis
- Forging new social networks
- Elaboration of strategic visions based on a shared sense of commitment
- Implications for present-day decisions and actions

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Appendix C (continued)

20 November 2006

Presentations (1)



**Above all else
Foresight is a social technology**

Michael Neenan

- Modern Foresight family tree**
(National, 50-7-orientated exercises)
- From 1970 Japanese Science and Technology Agency began periodic 30 year forecasts
 - Dutch began activity in 1989
 - US Congress established Critical Technologies Institute in 1991
 - German and UK exercises major milestones
 - Major upsurge during 1990s, especially in Western Europe and East Asia
 - 2000 - EU New Member States and Latin America
- Michael Neenan

- Who's doing what? (1)**
- Big EU countries
 - Germany: BMFT Futur and Delphi exercises; Nanotechnology for Health (Aachen); lots of society-oriented exercises conducted in cities and regions
 - France: Futuris (ANRT); AGORA 2020 (Transport); INRA 2020 (Life sciences research); Key Technologies 2010 (Min Industry); Territoires 2030 (DATAR); lots of regional and city exercises
 - United Kingdom: UK Foresight Programme (OST); CEPRA Horizon Scanning; Young Foresight; Housing Futures 2024 (CABE); UK Hydrogen Futures 2050; some regional and city level activities
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- Who's doing what? (2)**
- Smaller EU countries
 - Austria: Technology Delphi; Biomedical Innovations 2015; vision of a wireless information society
 - Denmark: National Technology Foresight; Future Wind Turbines; future of the patent system
 - Finland: Energy Vision 2030; Food Technology Foresight; Labour Force 2020; Services 2020; lots of regional, sectoral and societal Foresight
 - Ireland: National Technology Foresight; Marine Foresight; Archaeology in Ireland; Foresight for Rural Ireland 2025
 - India: biotechnology, ICT & education, and marine pilot Foresight studies (part-funded by EC)
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- Who's doing what? (3)**
- Eisewhere
 - United States: US Congress Critical Technologies; GRID 2020; robotics and intelligent machinery; a lot of think tank and state / city work
 - Japan: five-yearly national Foresight exercises (since 1970); Next-generation e-governance
 - China: National Technology Foresight; Hydrogen Vision 2050
 - Brazil: National Foresight on productive chains
 - Australia: ASTEC National Technology Foresight Programme; Construction 2020; Future Dilemmas 2050
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Appendix C (continued)

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Presentations (1)

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Explaining the diffusion of Foresight...

- Perception of escalating industrial and economic competition
- Increasing pressure on governmental spending
- Changing nature of knowledge production?
- Emergence of new styles of policy-making?
- Increasing desire for anticipatory intelligence?
- Interest in networking and building advocacy conditions => from diffusion to pluralism? From hierarchies and markets to networks?
- Policy transfer (bandwagon effects?)
- The "Millennium Effect"
- Activities of international organisations, e.g. EC, UNIDO, etc.

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Being clear on Rationales and Objectives

- Need to be clear on why you are embarking upon Foresight. What are the problems and challenges? And can Foresight help to address these? This clarity should extend to the formulation of clear (and hopefully) widely shared objectives
- Rationales tend to underpin three general sets of objectives:
 - Creation of visions and/or priority-setting
 - Better wired innovation systems
 - Development of a "Foresight culture"
- Often more locally-specific objectives too

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Examples of policy problems and how foresight might help...

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So what are Foresight's uses?

- Set general research directions
- Inform funding and investment priorities
- Increase understanding and change mindsets
- Build trust between participants
- Aid collaboration across administrative and epistemic boundaries
- Highlight interdisciplinary opportunities
- Build networks and strengthen communities
- Provide anticipatory intelligence to system actors
- Build visions of the future
- Inform policy and public debates
- Increase involvement of system actors in decision making
- Improve policy implementation by enabling buy-in to decision-making processes

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Module 4: Technology Foresight for Programmes

Examples of results to expect

- During the Exercise**
 - Production of baseline and benchmarking reports
 - Building of new linkages
 - Changing perceptions / new understanding / enlightenment
 - Acquisition of widely-shared visions
- Immediately After**
 - New (interdisciplinary) R&D programmes and projects
 - Further use and development of Foresight results
- Sometime Later**
 - R&D and innovation impacts
 - New working communities

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Reported Impacts (www.ctma.eu)

- Better informed strategies in general
- Reducing the costs for innovation investments in R&D
- Using foresight results to evaluate and improve strategies
- More informed SME strategies
- Development of new ways of thinking
- Creating a language and practice for thinking about the future
- Highlighting the need for a systemic approach to both policy-making and innovation
- Development of networks of actors for policymakers and other innovation actors
- Better evidence-based policy
- A source of inspiration for regional innovation actors
- Creation of new networks and clusters
- Establishment of communication structures between knowledge actors
- Collective learning through an open exchange of experiences
- Enhanced regional position and positive image of these regions creating a favourable visibility of a region's strengths and competitiveness
- Attention from the general public
- Achievement of long-term effects of the productive systems through a cultural engraving on high technology
- Accumulation of experience in using foresight tools and thinking actively about the future
- Stimulation of actors to conduct their own foresight activities after being inspired

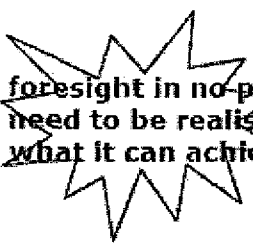
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Appendix C (continued)

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Presentations (1)

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Module 10: Technology Foresight for Organisations



**But foresight is no panacea!
You need to be realistic as to
what it can achieve!**

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Module 10: Technology Foresight for Organisations

What foresight can't do . . .

- Replace decision making! Difficult decisions will still remain, but should be better informed
- Overhaul a research or innovation system. It can contribute towards this, but is not enough on its own
- Always lead to consensus. But it can make known positions and foster mutual understanding
- Automatically lead to action. Commitment to implementation is required during and after exercises

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Module 10: Technology Foresight for Organisations

What does a Foresight exercise look like?

- Many shapes and sizes!
- Common aspects: experts, panels, project team, fixed budget and time, sponsor, reporting and recommendations
- Typical variations: methods used, methodological sophistication, degree of participation, budget and time available, time horizon, coverage, organisational configuration, etc.

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Module 10: Technology Foresight for Organisations


Typical stakeholders in a Foresight exercise

Foresight is about providing a framework for enabling DIALOGUE between various societal actors, such as:

- Government
- Industry
- Academe - natural & social scientists
- Others, e.g. NGOs, trade unions, the media, banks, schools, the general public, etc.

An important benefit for these actors is mutual (and collective) learning

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


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**Starting 'levels' for Foresight
(Not mutually exclusive)**

- Territorial: National (most visible), Sub-national (regional, city-region / municipality), Supranational (bilateral, multilateral, International Organisation), Global
- Domain: economic, social, environmental, technology, scientific discipline
- Alternative starting points:
 - Flows (e.g. rivers, pollutants, people, traffic, goods and services, etc.);
 - Networks (e.g. people, organisations, infrastructures, etc.);
 - Markets (e.g. goods, services, labour)

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
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Who sponsors / carries out foresight exercises?

- Ministries and other government agencies
- Research Councils
- Academies of Science and other research institutes
- Universities
- Regional Development Agencies
- Industry Clusters
- Large companies
- Industry Federations
- Private Foundations
- International Organisations
- ...

Essentially, virtually any organisation can sponsor a foresight exercise

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Appendix C (continued)

20 November 2006


Presentations (1)

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Module 1: Technology Foresight by Regulators

Summary

- Although Foresight exercises have some essential elements, they nevertheless come in many shapes and sizes
- It is important to question the myths surrounding Foresight whilst acknowledging the wide range of purposes to which such exercises can be put
- A lot of international experience has now accumulated in Foresight, and much can be learned from this
- Reflecting the diversity of Foresight exercises, a wide range of different impacts can be attributed to them

Michael Hancock




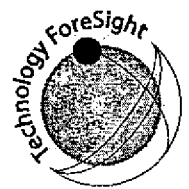
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Thanks!

Questions and comments?

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Appendix C (continued)

20 November 2006

Presentations (2)

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Methods to Technology Foresight for Decision Makers

The Role of Foresight in Strategic Thinking and Policy Formation

Attila Havas
Institute of Economics,
Hungarian Academy of Sciences

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Methods to Technology Foresight for Decision Makers

Outline

1. Buzz words - Policy traps?
2. An alternative conceptual framework
3. Policy context/ challenges: rationales to launch a foresight programme
4. Relevance of foresight
5. Conclusions

A Havas
Institute of Economics, HAS

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1. Buzz Words - Policy Traps?

It is all about high-tech (ICT, bio, nano, new materials)
 Knowledge-based economy
 New technology-based firms (NTBFs), SMEs
 Σ R&D \rightarrow automatic (socio-) economic benefits
Emerging/ transition economies

- *R&D is luxury ("we spend on R&D when we can afford")*
- *R&D - innovation (competitiveness) can be separated*
- *We can import technology (NIS vs. globalisation)*

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Competitiveness and RTDI

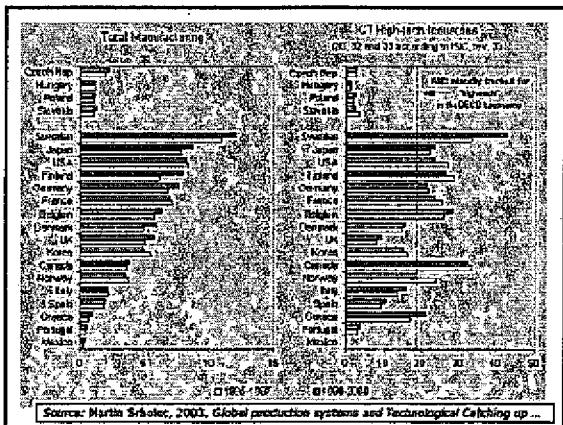
Low production costs \Rightarrow low local knowledge content, low-paid jobs, short-term (fragile, temporary) competitiveness

Innovation, knowledge-intensive activities
 \Rightarrow higher local knowledge content, better paid jobs, long-term (sustained) competitiveness

Innovation \neq 'high-tech'!!

Different sets of policies
 'wholesale' subsidies, keeping low wages
 orchestrated RTDI, FDI, HR, regional dev., (...) policies

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2. A New Conceptual Framework

Policies based on the OECD classification are likely to be misleading in emerging economies

- a) activities, products, firms, sectors
- b) cross-country differences

High-tech industries vs. knowledge-intensive activities (learning capabilities, flexibility)
 \Rightarrow competitiveness

Evolutionary, systemic approach to RTDI
 Not only in emerging/ transition economies

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Appendix C (continued)

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Presentations (2)

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Module 2: Technology Foresight for Organisations

Types of Knowledge

Codified vs. tacit

Scientific/ theoretical vs. "practical" knowledge

Learning by doing/ using
technological, organisational, mgmt, finance, marketing, personnel, etc.
e.g. unofficially modified programmes for CNC machines

All types are crucial for a successful innovation process \Rightarrow growth, improved competitiveness

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Institute of Economics, IAS

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Sources of Knowledge

Formal R&D: in-house, extra-mural
Not only "basic" research!

Non-R&D:

- design, scaling up, test, tooling-up, etc.;
- in general: trial-and error, all sorts of engineering activities
- ideas from suppliers, users
- inventors' ideas/ practical experiments
- learning by doing/ using/ interacting
- ...

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Institute of Economics, IAS

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Policy Implications

Tailor policy tools to various sorts of knowledge (not just R&D in a few S&T fields/ industries)

Promote both knowledge creation and exploitation (diffusion)

Facilitate networking, co-operation of actors (various types of knowledge needed for innovation)

Restructure, boost 'traditional, low- and mid-tech' industries, too

Firm level: align innovation strategy to distributed knowledge bases

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Theoretical Background: Economics of innovation

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Mainstream vs. Evolutionary Economics

Risk vs. uncertainty (optimisation)

'Time-less' models vs. 'history counts':
path-dependent, cumulative process,
learning by doing, using and interacting

Information vs. knowledge (tacit) & skills
learning capabilities

Learning, path-dependency \Rightarrow
heterogeneity (diversity) vs. 'repr. agent'

Linear vs. network (interactive) model

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Policy Implications

Uncertainty \Rightarrow no optimum

'Waste' is inherent in the innovation process
'duplication': (i) learning in a wider circle
(ii) diversity maintained
'error' where not to search

Variety, uncertainty \Rightarrow adaptive policy (policy learning)

Promote learning at individual, org., inter-org. levels

Facilitate co-operation, networking to generate and disseminate knowledge

Exploitation of R&D, diffusion of innovation is not automatic \Rightarrow adequate policy tools to foster

Co-ordination of various policies

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Appendix C (continued)

20 November 2006

Presentations (2)

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STI Policies

Science policy is "concerned with the development of science and the training of scientists"

Technology policy "has as its aims the support, enhancement and development of technology" (e.g. military, environmental protection)

Innovation policy "takes into account the complexities of the innovation process and focuses more on interactions within the system"

Dodgson and Bessant, 1996

Aileen
School of Economics, NIS

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Policy Rationales

Mainstream economics
market failure => (science) technology policy

Evolutionary economics
system failure => innovation policy

Actual policy schemes can be based on a combined rationale
e.g. development of new technologies in consortia, academia - industry co-operation, etc.

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School of Economics, NIS

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Hypes vs. Evolutionary, Systemic Approach: General Considerations

Knowledge-based vs. learning economy

NTBFs, high-tech SMEs vs. knowledge-intensive, innovative ones in any sector

R&D vs. RTDI assisted by an appropriate policy framework & a strong NIS → socio-economic benefits

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School of Economics, NIS

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Hypes vs. Evolutionary, Systemic Approach: Transition economies

R&D is luxury vs. RTDI creates wealth (but science in the 'ivory tower' does not)

R&D - innovation (competitiveness) should NOT be separated

No need for domestic efforts (imported technology will do) vs. NIS is not isolated, on the contrary: international co-operation is essential

- strong NIS ↔ FDI, joining international production networks
- R&D as learning (what technologies to import, how to use/ adapt/ improve upon)

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School of Economics, NIS

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3. Policy Context/ Challenges

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School of Economics, NIS

Change (innovation) and government policies

Education, training
Labour market
Innovation

Regional development
Social policies
Taxation

Ability to innovate and adapt to change

Cost and benefits

CHANGE

Transformation pressure

Macroeconomic, Trade, Competition

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School of Economics, NIS

Based on "The globalising learning economy: implications for innovation policy"

Appendix C (continued)

20 November 2006

Presentations (2)

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Policy Challenges (all countries)

- Complex, inter-related challenges (quality of life, HR, social gaps, globalisation, environment, etc.)
⇒ new approaches, methods
- Change attitudes and norms (at all levels)
- Develop new skills
- Speed of technological changes vs. ability to formulate appropriate policies
- Cut budget deficits, improve accountability social concerns about new technologies
- Facilitate co-operation, networking

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Policy Challenges (EEs)

- General pressures: even stronger
- Loss of former markets, and hence the need to find new ones
- Fragile international competitiveness
- Poor quality of life
- Brain drain
- Short ↔ long-term issues
- Raise the profile of STI issues in politics and formulating economic policies

A 10000
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4. The Relevance of Foresight

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Future-oriented Activities

(Prophecy)

- Visionary thinking (e.g. consultancy services)
- Forecast (extrapolation, prediction) for various purposes)
- Futures studies (for academic purposes)
- Strategic planning (various levels)
- Scenario planning (firm level, Godet)
- Indicative national planning (Japan, France)
- Central planning
- Prospective analyses (for academic or business purposes)
- Critical/ key technologies
- Foresight (individual) vs. Foresight programmes
- ??

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Differentiating Foresight

- Action-oriented [vs. 'contemplative' (passive)]
- Participatory [vs. non-participatory] (see next slide)
- Alternative futures [vs. a single future state]

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Participatory Programmes

Meet *all* the 3 criteria below:

- involve participants from at least two different stakeholder groups (e.g. researchers and business people; experts and policy-makers; experts and laymen)
- disseminate their results (e.g. analyses, conclusions, policy proposals) in a wider circle of the population, which is going to be affected by the programme/ project
- seek feedback from this wider circle

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Appendix C (continued)

20 November 2006

Presentations (2)

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Module 5: Technology Foresight for Organisations

Definition: UK TF1

A programme that aims to create sustainable *competitive advantage* and enhance the *quality of life* by *bringing together* business, the science base and Government to identify and respond to *emerging opportunities* in markets and technologies.

A 1999
Training of Skills 1999, 1998

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Module 5: Technology Foresight for Organisations

Definition: EU HLEG, 2002

A systematic, participatory process, collecting future intelligence, building medium-to-long-term visions, aimed at influencing present-day decisions and mobilising joint actions
(EC DG Research, 2002)

An essential tool to meet the above challenges, but NOT a panacea

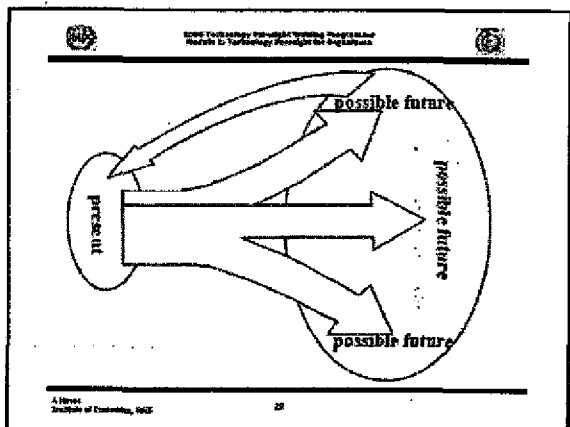
A 1993
Institute of Economics, 1992

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Foresight can improve the policy formulation process by

emphasising the possibility of alternative futures, and hence the opportunity of shaping our futures

A 1999
Institute of Economics, 1998



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Foresight can improve the policy formulation process by

emphasising the possibility of alternative futures, and hence the opportunity of shaping our futures
broadening perspectives via bringing together people with different experience
encouraging creative thinking ('outside the box')
facilitating more transparent decision-making (a way to obtain public support)
reducing uncertainty (participants can align their endeavours once they arrive at shared visions)

A 1999
Institute of Economics, 1998

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Policy Challenges – Foresight in EEs

'Burning' (short-term) issues
Need for fundamental structural (organisational, institutional) changes
⇒ short- & long-term issues compete for resources (attention)
Limited resources (actually, almost by definition)
- attention of politicians, policy-makers
- capabilities (intellectual resources)
- financial
- attention of opinion-leaders (makers)

A 1999
Institute of Economics, 1998



Appendix C (continued)

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Presentations (2)

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Policy Challenges – Foresight in EEs (2)

Reshaping NIS
 Bringing together actors (process results)
 ⇒ contribution to enhanced competitiveness, improved quality of life
 (other elements of rationale for foresight in emerging economies, as discussed)

Globalisation: joining to what international structures (economic, political), with what country

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Policy Dilemmas

Investment promotion: quantity vs. quality
 (quick, volume) job-creation (low wages, short-term) vs. skill-intensive jobs (fewer jobs, higher wages, longer-term commitment)

Promote 'high-tech' sectors vs. knowledge-intensive activities
 misleading statistics (OECD definition) activities, products, firms, sectors

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5. Conclusions

Place RTDI into a broad policy framework so as to clarify its rationale:
 Socio-economic development → RTDI strategy → RTDI policy schemes

Apply modern policy methods, feed back their results into the policy planning cycle:

- evaluation of policy programmes
- technology foresight, technology assessment
- regular consultations with stakeholders
- collect and analyse relevant data on RTDI

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Conclusions (2)

Complexities of economically, socially and environmentally sustainable development & the role of *STI policies* in tackling them

Foresight processes can assist decision-makers facing these tasks; *STI policies and beyond*

⇒ F is a policy tool (not a scientific project!)

Competences, responsibilities of decision-makers vs. participants of foresight programmes

Foresight vs. other prospective techniques (approaches)

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Conclusions (3)

Cost of foresight; results of other countries
 BUT F is relevant in less developed countries, at the semi-periphery, too: SWOT, process benefits

F is an especially useful tool to identify challenges and developing visions in emerging economies
 setting feasible & 'mobilising', ambitious goals
 But long-term thinking is discredited in the CEE/NIS region

International co-operation in F can help in

- changing attitudes
- creating synergies and economies of scale
- offering *additional* financial and intellectual resources

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Thanks!

Questions, comments?

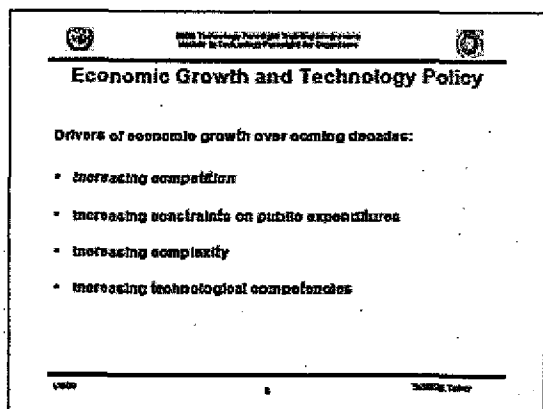
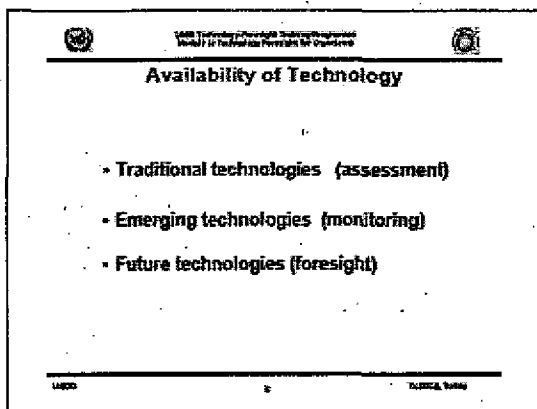
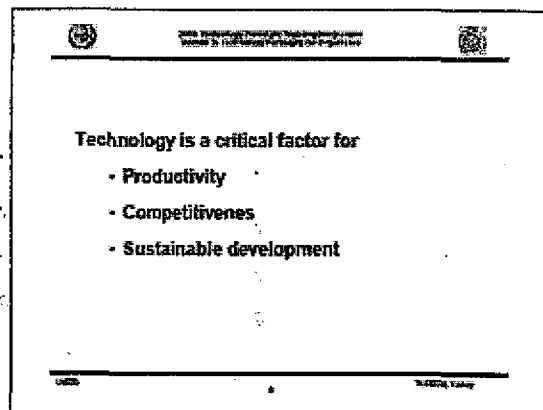
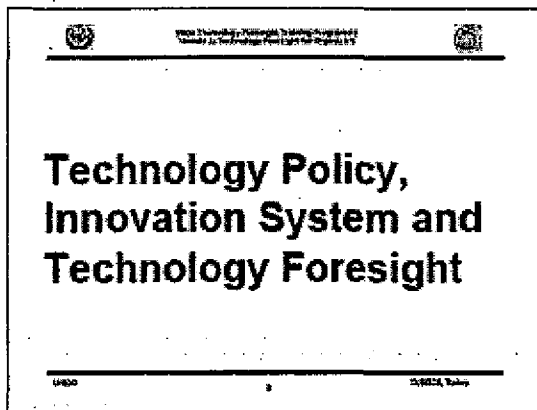
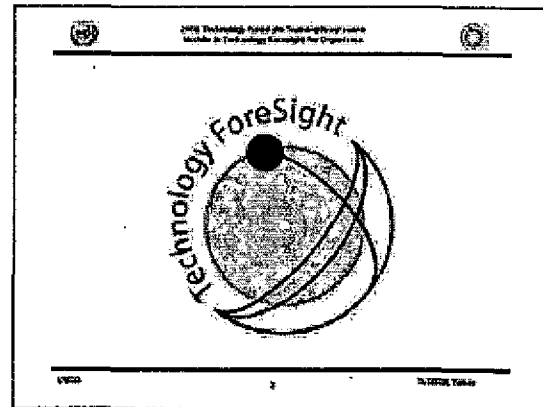
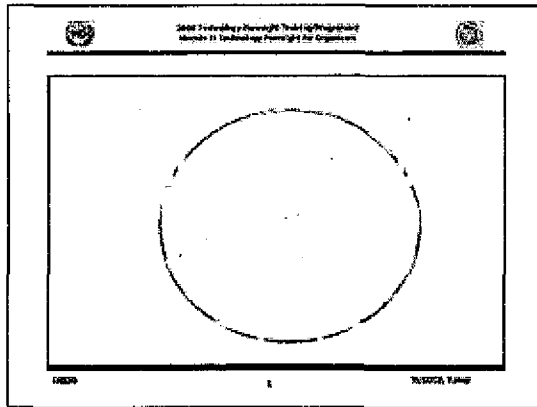
havasatt@econ.core.hu

A HUNGARIAN INSTITUTE OF ECONOMICS, INC.

Appendix C (continued)

20 November 2006

Presentations (3a)





Appendix C (continued)

20 November 2006

Presentations (3a)

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Challenges for strategic decision-making and policy

- Economy & society becoming more knowledge-intensive
- New generic technologies
 - likely revolutionary impact on economy and society
 - dependent on advances in basic research
- Growing strategic importance of ICT & technology
- Exploit longer-term payoff for R&T essential in era of growing international competition

Source: DfES March

1998 2 2006, Turkey

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Role and Impact of Technology

- Worldwide economic growth offers new opportunities for selling products and services in countries previously inaccessible.
- To compete effectively in foreign markets, local manufacturing is important and the potential markets for local industry will increase.
- Technological advances and innovation will provide new market opportunities, reduce product development time and help industry meet customers' rising expectations.
- R&D, new technologies and innovations are the greatest drivers of productivity increases.
- Success in capturing new, emerging markets will depend on the industry's ability to compete in different environments.
- To meet expanding customer expectations, the industry needs to apply innovative technology throughout all phases of R&D, production and distribution.

1998 3 2006, Turkey

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Needs for Research-Industry Partnerships

Innovation and learning strategies are formulated, implemented and monitored through consultations and partnerships at national and local level between the government, the industries and the R&D institutions, technology and innovation centres and learning support system

1999 4 2006, Turkey

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Factors Driving Development of Foresight

Changing world context since 1980

- Increasing competition, globalisation, emphasis on innovation + knowledge-based industry → Technology & science becoming competitive resources
- Increased pressures on public expenditure → H&M to link science & technology to economic & social needs
- Changing nature of knowledge production → Need for communication, networks, partnerships and collaboration
- Technology foresight = a tool for creating a new relationship between R&T and society

1998 5 2006, Turkey

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Module 3: Technology Foresight for Organisations

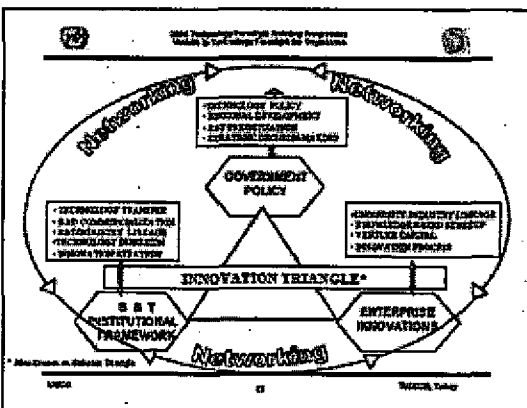
Factors Driving Development of Foresight

Enhancing and connecting the national innovation systems

- Concept of 'national innovation systems' - emphasis on links
- Many important innovations characterised by technology confidence and tacit
- Requires multi-disciplinary/institutional/sectoral effort - i.e. networks, partnerships
- Need for systemic policies + mechanisms to strengthen NSI so that it becomes more effective at learning and innovating
- CI, Organisational learning - need to stimulate & strengthen interfaces
- Technology Foresight +
 - more effective knowledge distribution
 - enhanced learning
 - greater capacity for innovating
- Foresight = a tool for 'connecting' the national (or regional) innovation systems

Source: DfES March

1998 6 2006, Turkey



Appendix C (continued)

20 November 2006

Presentations (3a)

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Decision Makers

Connecting the National Innovation System

11000 11 11/06/06, 11:00

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Decision Makers

Policy framework and the flow of actions

11000 11 11/06/06, 11:00

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Decision Makers

Weaknesses of conventional technology policy making

- simple extrapolative prediction
- narrow pool of expertise
- passive outcomes: "white papers" or R&T plans
- limited ownership from the wider stakeholders and public
- decisions mostly normative/coercive
- disruptive and innovative solutions are difficult to predict

11000 11 11/06/06, 11:00

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Decision Makers

Thinking about the Future

Who Would Have Imagined in the Late 1980s...

- the collapse of the Soviet Union and Communism?
- a fourfold increase in mobile phone use?
- a decade-long recession in Europe?
- the rise of the internet?

There is no alternative to thinking about the future

The future is unpredictable to predict

Assumptions about the future are inevitable

11000 11 11/06/06, 11:00

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Decision Makers

Thinking about the Future

Absorbed by the technology itself, the impacts of technology on societal change are often ignored

A market forecast of Mercedes cars in the year 2010 that the market would be dominated by cars that exceed 1000cc.

Lesson learned: Don't be preoccupied too much with technology push, take a balanced look also at societal contexts and market pull

11000 11 11/06/06, 11:00

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Decision Makers

Thinking about the Future

Technical Feasibility is often equated with societal demand

Lesson learned: In a world populated by a cluster of nice technical gadgets, customers may become very selective and reserved about 'disruptive' technologies

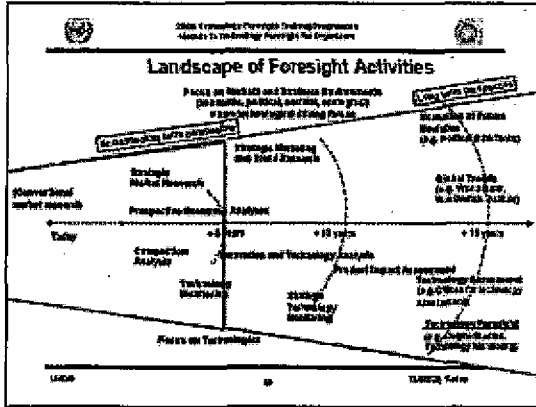
11000 11 11/06/06, 11:00



Appendix C (continued)

20 November 2006

Presentations (3a)



Foresight - Definition

J.F. Coates, 1985:

- Foresight is "... a process by which one comes to a fuller understanding of the forces shaping the long-term future which should be taken into account in policy formulation, planning and decision-making. Foresight is, therefore, closely tied to planning - merely a step in planning."

Foresight - Definition

Ben Martin, 1995:

- Foresight is a "... process involved systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits."

Foresight - Definition

Georghiou, 1996:

- Technology Foresight is a "... a systematic means of assessing those scientific and technological developments which could have a strong impact on industrial competitiveness, wealth creation and quality of life."

Foresight - Why?

Why is it important to know about future technologies?

- Know about future needs of society and economy. Knowing that, one can position a nation to a lead market ("anticipatory intelligence").
- Competitiveness of a nation is related to a high standard of R&D and thus, a high standard in future technologies. Future technologies are often more knowledge-based. These are markets in which a nation prosper in the global economy.

Foresight - Why?

- Funding agencies have to be able to set priorities (ideally based on consensus) time to fund constraints.
- Future technologies will require modified structures in R&D. The state has to shape these in time ("interdisciplinarity").
- Governmental funding has to be transparent and accountable to the public. At the same time, "public understanding of science" is promoted.

Appendix C (continued)

20 November 2006

Presentations (3a)

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

What for Technology Foresight?

- Improve decision making
- Guide technology choices
- Generate alternative trajectories for future development
- Enhance learning and improve preparedness for emergencies
- Motivate change

14/05/06 20 20/05/06 Telfer

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

The context of the Foresight process

14/05/06 20 20/05/06 Telfer

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Foresight framework and the flow of actions

14/05/06 20 20/05/06 Telfer

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Inclusion of Foresight in policy-making process

14/05/06 20 20/05/06 Telfer

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Dynamic policy-making with Foresight

14/05/06 20 20/05/06 Telfer

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Actors in the dynamic policy making with Foresight

14/05/06 20 20/05/06 Telfer

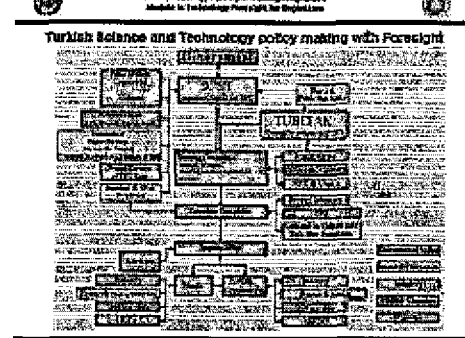
Appendix C (continued)

20 November 2006

Presentations (3a)

UNIDO Technology Foresight Training Programme
Workshop in Technology Foresight for Istanbul

Turkish Science and Technology policy making with Foresight



UNIDO
11
Istanbul, Turkey

UNIDO Technology Foresight Training Programme
Workshop in Technology Foresight for Istanbul

Role of participants on the policy definition with foresight


Policy Families	Tasks	Actors	Resources		
			People	Time	Money
Priority					
Analysis					
Forecasting					
Recommendation					
Implementation					
Monitoring					
Evaluation					
Feedback					
Communication					
Coordination					
Integration					
Application					
Validation					

UNIDO
12
Istanbul, Turkey

UNIDO Technology Foresight Training Programme
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**UNIDO
TECHNOLOGY FORESIGHT
PROGRAMME**

www.unido.org/foresight



Dr. Ing. Ricardo Sotgiu de Fonseca
INVESTMENT AND TECHNOLOGY PROMOTION BRANCH

UNIDO
13
Istanbul, Turkey



Appendix C (continued)

20 November 2006

Presentations (3b)

2006 Technology Foresight Training Programme
Module 17: Technology Foresight for Organisations

Some key elements of the Foresight process

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EARMA

UNIDO Course: 20/11/06 Gölcük, Turkey

EARMA

2006 Technology Foresight Training Programme
Module 17: Technology Foresight for Organisations

EARMA

European Association of Research Managers & Administrators

Working Group on Intangible Assets
VIMAK in HEROs
(Valuing Intangible and Managing Knowledge in Higher Education and Research Organisations)

www.earma.org

EARMA

2006 Technology Foresight Training Programme
Module 17: Technology Foresight for Organisations

Some key elements of Foresight in the S+T policy-making process

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Module 17: Technology Foresight for Organisations

THE S+T POLICY-MAKING PROCESS: THE CONTRIBUTION OF FORESIGHT TO THE POLICY-MAKING PROCESS

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2006 Technology Foresight Training Programme
Module 17: Technology Foresight for Organisations

look before you leap!

Before starting:

Ask yourself,

"Does it make sense to attempt to influence the whole socio-economic framework?"

"Would it be more appropriate to first make a stronger effort to analyse what can be shaped within the existing framework?"

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Module 17: Technology Foresight for Organisations

BEFORE STARTING....

Identify & acknowledge:

what are the external limiting factors

Why?

So as to ensure the achievement of a realistic impact.

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Appendix C (continued)

20 November 2006

Presentations (3b)

optimise the IMPACTS of Foresight....

The more the limitations of Foresight are clarified and acknowledged: the more you can concentrate on the issues where there is manoeuvrability;

- *thereby optimising your efforts and achieving real impacts.*

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S+T FORESIGHT:-

- ***SELF – FULFILLING PROPHECIES***

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**RELEVANCE OF CONTEXT.
ENGAGE SOCIETY**

**NEED FOR NEW
COMMUNICATION TOOLS
AND METHODOLOGIES**

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**NEED FOR NEW TOOLS
AND METHODOLOGIES**

Usefulness of IC Reporting techniques.

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BOUNDED RATIONALITY

- **What will (not what can!) an S+T Foresight initiative achieve:**
 - a mirror of the current state of the art?
 - review of your current strengths and priorities?

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DANGER AWARENESS

MIRROR OF THE CURRENT STATE OF THE ART:

You don't need Foresight for this!

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Appendix C (continued)

20 November 2006

Presentations (3b)

DANGER AWARENESS

Make sure that the
FUTURE
is firmly embedded in your Foresight!

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DANGER AWARENESS

- Will it reinforce academic & industrial silos and chasms?
- Can you set challenging, but realistic, goals in multi-disciplinary fields?

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Rate of participants on the policy definition with foresight

Policy Function	Tasks	Actors	Resources		
			People	Time	Skills
Analysis					
Design					
Development					
Implementation					
Monitoring					
Measurement					
Evaluation					
Feedback					
Communication					
Coordination					
Facilitation					
Mediation					
Arbitration					
Resolution					

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A SKILL YOU NEED TO MASTER

- **COMMUNICATION**

&

- **MANAGING RELATIONSHIPS**
ACROSS THE EXERCISE

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TWO VIEW POINTS YOU NEED TO UNDERSTAND

- Managing the relationship with external advisers.
- *What can you expect?*
- Understanding the rôle of the external adviser; as seen in their own eyes.
- *What will they expect?*

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The role and contribution
of external experts to
the S+T policy-making process:
as seen by both themselves
and the organisers.

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Appendix C (continued)

20 November 2006

Presentations (3b)

2006 Technology Foresight Pilot Study Programme
Module 3: Technology Foresight for Organisers

DO YOU NEED EXTERNAL ASSISTANCE?

- What factors should you consider before choosing and inviting external experts to participate in your exercise?
- What do you need to know about them and their "agenda" to minimise the risk of friction or misunderstandings?

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2006 Technology Foresight Pilot Study Programme
Module 3: Technology Foresight for Organisers

The rôle of the external adviser

As seen by the organiser of the Foresight exercise

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Module 3: Technology Foresight for Organisers

Some factors you should consider ...

What are your motives when considering whether or not to invite external experts to assist you in the process?

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Module 3: Technology Foresight for Organisers

Some factors you should consider ...

Do you feel the need of external validation of the outcomes vis-à-vis your key stakeholders, or your governmental authority?

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2006 Technology Foresight Pilot Study Programme
Module 3: Technology Foresight for Organisers

Some factors you should consider ...

If so, choose your 'external experts' having in mind, not only their experience and expertise, but their "weight" in the view of those you wish to "impress".

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Module 3: Technology Foresight for Organisers

Some factors you should consider ...

This may require choosing a few who are real experts and some who are "political heavyweights" (e.g. currently have or have had senior government or international organisation positions)

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Appendix C (continued)

20 November 2006

Presentations (3b)

2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Organisations

Some factors you should consider ...

Do you need a feeling of "security" from having external "expertise"?

- Evaluate realistically how much experience/expertise do you have available!

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2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Organisations

Some factors you should consider ...

1. In your own organisation
2. In government departments
3. In public institutions (e.g. universities, academy institutes etc)
4. In industry, or industry associations
5. In the country

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Module 10: Technology Foresight for Organisations

Some factors you should consider ...

- Are their major internal tensions among the key stakeholders at a national level and do you feel the need to have some "objective" views and analysis?
- » Analyse what lies behind these tensions and fears so as to have a clear idea of what will serve to allay them.

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2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Organisations

Some factors you should consider ...

- Are their specific areas of the process, or its management, where you have detected a lack of "home-grown" expertise or experience?
- » Are you in a position to hire external expertise from an individual or an organisation?

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2006 Technology Foresight Training Programme
Module 10: Technology Foresight for Organisations

Some factors you should consider ...

- How would you justify this expense?
- What kind of role would you want such a person/organisation to play?
- What level of commitment can you pay for?
- How will you evaluate their contribution?
- Will you expect them to meet deadlines?

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Module 10: Technology Foresight for Organisations

Some factors you should consider ...

- Could an external organisation assist you to pay for experts?
- Could you employ consultants?
 - As individuals?
 - A company?
 - A university team?

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Appendix C (continued)

20 November 2006

Presentations (3b)

2006 Technology Foresight Training Programme
Module 6: Technology Foresight for Organisations

Some factors you should consider ...

- Who will select those to be invited?
- Should you discuss this with a "mentor"?
 - » an international organisation: UNESCO, UNIDO, EC etc
 - » an experienced national organisation: DFG, NWO etc

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2006 Technology Foresight Training Programme
Module 6: Technology Foresight for Organisations

Some factors you should consider ...

- Who will issue the formal invitation?
 - Will you be able to get a very senior government official to sign the letter?
 - Do you have good lines of communication with this person and their staff so as to avoid delays and conflicts over the text?

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2006 Technology Foresight Training Programme
Module 6: Technology Foresight for Organisations

Some factors you should consider ...

- What budget restrictions do you have?
 - Are you able to transfer money out of the country?
 - Who will "hold" the budget?
- What is the level of flexibility between budget lines?

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2006 Technology Foresight Training Programme
Module 6: Technology Foresight for Organisations

Some factors you should consider ...

- Will the money be released as a lump sum:
 - before the process starts
 - at the end
 - By means of instalments according to 'milestones'
 1. who will evaluate the level of achievement of 'milestones'?
 2. what will happen if it is judged that a 'milestone' has only partially been accomplished?

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Module 6: Technology Foresight for Organisations

Some factors you should consider ...

will there be a delay between reaching approval of the milestone and reception of the funds?

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2006 Technology Foresight Training Programme
Module 6: Technology Foresight for Organisations

Some factors you should consider ...

- How much "working capital" does your own organisation have to "tide you over"?
 - Can you use normal bank accounts in the names of individuals?
- Would a managerial (&/or travel agency) accept to cover the costs up front and settle after you have received funds?

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Appendix C (continued)

20 November 2006

Presentations (3b)

Some factors you should consider ...

- **What type of interaction do you envisage with external experts (review of documents / face2face)?**
 - **Will you use a dedicated web site?**
 - If so, are there members of your staff with the technical capacity to set it up and maintain it?
 - Who will actively promote its use?
 - » A Rapporteur?

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Some factors you should consider ...

- **Will documents used internally have to be translated into another language(s)?**
 - How will the translation be carried out
 - Have you considered the cost of this?
 - Have you considered the time delay involved?

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Some factors you should consider ...

- **Will someone (*NATIVE SPEAKER!*) check the final version to ensure that:**
 - it reads fluently in the other language;
 - the original sense has not been lost?

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Some factors you should consider ...

What kind of recompense will you be able to offer external experts?

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Some factors you should consider ...

- **Financial**
 - only reimbursement?
 - calculated on what basis?
 - additional (by a contract?)

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Some factors you should consider ...

- **Recognition**
 - among peers
 - by an "authority"
- **Opportunity to produce an academic paper (or similar)**
- **A feeling of "wellbeing" (volunteer syndrome)**

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Appendix C (continued)

20 November 2006

Presentations (3b)

2006 Technology Foresight Strategic Programme
 Module 10: Technology Foresight for Organisations

Some factors you should consider ...

- **Do you want to achieve long-term "buy-in" on the part of external experts?**
 - for monitoring / evaluation;
 - training and raising awareness;
 - embedding an S+T Foresight Culture.

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2006 Technology Foresight Strategic Programme
 Module 10: Technology Foresight for Organisations

The rôle of the external adviser

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2006 Technology Foresight Strategic Programme
 Module 10: Technology Foresight for Organisations

The rôle of the external adviser

As seen by this person

WHY DO YOU NEED TO UNDERSTAND THIS?

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2006 Technology Foresight Strategic Programme
 Module 10: Technology Foresight for Organisations

Group work on the case of Romania....

This will provide you with an opportunity this afternoon to sit on the "other side of the fence"!!

Thank!

Copyright MARRSH



Appendix C (continued)

20 November 2006

Presentations (4)

2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Foresight in Policy cycles: case of Romania

ROST
Romanian Science and Technology Foresight

Campbell WARDEN IARH-European Association of Research Managers and Administrators
 Adrian CIURAJ Executive Agency For Higher Education and Research Funding-Romania

2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Outline:

1. Background
2. Objectives
3. Specific country context
4. Organizational Structure;
5. Stakeholders;
6. National RDI priorities;
7. From system priorities to vision;
8. RDI Strategy;
9. Our links

Campbell WARDEN Adrian CIURAJ

2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Background

- ROST Project, the Romanian Science and Technology Foresight, was launched in 2004;
 - Preparatory phase (November - December 2004);
 - Implementation phase (June 2005 - October 2006)
- The sponsor: Ministry of Education and Research, National Authority for Scientific Research.
- A strong political will not affected by general election at the end of 2004;

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2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Background

- From chronic *under-financing* and RDI seen as *expenditure* to an unprecedented increase in public expenditure in RD, and RD seen as *investment*;
- Increase in public expenditure for RD from 0.3 in 2004 to 0.7 in 2007 and 1.0 in 2010;
- From broad "development" and "a coffee for all" to concentration and support for excellence;

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2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Background

- Changes in the Romania position in S&T; Catching-up strategy and preparing the next step... *forefront in selected areas on selected topics*;
- From a fragmented RDI system to Romanian Research Area part of the ERA.
- From brain-drain and ageing of human resources to real career development opportunities;
- From "evaluation in our way" to international evaluation

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Module 11: Technology Foresight for Engineers

Objectives

The project's main objective:

To develop the "RDI National Strategy for the period 2007-2013", that should eventually generate further the the national research framework programme "National RDI plan for the period 2007-2013".

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Appendix C (continued)

20 November 2006

Presentations (4)

2006 Technology ForeSight Training Programme
Phase 02: Technology ForeSight for Organisations

The organisation perspective

Objectives

Specific objectives:

- Assessment of the National RDI System;
- Defining the set of strategic and specific objectives for the Romanian RDI system for the period 2007-2013;
- Develop the National RDI Strategy based on strategic planning elements (?);
- Develop the NPRDI II, and drafting the needed programmatic instruments.

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2006 Technology ForeSight Training Programme
Phase 02: Technology ForeSight for Organisations

Objectives

Additional objectives:

- Develop the knowledge base in order to provide post-implementation support and dynamic use of the project results;
- Identify opportunities for regional Knowledge Transfer (Black Sea, Balkans).

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2006 Technology ForeSight Training Programme
Phase 02: Technology ForeSight for Organisations

Objectives

A link with present programmes

Both product and process oriented

- Product oriented (sponsor request):
 - Supply decision makers with analytical reports (a lack of reliable data and existing coherent reports);
 - List of priorities (?);
 - Related actions:
 - RDI Strategy;
 - Second National Plan for Research, Development and Innovation.
- Process oriented (ACST team expectation):
 - Facilitate networking;
 - Facilitate communication and co-operation among stakeholders;
 - Increase the science-society dialogue.

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2006 Technology ForeSight Training Programme
Phase 02: Technology ForeSight for Organisations

Specific country context

A view from S&T governance

The diagram illustrates the S&T governance structure. At the top is the RDI Strategy 2007-2013. Below it, the Ministry of Education and Research oversees the National Authority for Scientific Research (2006-81%). This authority oversees the National Plan for Research and Development 2007-2013. On the left, the Romanian Academy (2006-8.2%) is also connected to the National Authority. On the right, 'Other Ministers (2006-10.8%)' oversees the Academy of Medical Sciences, the Academy of Agricultural Sciences, and the Academy of Medical Sciences.

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2006 Technology ForeSight Training Programme
Phase 02: Technology ForeSight for Organisations

Specific country context (?)

1.1. A proper sponsor's authority/responsibility level

- RDI policy seen as an isolated policy;
- Different actors in the S&T governance system try to:
 - Keep their position even empower it by the new policy documents;
 - Continue to control their budget according to their internal agenda.

Results: duplication, fragmentation, waste of resources, expenses vs. investment, etc.

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2006 Technology ForeSight Training Programme
Phase 02: Technology ForeSight for Organisations

Specific country context (?)

Links with other policies, strategies, plans

The diagram shows a central circle for RDI Strategy. It is linked to several other circles: Education, Land planning, Export, Agriculture, Environment, Energy, Defense, EU-Framework programme, and NDP. There is also a circle for SMS.

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Appendix C (continued)

20 November 2006

Presentations (4)

2006 Technology Foresight Training Programme
Module 10 Technology Foresight for Organisations

Specific country context (?)

- The whole project has been mainly oriented to the S&T policy;
- Innovation policies are also dependent on the Dept. of Trade and Industry, Agency for SMEs, among other governmental players (ministries, agencies, etc.)
- Formally the players/stakeholders were involved but it was not really passed the gap of discussing about S&T strategy or Science, Technology and Innovation Strategy. It is a task for the "next loop".

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2006 Technology Foresight Training Programme
Module 10 Technology Foresight for Organisations

Specific country context

LL2. Bounded rationality: If you have a "right" client you could accept the challenges...

even if...

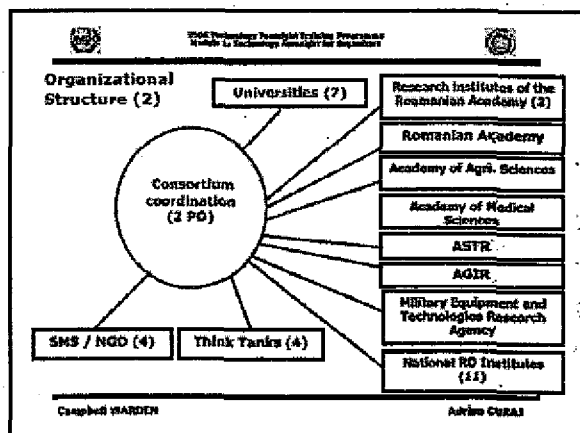
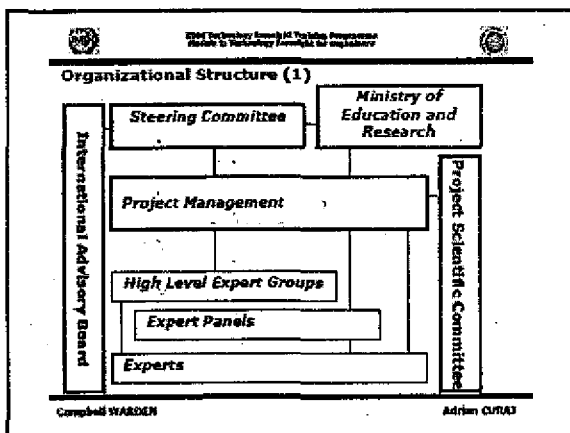
- It is not a clear understanding how could foresight contribute to its strategic objectives
- ToR are not well defined
- The expectations are not realistic (foresight a purpose?)
- It provides not enough time to complete the exercise but motivated by the realistic (?) time constraints it has

but :

- It can be seen a clear commitment to use the results
- It is strong enough to cover the budget
- It is stable enough to survive (maintain high level of interest) at least for the whole exercise and part of the implementation (??)

Adapted from a talk of Paul Marshall

Campbell WARDENAdrian CURAJ



2006 Technology Foresight Training Programme
Module 10 Technology Foresight for Organisations

Organizational Structure (3)

A large Consortia

- Significant extra managerial workload
- but*
- All important stakeholders were represented;
- even more*
- Some organizations asked during the exercise to become official partners in the project (e.g. Romanian Academy)....*interesting and unusual*

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2006 Technology Foresight Training Programme
Module 10 Technology Foresight for Organisations

Organizational Structure (4)

Steering Committee, 5 persons:

- Immediate past State Secretary for Research who launched the foresight exercise;
- The State Secretary for Research who started the NRDP I implementation, in 1999;
- A vice-president of Romanian Academy;
- President of Consultative Council for Technology-National Authority for Scientific Research;
- President of the National University Research Council.

An Old Boys Club?

Campbell WARDENAdrian CURAJ



Appendix C (continued)

20 November 2006

Presentations (4)

2004 Technology Foresight Training Programme
Module 3: Technology Foresight for Organisations

Organizational Structure (5)

Q: Feasible or not?

LL3: However you call it and the names you use panels, HLEG, etc. a clear WBS is a must for a large project. Be careful at coordination and information flow to avoid running in parallel, separately, a number of small projects.

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Module 3: Technology Foresight for Organisations

Organizational Structure (6)

International Advisory Board

EC, DG-IB - Directorate K2; - IPTG-JRC - ERC World Bank UNIDO UNESCO-CEPES National Science Foundation European Science Foundation NWO-Holland EARMA and From Hungary: HAS-Vice-president Spain - Science Policy - Biotech UK - TT	Senates Commission for Education and Research Parliament: ICT Commission Prime minister: a counselor Romanian Academy: a Vice- president Group Renouit-vice-president GEA-think tank, past minister of finance
--	--

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Project Start (Regional Learning Workshop Feb 2005 - IPTG, S&B)

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Romanian Foresight Exercise Stakeholders

LL3: Who should be given a special attention? Who should be involved?

Adrian CURAJ

2004 Technology Foresight Training Programme
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Romanian Foresight Exercise Stakeholders

LL4: C³ (Communicate/Communicate/Communicate) with your stakeholders even if it seems to be crystal clear for everybody.

LL4': Do not forget general public; they are tax payers and have to be informed. Scientific citizen...

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Romanian Foresight Exercise

Foresight Architecture

PROBLEMS Fragmentation within the system / lack of cohesion Need for planning the effective use of structural funds Low level of science - society dialogue	THE FOUR PILLARS OF ROMANIAN S&T FORESIGHT ANALYSIS OF SOCIO-ECONOMIC NEEDS present - medium term future ANALYSIS OF THE R&D SYSTEM present - medium term future MOST PROMISING SCIENTIFIC RESEARCH present STRATEGIC VISIONS present - medium term future	RESULTS Foresight into the R&D System with the time horizon 2020, particularized for 2013 Suggestions on the fields of S&T Romanian R&D System should focus.
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Appendix C (continued)

20 November 2006

Presentations (4)

2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Romanian Foresight Exercise

Foresight approach:

- Systematic**
 - 56x consultation rounds with specific methodologies for defining ROI priorities
- Collaborative**
 - 300 persons in workshops, 5000 online
- Prospective:**
 - a long term vision

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Module 11: Technology Foresight for Engineers

Romanian Foresight Exercise

Systematic Approach

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Romanian Foresight Exercise

Collaborative Approach

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Romanian Foresight Exercise

Panels

- Panel 1: Information Society Technologies
- Panel 2: Competitiveness through innovation
- Panel 3: Quality of life
- Panel 4: Social and cultural dynamics
- Panel 5: Sustainable development
- Panel 6: Institutional building/empowering
- Panel 7: Science, frontier science, knowledge development

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Module 11: Technology Foresight for Engineers

Romanian Foresight Exercise

Panels

- 15 experts each;
- Chair, one deputy chair, and one rapporteur;
- Chair was asked to nominate experts consulting project partners, key stakeholders and use her/his personal contacts;
- A balance distribution between S&T; S&T governance; Central and Local Adm.; Industry & Business; Civil Society;
- No major changes from nomination to membership.

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Module 11: Technology Foresight for Engineers

February - March 2006

Reaction

Panels on each Domain of Interest	3 - 30	max. 99
P1-P7	Answers per stakeholder possible priorities for the Domain of Interest (DOI)	
Panels' activity	400-800 possible priorities for each Domain of Interest	List of possible priorities for each Domain of Interest
Methods: Desk research, Workshops, Interviews with stakeholders		

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Appendix C (continued)

20 November 2006

Presentations (4)

2004 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

14-30 March 2006 **Reaction**

7 Negotiation Workshops	60-100 participants /workshop	15 Possible RTDI Priorities on each Domain of Interest D1-D6 Preparing the statements for the Delphi survey
Parallel and plenary sessions		32 Possible RTDI Priorities

07

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2004 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

April - May 2006 **Reaction**

Delphi Survey Round 1 (D1-D6)	4880 persons saving sessions: - 1164 for D1: Information Society Technologies - 850 for D2: Competitiveness through innovation - 849 for D3: Quality of life - 541 for D4: Social and Cultural Dynamics - 474 for D5: Sustainable Development - 551 for D6: Institutional building of the National R&D System in the knowledge society	Criteria: - Economic Growth - Job Creation - Social Cohesion - Environmental Impact - Attractiveness for private investments - Knowledge production - RTDI Systems Capacity to deliver significant results.
----------------------------------	---	--

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2004 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

April - May 2006 **Reaction**

On-line Survey Basic Research D7	More than 700 persons	Two dimensions: 1. Existing Potential to produce publications in highly ranked Journals; 2. Convergence with the directions of investigation (D1-D6); links with the socio-economic needs
--	-----------------------	---

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Business representatives in foresight

November 2005 (Institutional consultations)
- ADER (Romanian Association for Economic Development)
- ADAR (Romanian Association of Business-persons)
- UGIR 1903 (General Union of Romanian Industrialists)

December 2005-January 2006 (Online consultation)
- 85 respondents from business sector

February - March 2006 (stakeholder consultation)
- 40% of the approx 300 institutions

June 2006 (Consultation of business sector)
- 26 employers' associations
- 59 companies

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Module 2: Technology Foresight for Organisations

Romanian Foresight Exercise
Prospective dimension

Vision 2020

- Priorities for further research (26)
- Priorities of the RDI system transformation
- Scenarios of RDI system development (4)
- Strategic vision

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Romanian Foresight Exercise
Prospective dimension

Priorities for further research

Step 1: From ordered list of possible priorities to the list of priorities

- Find two personalities for each of the 5 categories of thematic priorities
- Focus group: choosing up to 5 priorities out of the first 5 from the ordered list of 15 for each category

Result: 26 RDI priorities

Step 2: Elaborate a fiche for each of the 26 priorities

- Invite a personality for each of the 26 selected priorities
- A set of interviews for developing fiches (including rationale of public investment in the field and establishing key aspects of the priority)

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Appendix C (continued)

20 November 2006

Presentations (4)

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Romanian Foresight Exercise
Prospective dimension

11.5. When you find proper persons for developing fiches have be sure ToR are simple and clear, crystal clear.

Work person to person; it is difficult to make proper arrangements for large meetings.

Be sure the task is well understood just in order not to lose days and weeks.

Case by case and person by person you should decide to interview the key person, develop a chart, discuss the draft and make adjustments a.s.a until the moment the key person takes the ownership of a fiche.

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Module 1: Technology Foresight for Organisations

Romanian Foresight Exercise
From system priorities to vision

Step 1. Selecting 5 of the 20 priorities for the RDI system transformation

Step 2. Establishing the detailed meaning for each of 5 priorities

Step 3. Formulating scenarios

Step 4. Writing a story for each scenario

Step 5. Choosing the dominant scenario

Step 6. Combining the scenarios into the vision

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Module 2: Technology Foresight for Organisations

Romanian Foresight Exercise
From system priorities to vision

<p>1. KNOWLEDGE NETWORKS</p> <p>The RDI system is connected to international developments in the field of knowledge</p>	<p>2. BRIDGES OF SCIENCE</p> <p>Scientific activity and research policies are well integrated into the social construction</p>
<p>3. PRIVATE INTEREST FOR PUBLIC GOOD</p> <p>The RDI system supports innovation as a basis of company competitiveness</p>	<p>4. RESEARCH - AN ELITE OF SOCIETY</p> <p>The RDI system attracts and motivates those catering to societal needs to generate knowledge.</p>

Scenario: Dominant Scenario

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Module 1: Technology Foresight for Organisations

RDI Strategy

Scenario building	<p>RDI Strategy</p> <ul style="list-style-type: none"> Introduction; Vision; Current status; RDI system objectives; Human resources; Capacities; Exploratory research; Priorities of public RDI investment; Innovation; Institutional performance; RDI system governance
RDI system assessment	
Personnel/HR Workshop	
Foresight Basic research potential	
Foresight National RDI priorities	
Foresight RDI system transformation priorities	
Key persons Focus group	

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The vision/strategic process

The Vision in Strategy

Vision statement:

The RDI system will represent the driver of the knowledge society development in Romania, being able to support the innovation in all the fields that contribute to the welfare of the citizens and also to reach the internationally acknowledged scientific excellence.

One page vision

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The objective process

RDI System Objectives

- 1. Knowledge creation**
 - top scientific and technological results
- 2. Romanian economy competitiveness**
 - Focus on innovation in business sector
- 3. Social quality**
 - Science and technology supporting human and social development

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Appendix C (continued)

20 November 2006

Presentations (4)

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Module 2: Technology Foresight for Organisations

The clustering process

RDI System Objectives

Priorities of public RDI investment

The 26 priorities have been clustered in 8 categories:

- Information Technology and Communications
- Energy
- Environment
- Health
- Agriculture, food security and safety
- Biotechnologies
- Innovative materials, processes and goods
- Social and economic research

Clustering process: workshop
In the Strategy every cluster has a rationale, objectives and thematic categories.

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The clustering process

RDI System Objectives

Priorities of public RDI investment

The 26 priorities have been clustered in 8 categories:

- Information Technology and Communications
- Energy
- Environment
- Health
- Agriculture, food security and safety
- Biotechnologies
- Innovative materials, processes and goods
- Social and economic research

Clustering process: workshop
In the Strategy every cluster has a rationale, objectives and thematic categories.

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Module 2: Technology Foresight for Organisations

National RDI Plan

Scenario building	RDI Strategy	RDI Plan
RDI system assessment	Introduction	Introduction
Personalities Workshop	Current status	Proposals:
Foresight: Basic research potential	RDI system objectives	P1. Human resources
Foresight: National RDI priorities	Human resources	P2. Capacities
Foresight: RDI system transformation activities	Capacities	P3. Ideas
Key persons Focus group	Exploratory research	P4. Priorities of public investment
	Priorities of public RDI investment	P5. Innovation
	Investments	P6. Institutional core-funding
	Innovation	Institutional framework
	Institutional performance	Investment model
	RDI system governance	

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Module 2: Technology Foresight for Organisations

Investment Model

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Module 2: Technology Foresight for Organisations

The closure process

Our links:

- UNIDO – FP6 SSA project- Just approved
- ForLearn- beneficiaries and providers – Mutual Learning Workshops
- EFMN- The European Foresight Monitoring Network
- FORSOCIETY- ERA-NET FP6 project, voluntary participation to the benchmarking exercise
- COST A22-Foresight

"The future of Higher Education in Romania" (217)

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Module 2: Technology Foresight for Organisations

Thank you!

Questions, comments please.



Campbell WARDEN | Adrian CURAJ



Appendix C (continued)




20 November 2006

Presentations (5)

THE FUTURE OF THE FISHERY INDUSTRY
South American Pacific Coast




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Regional Foresight Exercises

Regional foresight exercise can contribute to raise awareness and create consensus among the stakeholders interested on the sustainable reorganization of the corresponded production chain.

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Perspectives of Regional Foresight Exercise for Production Chains

Products	Production processes	Markets
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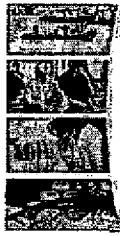
Identification of: Opportunities for the regional production chains and industries Needed technology enhancement
--

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The future of the Fishery Industry
South American Pacific Coast

New technology is changing the fishery world



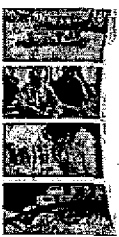
Changes within the fishery industry, such as natural and living resources, industrial input, forms of extraction, processing, lifestyle and with it, human consumption, are being increasingly influenced by new knowledge and applied technology...

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The future of the Fishery Industry
South American Pacific Coast

Technology Foresight Programmes to promote the Innovation Process





The possibility a country has to keep itself abreast in the fishery industrial sector, depends on its capacity to change and update.

This will be possible through the use of programmes which promote the development of science and technology, applicable to different sectors within the fishery industry.

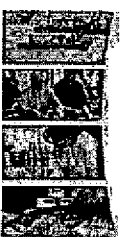
These programmes would allow a more extensive and sustainable development of fragile fishing natural resources.

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The future of the Fishery Industry
South American Pacific Coast

A Regional Initiative for Latin America



UNIDO, in cooperation with the Government of Spain, implemented within the Regional Technology Foresight Initiative for Latin America and the Caribbean, a technology foresight study of the productive chain of the fishery industry in the region of the South American Pacific coast.

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Appendix C (continued)

20 November 2006

Presentations (5)

The future of the Fishery Industry South American Pacific Coast

The countries covered in this study are...

Colombia
Ecuador
Peru
Chile

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The future of the Fishery Industry South American Pacific Coast

Scope

The project concentrates on the fishery industry as conceived as an integrated production chain:

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The future of the Fishery Industry South American Pacific Coast

Productive Chain

RESOURCES
Fish
Fresh water
Aquaculture

EXTRACTION
Fishery sites
Ships
Small scale
Aquaculture

PROCESSING
Canned
Frozen
Cured
Canned/salted
Hydrolyzed
Meats and oils, etc.

HUMAN CONSUMPTION

INDUSTRIAL - RUMOUR CONSUMPTION
Semi-refined oils
Refined oils
Balanced feed
Actual feed

INDUSTRIAL INPUTS
Intermediate and final agricultural goods
Industrial intermediate goods
Production services
Capital goods
Infrastructure

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The future of the Fishery Industry South American Pacific Coast

The project highlights are the following sectors:

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The future of the Fishery Industry South American Pacific Coast

Natural Resources

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The future of the Fishery Industry South American Pacific Coast

Extraction

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Appendix C (continued)

20 November 2006

Presentations (5)

The future of the Fishery Industry
South American Pacific Coast

Processing

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South American Pacific Coast

Quality Assurance

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South American Pacific Coast

Commercialisation

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The future of the Fishery Industry
South American Pacific Coast

Methodology

The methodology used for the study aims at combining the national and regional levels of the project.

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The future of the Fishery Industry
South American Pacific Coast

Methodology

Strength and weaknesses of the environment National productive chains: fleets, industry, markets

Analysis of the basic productive chain

National Diagnostics

Regional Situation

Regional Panel Regional Conferences Methods Workshop

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The future of the Fishery Industry
South American Pacific Coast

National Foresight Studies

National Panel 1 National Panel 2 National Panel 3 National Panel 4

Consultations

Regional Panel and Report

Critical Technologies Markets Tools of Action Decision Making Processes

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Appendix C (continued)

20 November 2006

Presentations (5)

The future of the Fishery Industry South American Pacific Coast

Agents

Host Counterparts Foresight Expert Institution
OPTI

National Coordinators International Experts

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The future of the Fishery Industry South American Pacific Coast

Background

- Project as part of the UNIDO Regional Initiative for Technology Foresight in Latin America
- Interest of the countries in the region on technology foresight
- Experience of OPTI on complex foresight exercises
- Experiences, specially in Brazil, on working with production chains analysis
- Critical character of the fishery activities in the region
- Financing by the Spanish government

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The future of the Fishery Industry South American Pacific Coast

The foresight exercise was expected to:

- Promote a collective vision about the future of the subject production chain
- Not to propose immediate solutions but the basic elements to design them
- Not to tell what "will happen" but instead what "could happen"
- Should be adapted to the concret conditions of the countries involved or the region
- Should be a social mobilization process around technological and industrial issues

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The future of the Fishery Industry South American Pacific Coast

Special characteristics of the exercise:

Participation of different countries
↓
Plurinational
↑
Multisectorial
↑
Complex production chain

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The future of the Fishery Industry South American Pacific Coast

Phases of the exercise

1. Diagnostics
2. Foresight study

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The future of the Fishery Industry South American Pacific Coast

Diagnostics



- Objective:
 - Describe the present situation of the productive chain, identifying its limitations and opportunities. This description is the basis for the long-term foresight exercise.

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Appendix C (continued)

20 November 2006



Presentations (5)

 **The future of the Fishery Industry South American Pacific Coast** 

Diagnostics

- Key aspects for consideration:
 - Productive efficiency
 - Quality of the products
 - Environmental sustainability



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 **The future of the Fishery Industry South American Pacific Coast** 

Regional Diagnostics

- Based on the national diagnostics and other available information
- Not to be a composition or repetition of the content of the national diagnostics
- Envisages identifying the wider questions, threats and drivers to form the framework for the foresight studies

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 **The future of the Fishery Industry South American Pacific Coast** 

Foresight studies

The methodology is supported by two elements:

- Creation of a Expert Panel
- Consultation through a questionnaire to be answered by a representative number of knowledgeable persons, covering different view points



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 **The future of the Fishery Industry South American Pacific Coast** 

Experts Panel

- 10-15 persons
- Balance of professional fields
- Balance of age, gender and geographic origin
- Care of dominant personalities
- Care of cross interest

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 **The future of the Fishery Industry South American Pacific Coast** 

Functions of the Panel



Before the consultation:

- Write down the hypothesis for the questionnaire
- Selecte the variables to valorize these hypothesis
- Propose the persons to be consulted

After the consultation:

- Analyze the results
- Identify future trends
- Elaborate the conclusions and recommendations

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 **The future of the Fishery Industry South American Pacific Coast** 

Consultation

- Persons, not institutions
- Qualifications:
 - Experts in the field
 - Vision of the future
 - Imagination
- Motivation to participate
- Follow up capacity

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Appendix C (continued)

20 November 2006

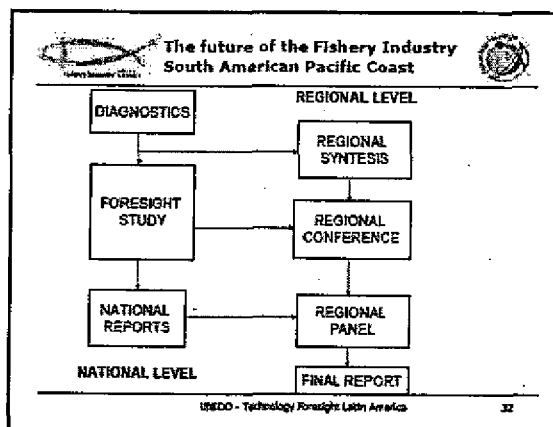
Presentations (5)

The future of the Fishery Industry South American Pacific Coast

Results of the consultation

- Identification of relevant events
- Probable term of implementation
- Distribution of opinions (levels of uncertainty)
- Conditions of implementation
- Diverse opinions
- Creation of a network of experts to be consulted in the future and to support the post-foresight activities

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The future of the Fishery Industry South American Pacific Coast

Regional Panel : Mission

The institutional mechanism to guarantee the regional dimension of the exercise. Its role is to achieve that the conclusions and recommendations are not a simple summing of the results of the national studies, but that they incorporate the added value of a collective and plurinational vision of the future.

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The future of the Fishery Industry South American Pacific Coast

Problems and lessons learned

- Long preparation time
- Difficulties in communication
- Level of replies at the consultation
- Adaptation of the methodology to the real local conditions
- Critical level of resources

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The future of the Fishery Industry South American Pacific Coast

Main results

- 1) Agreements on regional cooperation for improving productivity and competitiveness of selected sectors of the fishery industry.
- 2) Definition of regional R&D programmes.
- 3) Application of up-graded technologies in selected products and sectors of the fishery industry

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The future of the Fishery Industry South American Pacific Coast

Recommendations for follow up programmes

- Definition of a regional policy
- Technology up-grading and investment promotion for re-conversion and modernization
- Creation of new regional center for capability building and technology watch/road mapping
- Establishing a quality mark of origin for the fish products of the region

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Appendix C (continued)

20 November 2006

Presentations (5)





Appendix C (continued)

21 November 2006

Presentations (6)

2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Organisations

Scope and Focus of Foresight Programmes

Attila Havas
Institute of Economics,
Hungarian Academy of Sciences

1

2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Organisations

Outline

1. Types of foresight
2. Focus of foresight
3. Coherence of foresight programmes
4. Conclusions

2

2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Organisations

1. Types of Foresight

Methods, approaches
Geographical scope (level)
Product- vs. process orientation
Clients

3

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Module 1: Technology Foresight for Organisations

Foresight Methods

The diagram consists of two overlapping circles. The left circle is labeled 'Delphi-survey' and contains the following countries: USA, Japan, South Korea, France, Germany, and Austria. The right circle is labeled 'Panels' and contains: Ireland, Sweden, The Netherlands, and Finland. The overlapping area in the center contains: UK, Spain, Macro visions, too., South Africa, and Hungary.

4

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Module 1: Technology Foresight for Organisations

Geographical scope (level)

Local
Regional
National
International

- cross-border regions
- group of countries

5

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Module 1: Technology Foresight for Organisations

Clients/ sponsors

National programme

- govt. (one or more ministries, govt.)
- business associations
- research communities (in principle)
- coalition of actors

Policy-makers at regional, local levels

Firms: individual (large) ones, groups, entire sectors (chambers)

6



Appendix C (continued)

21 November 2006

Presentations (6)

2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Organisations

Outputs

Product-oriented: analytical reports, list of priorities, recommended actions

Process-oriented: facilitating networking, communication and co-operation among key players

But: products ↔ processes

Use of outputs

- policy recommendations (direct)
- input to strategy formulation at different levels (indirect)

A. Miles
Institute of Strategy, NIS

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Module 11: Technology Foresight for Organisations

2. Focus of Foresight (prospective/ strategic technological analyses)

Pure S&T

Techno-economic

Societal/ socio-economic

A. Miles
Institute of Strategy, NIS

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Module 11: Technology Foresight for Organisations

Policy context (challenges) → focus

Perceived socio-economic needs/ challenges

⇒ focus of foresight: purely technological, techno-economic or societal/ socio-economic

⇒ broad objectives, geographical scope (level), themes, time horizon, methods and participation

Foresight → revise policy needs, identify new ones

A. Miles
Institute of Strategy, NIS

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Pure S&T focus

A: identify S&T priorities (in their own logic)

R: national prestige, S&T excellence
big missions (man on the Moon, nuclear weapons)

P: small group of experts

M: trend analysis, technology roadmap, brainstorming, 'instant' Delphi, etc.
unlikely: scenarios, wide consultation

Who can "afford" (benefit): large, affluent countries with strong incentives, appropriate mechanisms to exploit and disseminate S&T results

How "many" countries in the world?

A. Miles
Institute of Strategy, NIS

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Techno-economic focus

A: identify S&T solutions for economic sectors

R: business logic: improve competitiveness
correct market failure
strengthen academia-industry co-operation
extend the short time horizon of businesses

P: researchers, business people, policy-makers

M: SWOT, brainstorming, large-scale Delphi, scenarios (etc.), wide/r/ consultation

Who can "afford": advanced, socially stable countries with strong enough NIS

Internal and external social tensions, fundamental changes in the global settings, economic repercussions?

A. Miles
Institute of Strategy, NIS

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Module 11: Technology Foresight for Organisations

Societal/ socio-economic focus

A: tackle socio-economic issues by S&T solutions + other policies

R: improve quality of life (competitiveness as a means)
correct systemic failure, strengthen NIS

P: researchers, business people, policy-makers, social stakeholders (lay persons?)

M: STEEPV, SWOT, brainstorming, large-scale Delphi, scenarios (etc.), wide consultation

Who would opt for it: 'agile' countries with open-minded, flexible, well-educated decision-makers, strong enough civil society

Who would need it? Chances in emerging countries??

A. Miles
Institute of Strategy, NIS

Appendix C (continued)

21 November 2006

Presentations (6)

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

'Annex': Key/ Critical Technologies

A: identify (S&T) policy priorities
 R: improve efficiency of govt spending, (indirectly: competitiveness of firms)
 P: researchers, business people, policy-makers

Shorter time horizon → A single future is considered
 No feedback from those affected

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3. Coherence of Foresight Programmes

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Focus → structure, elements

Principal rationale → coherent exercise
 Avoid tensions between

- (a) the various objectives
- (b) elements of its structure
- (c) the objectives and methods
- (d) the participants and objectives
- (e) among the participants themselves

Some tensions → creative, innovative ideas

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Themes and Time Horizon

Key Technologies
 technological fields; 5-8 years
 Pure S&T focus
 S&T fields; mid- or long-term
 Techno-economic focus
 S&T, economic sectors; long-term
 Broad socio-economic orientation
 S-E issues, challenges; long-term

Examples: UK1, UK2, Hungarian, Swedish TP

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<h3>Hungarian themes</h3> <ul style="list-style-type: none"> Human resources Health, life sciences Natural and built environment ICT, media Manufacturing and business processes Agribusiness, food Transport 	<h3>Swedish</h3> <ul style="list-style-type: none"> Health, medicine and care Biological natural resource Society's infrastructures Production systems ICT systems Materials and material flows in the community Service industries
--	--

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Same topic - Different approaches

No mechanistic link between the focus, themes and time horizon

Technologies, e.g. ICTs can be/ are analysed from different angles (all the approaches mentioned above)

Non-technological topics – such as human resources, crime prevention, etc. – are only addressed by programmes tackling socio-economic issues

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Appendix C (continued)

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Presentations (6)

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Different approaches: an example

Key Technologies: emphasis on specific technological terrains; 3-5-year; no attention to social issues

Pure S&T focus: broader fields, too; long/er/-term; (glorious) impacts on society (not vice versa, no social strata)

Techno-economic focus: economic aspects; 10-15 years; social factors shaping demand (but not social challenges, e.g. digital divide)

Societal/ socio-economic focus: social issues & technical aspects/ trends; long-term: time needed for a change aspired by the programme

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Focus → questions, factors, participants

Different focus ⇒ different approaches when analysing seemingly similar issues:

- A different set of questions
- Various – social, technological, economic, environmental and political – factors and values
- To a different degree
- A different set of participants (futurists, technology gurus, business people, researchers, policy-makers, lay people)

Inherent (technical, social) features of the various themes } Time horizon

Focus (main objectives)

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4. Conclusions, Dilemmas

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Policy challenges
Policy environment

➔
Focus

- If decision-makers strongly favour a certain approach, do not try to push through a drastically different programme design – even if it might seem to be more appropriate from a theoretical/ methodological point of view.

Focus → design (objectives, methods, time horizon...) & coherence

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Dilemmas, Inherent Contradictions

Long-term nature of foresight issues (policy recommendations) ↔ substantially shorter time horizon of politicians (some policy-makers)

Strong ('distant') political support, embeddedness ↔ intellectual, organisational, financial independence

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Dilemmas, Inherent Contradictions (2)

Departmentalised government structures ↔ complex issues (health, quality of life, environment, competitiveness, etc.)

Public resources – financial and intellectual ones – should be pulled together to make a real difference in an efficient (co-ordinated) way

Yet, they are allocated to different ministries and other government agencies

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Appendix C (continued)

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Presentations (6)

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What can NOT be expected

- Setting posteriorities (as opposed to priorities)
- Strictly controlled processes
- Quick, direct, easy results
- Exact measures of economic impacts

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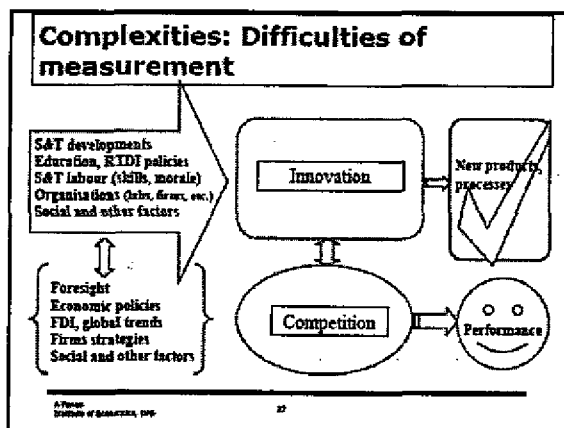
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What foresight can't do . . .

- Replace decision making! Difficult decisions will still remain, but should be better informed
- Overhaul a research or innovation system: It can contribute towards this, but is not enough on its own
- Always lead to consensus: But it can make positions known and foster mutual understanding
- Automatically lead to action: Commitment to implementation is required during and after exercises

Thanks to Michael Keenan for this slide!

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Thanks!

Questions, comments?

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Appendix C (continued)

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Presentations (7)

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Methods to Technology Foresight for Organisations

Scope and Focus of Foresight Exercises - 2

Dr. Ozcan Saritas
Ozcan.Saritas@manchester.ac.uk

Presentation to UNIDO Technology Foresight Training Seminar, Gebze
November 2006

UNIDO Saritas

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Outline

- Context & Content of Foresight
- Process of Foresight
- Foresight "methodology"
- Choosing appropriate "methods"
- Mobilising relevant stakeholders and participants

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Systems & Foresight

- Assumptions**
 - Systems exist
 - Systems are located in a wider context (other external systems)
 - Institutional Foresight is embedded in a context
 - Context affects the content and process of the activity
- Keywords**
 - Context:** The set of facts or circumstances that surround a situation or event
 - Content:** The sum or range of what has been perceived, discovered, or learned
 - Process:** A particular course of action intended to achieve a result

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Context of the Foresight system

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Content of Foresight

Content of Foresight refers to

- "what" of change
- the subject area(s) taken into consideration
- the ideas created related to those areas

The main goal of a Foresight exercise is to introduce change or improvements in to the content of the exercise and thus provide further changes or improvements in the context.

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Process of Foresight

- "the actions, reactions, and interactions from the various interested parties as they seek to move the (organisation) from its present position to its future state" (Pettigrew, 1987)

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Appendix C (continued)

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Presentations (7)

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Workshop 1: Technology Foresight for Organisations

Context, Content & Process

Systemic Foresight Model (Sarason, 2006)

Workshop 1
7

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Workshop 2: Technology Foresight for the Nation

Context, Content & Process of Vision2023

Systemic Foresight Model (Sarason, 2006)

Workshop 2
8

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Workshop 3: Technology Foresight for Organisations

Methodology of Foresight

- *'Methodology' is not equal to 'method'*
- *Methodology is prior to method and more fundamental, it provides the philosophical groundwork for methods*
- *Methods are then applied to facilitate discussions, to give directions and to obtain results*

Systemic Foresight Model (Sarason, 2006)

Workshop 3
9

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Workshop 3: Technology Foresight for Organisations

5 mental acts of Foresight

1. Understanding
2. Synthesis
3. Analysis and selection
4. Transformation
5. Action

Systemic Foresight Model (Sarason, 2006)

Workshop 3
10

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Workshop 3: Technology Foresight for Organisations

1. Understanding

- Starts by seeking a reasonably comprehensive view of systems in a wider context.
- Creates a mindset for understanding that context
- Gains a shared understanding and mutual appreciation of systems in their current context.
 - including personal worldviews and objectives, by uncovering uncertainties about the values, choices and the environment, and clarifying the goals of developing a strategy
- Does not try to bring about a convergence of views. However, at least a partial convergence is likely to emerge from this process to get a commitment for action

Systemic Foresight Model (Sarason, 2006)

Workshop 3
11

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Workshop 3: Technology Foresight for Organisations

2. Synthesis

- Explores alternative courses for development and their integration into designs for a new context
- Creates a future context from an existing one
- Produces models of the future

Systemic Foresight Model (Sarason, 2006)

Workshop 3
12

Appendix C (continued)

21 November 2006

Presentations (7)

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Module 11 Technology Foresight for Organisations

Purpose of participation

- to enrich decisions through:
 - Understanding:** to cope with complexity and create mutual understanding among stakeholders (i.e. to resolve or avoid conflict)
 - Legitimacy:** to empower people to have stronger voice in designing their future; to seek to make a process and outputs more relevant to interested stakeholders; and to create ownership
 - Capacity:** to seek improve the skills, knowledge and experience of those involved

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Participation in Foresight

- Participation is highly important in terms of:
 - Gathering of relevant information and knowledge
 - Simulation of new insights and creative views and strategies for the future, as well as new networks
 - Diffusion of the Foresight process and results to much wider constituencies
 - Overall impact of Foresight in terms of follow-up action
- A critical view might be beneficial, where
 - conflicts and unequal power distribution occur
 - equal representation and equal voice needed

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Typology of stakeholders

3 attributes:

- Power of stakeholder to influence decision-making
- Legitimacy of stakeholder's claim with respect to the issue
- Urgency of stakeholder's claim on the issue

[Mitchell et al. 1997]

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Participants of Foresight

- Participants of Foresight are individuals or groups, who are affected by or able to affect decision-making on an issue
- Who participates depends upon Foresight's scope, including objectives, orientation and focus (the themes/sectors covered) of the exercise
- Typical actors involved in the Foresight process are:

Participants	Activities	Outcomes
Senior Executives	Provide direction, resources, and legitimacy	Strategic Foresight
Managers	Operational planning and implementation	Operational Foresight
Employees	Knowledge sharing and innovation	Employee Foresight
Customers	Market research and feedback	Customer Foresight
Suppliers	Supply chain management	Supplier Foresight
Partners	Collaborative innovation	Partner Foresight
Competitors	Competitive analysis	Competitor Foresight
Government	Policy and regulation	Government Foresight
Academics	Research and development	Academic Foresight
Investors	Financial analysis and funding	Investor Foresight
Media	Public relations and communication	Media Foresight

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Ways of participation

Three ways to recruit members & participants

Through personal contacts
Using names listed in their company directories or on the internet. You should ensure that they will be able to participate.

Through established relationships
Use the identified stakeholders to find participants.

Through formal systems
 1. Define the points of interest
 2. List relevant stakeholders
 3. Contact relevant parties and invite them to participate
 4. Monitor their responses
 5. Evaluate the results

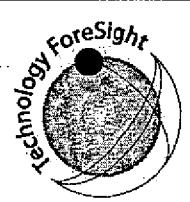
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Methods for participation

Experts and Mainly passive	Randomly sampled	Physically present
Experts and Mainly passive	Correction of postal addresses in a local Directories (mailing)	Attendance mainly as a consequence of work-related conferences
Highly interactive	Participatory in conferences, conferences, seminars, workshops	Experts, Panels, Round tables, workshops, Brainstorming

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Appendix C (continued)

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Presentations (7)

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Module 6: Technology Foresight for Organisations

Organisational structure of Foresight

The actions from 1 to 11 represent the Foresight cycle:

1. Promotion of Foresight (written, oral and visual presentations)
2. Identification of interested parties
3. Drafting the first outline of the project (objectives and focus)
4. Search for sponsors
5. Involvement of stakeholders (meetings)
6. Identification of sponsors
7. Selection of experts among stakeholders (Workshops)
8. Championing the Foresight process
9. Consultations with stakeholders (to provide future ownership of the process and products)
10. Involvement of stakeholders in SC
11. "

(Saritas & Foray, 2005)

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Module 6: Technology Foresight for Organisations

Summary

- Systems exist
- Foresight
 - deals with those systems, where it is embedded in (context)
 - aims to change or improve them
 - intervenes through specific parts (or sub-systems), which potentially have significant influence on the other parts of the system (content)
- It is through the Foresight process future oriented ideas are created
- The linkage between context, content and process is vital for the "Fit for Purpose"
- A Foresight methodology is needed to enable: Understanding, Synthesis, Analysis & Selection, Transformation and Action
- There are a set of available methods, which can be used in the framework of the designed methodology
- Participation is a key element of Foresight process, which helps to create mutual understanding, synergy in idea creation, and ownership

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Module 6: Technology Foresight for Organisations

UNEDO Training Programme on TF 2006
TF for Organisations - Module 6

Questions / Comments?

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Appendix C (continued)

21 November 2006

Presentations (8)

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Workshop in Technology Foresight for the Industry

Organising and Managing Foresight

Dr. Michael Keenan
PREST, University of Manchester, UK

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Michael Keenan

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Workshop in Technology Foresight for the Industry

Overview

- Introducing a framework for scoping a Foresight exercise (to be used in practical exercise)
- Providing hints and tips on the day-to-day challenges facing practitioners of Foresight

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Why is scoping necessary?

- To assess current and past arrangements
- To review and perhaps pilot foresight options
- To assess requirements against capabilities
- To establish the need for any new structures or arrangements that will need to be put in place
- To generate a blueprint for the exercise that uses the most appropriate methods

Scoping is a process that carries its own benefits and responsibilities

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Critical elements to consider when scoping a Foresight exercise

<ul style="list-style-type: none"> a. Rationales and Expected Outcomes b. Objectives c. Orientation (foci) d. Level e. Policy-institutional fit f. Time horizon g. Coverage h. Participation & Consultation i. Raising Awareness & Publicity j. Resources k. Methods to be used l. Organisation & Management m. Outputs & Intervention n. Evaluation & Renewal 	<p>Determined through a continuous, iterative process during the lifetime of the exercise</p>
--	--

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Major challenges for the Foresight manager / practitioner

- Keeping within time and budget – project management skills, but also political skills
- Avoiding 'BOGSAT' by genuinely opening up the process, especially to different perspectives
- Dealing with short-termism, i.e. a failure to look sufficiently forwards (or backwards)
- Evidence-based – collecting, circulating and digesting information
- Getting people to act as individuals rather than as representatives
- Instilling creative thinking
- Unfamiliarity with some foresight methods
- Ensuring sustained participation
- Managing expectations of (policy) impacts
- Remaining relevant whilst pushing the boundaries

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Time and budget

- Time and budgets largely dictate the approach to foresight
- Be clear on the time available for the exercise and plan your approach accordingly
 - Are there real deadlines that must be respected?
 - The scope and rationales for setting some artificial deadlines?
 - Wise to plan for a 50% overrun on time, especially first time around
- Generally speaking, budgets must be in place before starting
 - Budget planning – how much is each part going to cost?
 - Does budget need to be spent by a particular time?
 - Possibility of obtaining further funding as the exercise progresses?
 - Resources in kind – where they come from and their value

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Appendix C (continued)

21 November 2006

Presentations (8)

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Module 5: Technology Foresight for Organisations

Keeping the process open

- Dangers of BOGSAT?
- But opening things up is often easier said than done
 - Even with good intentions, this requires some skill
 - Some interests will prefer to maintain an exclusivity to the usual suspects - for example, scientists will often take this position, as will business and government interests
 - How to convince them of the importance of opening up the process? What value can be demonstrated?
- Time and budget implications - but is there an alternative?
- Orderly disorder, managed mayhem, and controlled chaos - regular descriptions of foresight exercises
- Gate-keeping and leaving some groups or individuals locked out

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Module 5: Technology Foresight for Organisations

Participant profile

- Composition
 - What sorts of expertise and/or experience does the exercise require?
 - How should this be represented in the exercise?
- Balance
 - Within exercise and/or within individuals
 - Perspectives
 - Biases and interests
 - Transparency
 - Methodological support
 - Wide consultation

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Foresight, not zeitgeist

- What is/are the time horizon(s) of your exercise?
 - Foresight is concerned with policy actions today - but this shouldn't constrain the process to current and near-future issues
 - Time horizons should be beyond normal planning periods
- Advantage of looking to the future:
 - Novelty and distinctiveness that interests people
 - Capture future trends and issues that are often missed
 - Avoid being (overly) caught up in contemporary controversies
- How to install foresight into Foresight?
 - Looking forward, e.g. through forecasting, trend analysis, gaming and scenarios, futurist writing, etc.
 - Looking across, e.g. through systemic thinking
 - Looking backwards, through historical analogy, previous future-oriented studies, trend analysis, etc.

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Building an evidence base

- Dealing with bias and prejudice
 - Tendency for people to think they already know about past, present, and near-future picture
 - But these assumptions need to be tested / questioned
 - This is best done implicitly by presenting statistical data, benchmarking studies, multiple-perspective analyses, etc.
- Where do these inputs come from?
- How to ensure participants use the evidence base provided?
 - Aim: Information \Rightarrow Knowledge
 - Allow sufficient time; package the data into attractive and accessible formats; design the process so that such data is required by default
- Important to demonstrate the use of these inputs

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Some typical data inputs

- Baseline data:
 - Socio-economic data and statistics
 - Existing relevant strategic studies
 - S&T metrics, e.g. bibliometrics, patent analyses, etc.
- Benchmarking data:
 - National, regional, sectoral, company, organisational comparison
- Mapping data:
 - Stakeholder analysis
 - Issue analysis
- Future-oriented data:
 - Existing or new futures studies and scenarios
 - Existing or new forecasts and trend analyses

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Managing information flows

- Managing information across the various parts of an exercise can sometimes be difficult, especially in large exercises with parallel activities
- Also, a major challenge concerns managing information through the process, i.e. from one step to the next
- Solutions?
 - Regular reporting and distribution of information
 - Using some individuals in dual or multiple roles
 - Designing exercises with dependencies across space and time - but what are the risks here?
 - Knowledge management skills required
- Keeping the sponsor (and wider community) informed and content?

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Appendix C (continued)

21 November 2006

Presentations (8)

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Module 5: Technology Foresight for Organisations

Encouraging out-of-the-box thinking

- Getting people to think creatively and (to some extent) independently of their affiliations can be difficult
- Taking a long-term view should help in this regard, as should the inclusion of multiple perspectives
- Using methods to stimulate creative thinking, e.g. scenarios, gaming, brainstorming, etc.
- Inviting leading thinkers to input into the process
- Putting things back into the box?

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Module 5: Technology Foresight for Organisations

From sorcery to mastery

- Most participants will be unfamiliar with foresight approaches and methods
- This instils excitement in some, but also suspicion in others
- At the start, some of the methods might appear to be more sorcery than serious approaches to thinking about future policy and strategy
- Methods should be explained – the general approach, its strengths and limitations, where it might be used, examples of use in other settings, and an outline of any typical variations
- Where possible, training in the use of methods should be provided, at least to those participants who are expected to play leading roles – but mastery will only come through use

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Module 5: Technology Foresight for Organisations

Ensuring sustained participation

- Ways for ensuring participants remain committed to the exercise need to be thought about
- Panels often used in foresight studies for this purpose
 - Foresight is a participative, dispersive activity – panels are ideal for opening up the foresight process to hundreds of people and allow for meaningful debate and knowledge exchange
 - Availability of expertise 'on tap' within the exercise
 - Easily complement (and even necessary to) other foresight methods
 - Authority, credibility, legitimacy
 - Incubators for foresight 'champions'
- Panels often constitute the 'process centres' for foresight
- Dangers of over-dependancy on panels?

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Attracting and keeping participants

- Highlight the importance of the exercise and the benefits of participation – but don't oversell!
- For panels, provide a Terms of Reference (TOR)
 - Distributed to panels at the outset
 - Provides background on and rationales for exercise
 - Sets out:
 - What needs to be achieved
 - How the panel should conduct its work
 - Series of milestones for deliverables
 - How the panel works fits into the overall foresight study
 - Details of resources available to panel
 - Allows for accountability and transparency

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Module 5: Technology Foresight for Organisations

Being relevant, but challenging

- Foresight should not provide "more of the same" – it should challenge current thinking
- Foresight should be action-oriented so needs to be relevant
- Striking a balance
 - Building an exercise around some preconceived notions of relevance can lead to overly conservative outputs
 - But complete freedom can lead exercises to go off course
- Exercises need periods of creativity and reflection
- Foresight should be analytical but essentially bring in new frames of reference that challenge the boundaries of current thinking and policy

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Module 5: Technology Foresight for Organisations

Closure and Reporting

- Reaching 'closure' – priorities and recommendations
- Findings – audit trail – coherence and integrity
- Preparation of written reports and briefings
- Measuring success and quality
- Dissemination strategy – who does what?

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Appendix C (continued)

21 November 2006

Presentations (8)

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 Module 2: Managing Foresight for Organisations

Expectations of (policy) impacts

- Foresight should have impacts, but what can be expected and by when?
- Need to take a broad view of WHAT constitutes an impact and WHERE it might be found
 - WHAT: tangibles and intangibles and their interdependency
 - WHERE: systemic view
- Requires an understanding of policy, business, innovation, etc. processes
- But also an appreciation of the scope of intervention that is possible with foresight – how well is this understood?
- Impacts over time
- Challenge of measuring (demonstrating) impacts
- Expectation management – how to encourage realistic expectations of what can be achieved without instilling disenchantment?

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 Module 2: Managing Foresight for Organisations

Summary

- Foresight managers / practitioners face numerous challenges
- Some of these can be anticipated beforehand and possible options thought about – a key advantage in using the scoping framework introduced here
- Others will be unexpected and will need to be dealt with as they arise
- This presentation has aimed to highlight some of those things that can be thought about beforehand

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 Module 2: Managing Foresight for Organisations

Thanks!

Questions and comments?

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Appendix C (continued)

21 November 2006

Presentations (9)

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Module 2: Technology Foresight for Engineers

Turkish Research Area (TRA)

At the 11th meeting, in September 2004, the Turkish Research Area (TRA) was defined. It is a strategically integrated body consisting of all private and public entities that either perform, fund or describe R&D activities

- Areas
- Objectives
- Principles
- Priorities

- Solving problems
- Increasing quality of life
- Enhancing welfare
- Boosting competitiveness

Serhat CANIKIR
21 Nov. 2006
GERZE-TURKEY

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Turkish Research Area (TRA)

- TUBITAK was assigned the task of setting up the necessary system for strategic management of the Turkish Research Area.

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Main Objectives of Turkish Research Area

- To increase the quality of life in Turkey
- To find solutions to social problems
- To increase the competitive power of our country
- To create awareness and interest in STI in the society

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21 Nov. 2006
GERZE-TURKEY

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Module 2: Technology Foresight for Engineers

Basic Targets of Turkish Research Area

- To increase the share of the R&D expenditures in GDP (R&D Intensity)
- To increase the demand for R&D
- To increase the number and the quality of R&D personnel

Serhat CANIKIR
Council for Science and Technology, 13. Meeting (Decree 2004)
21 Nov. 2006
GERZE-TURKEY

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21 Nov. 2006
GERZE-TURKEY

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Science and Technology Strategies Vision 2023

(a project to build a science and technology vision for Turkey)

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21 Nov. 2006
GERZE-TURKEY



Appendix C (continued)

21 November 2006

Presentations (9)

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 Module 2: Technology Foresight for Organisations

What was the difference?

- Action without vision is an activity
- Vision without action is dreaming
- Action with vision you make the difference

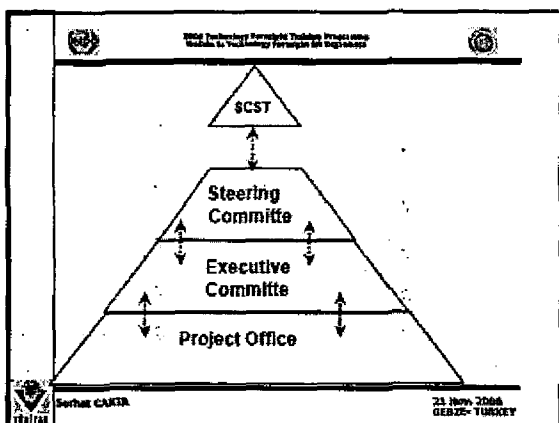
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SCST Decision on 13 Dec. 2000:
 A new national S&T policy document for the period 2003-2023 is to be prepared to build a welfare society in 2023

100th Anniversary of the Foundation of the Turkish Republic

Serhat CAKIR 21 Nov. 2006 GERZE- TURKEY



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Steering Committee

- **Structure:**
 - 27 Public (Co-ordination: TÜBİTAK)
 - 28 Non-Governmental Organizations (NGO's) and Chambers
 - 10 Academic (Higher Ed. Coun. and 9 Univer.)
- Total of 65 Bodies Represented
- **Function:**
 - Strategic Decisions
 - Ensure sustained commitment of actors
- **Level of Representation:**
 - High ranking officials and managers

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First Steering Committee Meeting

- 13 April 2002
- Participation from 52 members
- Decided to form 11 Foresight Panels:
 - An extended list prepared by the project office
 - Additions
 - Prioritisation / first round
 - Clustering
 - Prioritisation / second round
 - Final revision

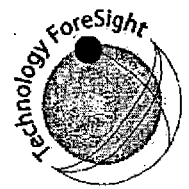
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Executive Committee

- **Structure:**
 - President and Vice-presidents of TÜBİTAK
 - Project Manager
 - Representatives of:
 - State Planning Organisation
 - Undersecretariat of Defence Industries
 - Technology Development Foundation of Turkey
- **Function:**
 - Operational and budgetary decisions

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Appendix C (continued)

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Presentations (9)

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Workshop 11: Technology Foresight for Stakeholders

Main Decisions

- **Rationale**
 - A tool for formulating S&T policy for 2003-2023
 - Process benefits
- **Scope**
 - Science and Technology
- **Expected Outputs**
 - Strategic technologies and R&D priorities
 - Raising awareness on the importance of S&T
 - Wide and effective participation of all stakeholders

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Given the "welfare society" goal for 2023; which socio-economic activities should be covered in the foresight exercise?

- **Criteria:**
 - Technology Relevance
 - Policy Relevance
 - 10-12 panels
 - Interrelatedness
 - Manageable

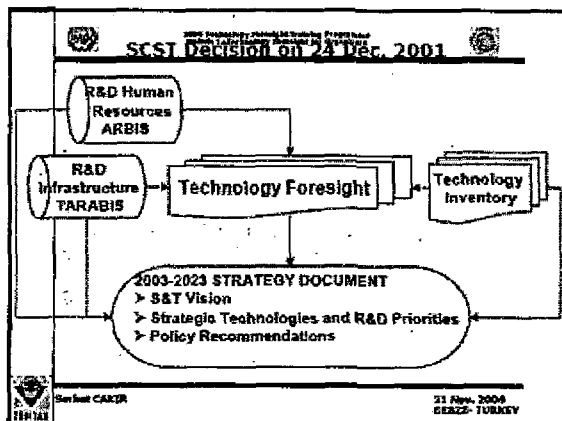
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Action Plan

- Nominations for panel membership (around 2000)
- A core group consisting of panel chairs, reporters and information multipliers for each panel
- First Inter-panel Meeting
- Project Design and Methodology
 - Task Description
 - Foresight Techniques
- Workshop: Foresight in Action
- Foresight Panels

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Pre-foresight Activities

- Training
- Scanning - Foresight in other countries
 - Report on foresight exercises
- CRITECH-2001 (20-21 Sep.)
 - Participation from OECD, EU, IPTS, Greece, USA
- Conferences
- Workshop: Foresight Methodologies (2 March,02)
- Electronic survey on panel topics
- Project Planning
 - Rationale, scope, expected outputs
 - Methodology, time table, budget

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**TECHNOLOGY FORESIGHT PROJECT
METHODOLOGY**

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Appendix C (continued)

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Presentations (9)

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Methods

- Panels (Technology Demand)
 - Socio-economic Panels
 - Thematic Panels
- Delphi Survey (Technology Supply)

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Thematic Panels

Thematic panels will be formed on

- cross-cutting issues; and
- cross-cutting technologies raised/demanded by socio-economics panels (and by the Steering Committee)

Another thematic panel is to be formed

- to synthesize the panel findings and proposals, and to build a science and technology vision.

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Socio-economic Panels

Socio-economic panels will:

- Assess technological/economic/structural conditions in Turkey and the world, and main drivers of change;
- Construct vision(s) of future;
- Determine technological capabilities necessary to make the vision(s) realizable;
- Conduct SWOT analysis on those capabilities; test the feasibility of vision(s);
- Determine supporting issues and trends, as well as underpinning technologies (technology demand);
- Recommend policies necessary to gain those technological capabilities.

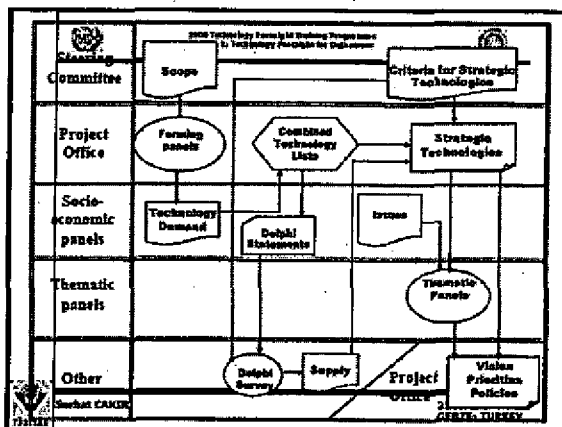
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Foresight Panels

- 1- Education and Human Resources
- 2- Environment and Sustainable Dev.
- 3- Information and Communication (inc. Electronics)
- 4- Energy and Natural Resources
- 5- Health and Pharmaceuticals
- 6- Defence, Aeronautics and Space Industries
- 7- Agriculture and Food
- 8- Machinery and Materials
- 9- Transportation and Tourism
- 10- Chemicals
- 11- Textiles
- 12- Construction and Infrastructure

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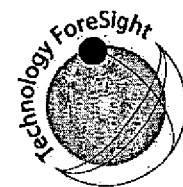


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Strategic Technologies

- Prioritisation based on
 - Importance index, and
 - Feasibility Index
- Importance Index:
- "Strategic Technology" Criteria
- Feasibility Index: Panels and Delphi Survey

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Appendix C (continued)

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Presentations (9)

2006 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

Criteria for "Strategic Technologies"

Given the "welfare society" goal for 2023; what features of a specific technology make it preferable to others?

- **Conditions:**
 - Technology Relevance
 - Policy Relevance
 - Discriminating and Objective
 - 2-3

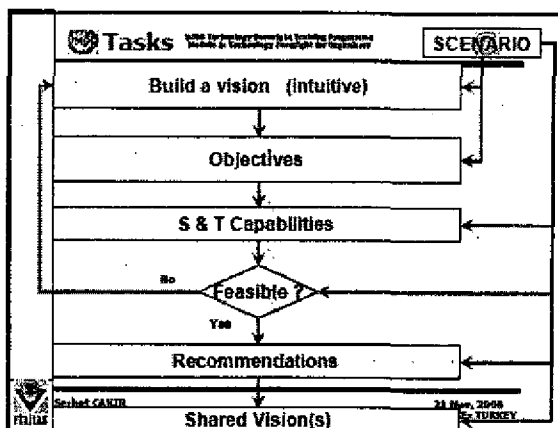
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 Module 10: Technology Foresight for Organisations

**Criteria for "Strategic Technologies":
 Examples**

- Competitiveness
- Technology / R&D intensity
- Productivity
- Employment
- Skilled employment
- SME-oriented
- Environment friendly
- Local resources
- New industries
- Energy saving
- Social / cultural acceptance

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Other Tasks

- In co-ordination with the project office and other panels;
 - Classification of technologies
 - Preparation of Delphi statements and questions
 - Nominations of experts for the Delphi survey
 - Analysis of survey findings
 - Suggestions for "Strategic Technology" criteria

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More on Panels

- About 15 experts (one from TÜBİTAK)
- Nominations by the "core group"
- Enlarge the panel if needed
- Workshops, conferences, surveys, analyses on request
- All logistics provided by TÜBİTAK
- Panel members were paid

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 Module 10: Technology Foresight for Organisations

R&D Human Resources Database (ARBIS)

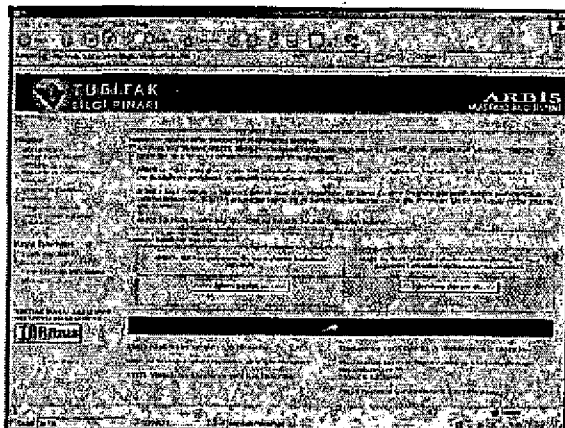
- Interactive (Web based)
- Available since October 2003
- Number of records: >30.000
- Estimated number of researchers: 70.000 (head count)
- All sectors:
 - Higher Education,
 - Governmental
 - Private
 - NGO's
- Content of Database:
 - Demographic
 - Education
 - Work Place
 - R&D Activities

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Appendix C (continued)

21 November 2006

Presentations (9)



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Module 5: Technology Foresight for Organisations

National R&D Infrastructure Database (TARABIS)

- Interactive (Web based)
- Available since: October 2004
- Number of records > 800 Labs
- Price > 10.000 \$
- The questions will be answered by R&D department chairperson or facility directors
- Content of Database:
 - Demographic
 - Work place
 - Age and value of the instruments
 - R&D Activities

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Module 5: Technology Foresight for Organisations

The research priorities for Turkey, based on the input generated by the Vision 2023 project;

- 1. Information Technologies.
- 2. Biotechnology and Gene Technologies
- 3. Materials
- 4. Nanotechnology
- 5. Design Technologies
- 6. Mechatronics
- 7. Production Methods and Machinery
- 8. Energy and Environmental Technologies

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Module 5: Technology Foresight for Organisations

National Science and Technology Policies Action Plan 2005-2010

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Module 5: Technology Foresight for Organisations

National Science and Technology Policies Action Plan 2005-2010

- A strategic framework of actions to be undertaken by the S&T actors between 2005-2010.
- Approved by the Supreme Council for Science and Technology in March 2005.
- TÜBİTAK was charged with monitoring and coordination of the implementation of this plan.
- Consists of prescribed actions defined under 7 strategic objectives that are in line with the main objectives, basic principles, and major targets of the national S&T system.

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Module 5: Technology Foresight for Organisations

National Science and Technology Policies Action Plan 2005-2010

- TÜBİTAK launched a new project to follow up, evaluate, and coordinate the implementation of the plan.
- Now a survey is being undertaken to collect information on
 - who does what,
 - who plans what,
 - who needs whom/what
 within the scope of the action plan.
- Then, this information will be processed in workshops and core groups collectively.

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Appendix C (continued)

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Presentations (9)

2010 National Science and Technology System Targets

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Targets

Indicator	The Latest Value	The Year of the Latest Value	2010 TARGET
Direct Expenditure on Research and Development (GERD) as a percentage of GDP	0.68	2002	2
GERD per capita population (current PPP dollar)	48.2	2002	154
Total researchers (FTE)	23766	2002	49000
Total researchers per thousand total employment	1.1	2002	3.3
Business Expenditure on Research and Development as a percentage of GERD	78.7	2002	80
Government Expenditure on Research and Development as a percentage of GERD	?	2002	12
Higher Education Expenditure on Research and Development as a percentage of GERD	84.8	2003 (Nov. 2005)	88

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Year 2004....

- 10. SCST Decree 2004/1-4
 - It has been decided that, starting from the 2005 budget, additional public funds will be allocated so that the share of R&D expenditures in GDP will be increased to 2% by 2010.

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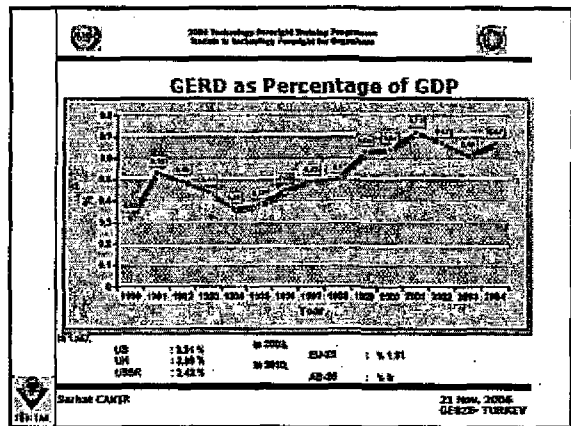
A New Attempt in Turkish S&T Activities

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Since 1967.....

- Year 1967....
 - "As widely accepted, 2% is the share of GNP that developing countries devote to R&D."
- Year 1983.... 16 years later. (Science and Technology Policy 1983-2003)
 - "From 0.2% to 1% in 1983, to 2% in 2003"
- Year 1989.... 8 years later (1. SCST, Decree 89/6)
 - "To increase R&D expenditure to 2% of GNP in the next ten years...."
- Year 1993.... 4 years later (2. SCST, Decree 93/1)
 - "The ratio of R&D expenditures to GNP, which is currently 0.33%, to exceed 1%"

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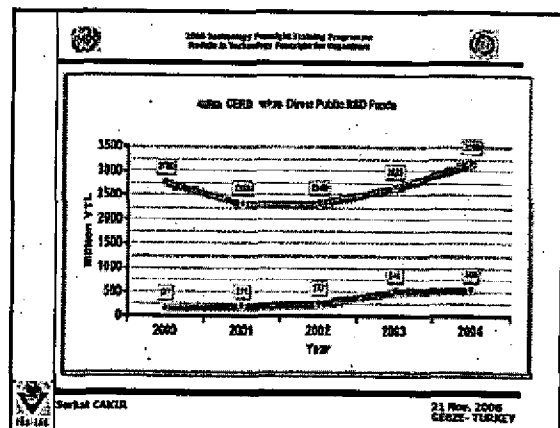
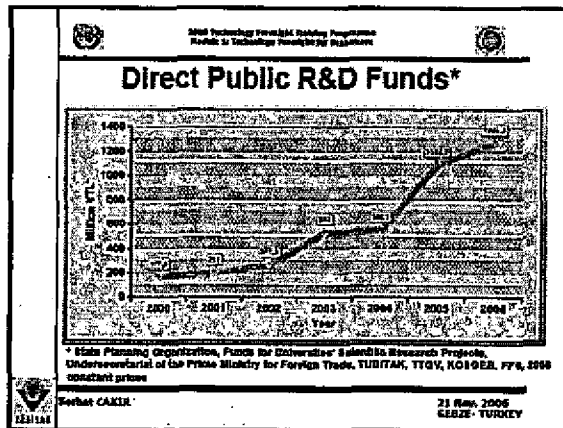
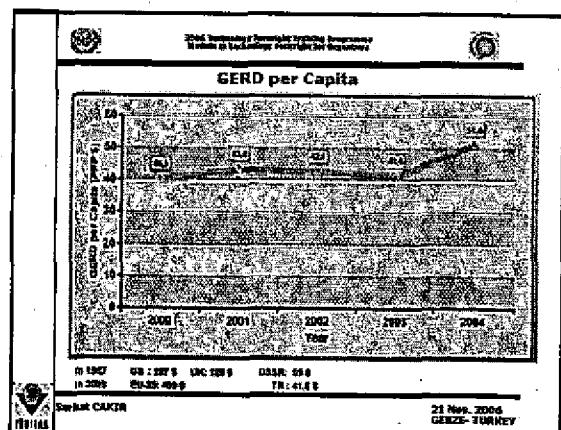
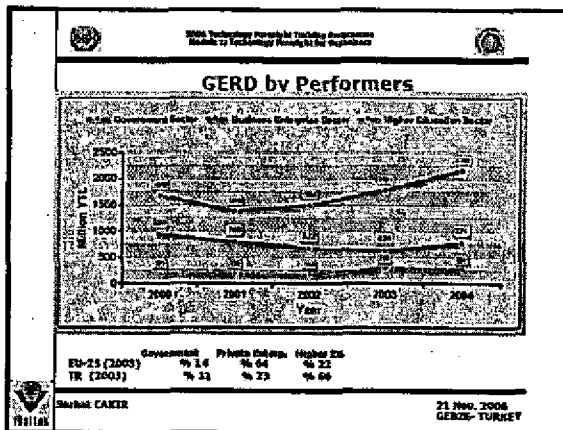
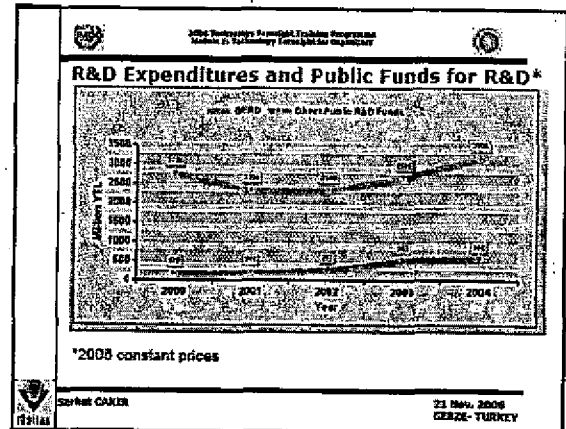
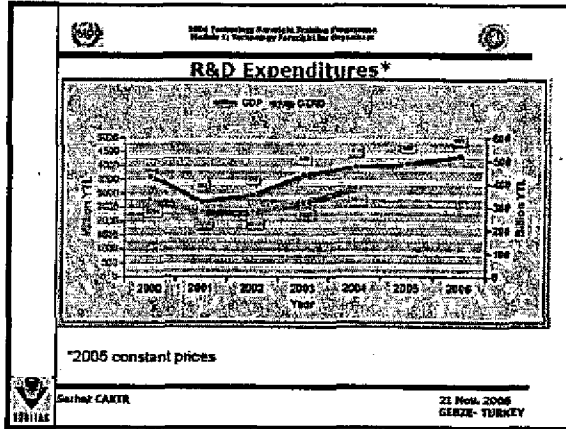




Appendix C (continued)

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Presentations (9)





Appendix C (continued)

21 November 2006

Presentations (9)

2006 Technology Foresight Turkey Programme
Module 2: Technology Foresight for Decision Makers

Since 1967... Scientific Articles

- Year 1967....
- Year 1983.... 16 years later,
(Science and Technology Policy 1983-2003)
 - "Regarding its contribution to world's science literature, currently being at 41st rank Turkey should be up at 30th rank in 1993 and at 20th rank in 2003."
- Year 1989.... 6 years later
- Year 1993.... 4 years later... (2. SCST, Decree 93/1)
 - "regarding its contribution to universal science, its rank should be up at 30th which is currently at 40th"

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Rank of Turkey with respect to the Number of Scientific Articles

Year	Rank
1967	41
1983	41
1989	35
1993	30
2003	20

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The Number of Scientific Articles

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Number of Scientific Articles per Million Population

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Since 1967... IPR

- Year 1967....
- Year 1983.... 16 years later,
(Science and Technology Policy 1983-2003)
 - "To update laws on IPR"
- Year 1989.... 6 years later (1. SCST, Decree 89/5)
 - "To update laws on IPR"
- Year 1993.... 4 years later.... (2. SCST, Decree 93/1)
 - "To update laws on IPR, especially to include software industry within the scope of IPR as an important part of information and communication technologies industry"
- Year 1997.... 4 years later (3. SCST, Decree 97/3)
 - "To give support for the expenses on patents, utility models and industrial designs."
- Year 1998.... 1 years later (4. SCST, Decree 98/4)
 - "Money, Credit and Coordination Committee's Decree on Support for Expenses on Patents, Utility Models, and Industrial Designs had been introduced by the Official Gazette in February, 1998."

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Module 2: Technology Foresight for Decision Makers

Recent Developments

- Statutory Decree on Protection of Patent Rights, June 1995
- Law on Establishment and Responsibilities of Turkish Patent Institute (TPI), November 2003
- KOSGEB Incentives for Patent Applications in SME's 1603
- Termination of Support for Patent Applications given by Undersecretariat of the Prime Ministry for Foreign Trade (DTN), 2004
- Launch of TPI Research and Examination Services, January 2005
- Launch of accession services to international patent databases by TPI (Esp@cenet)
- TPI Training courses on IPR (TOBB, KOSGEB, universities, public institutions, TÜBİTAK)

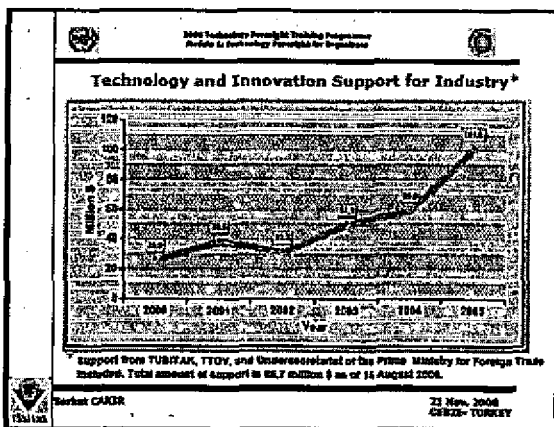
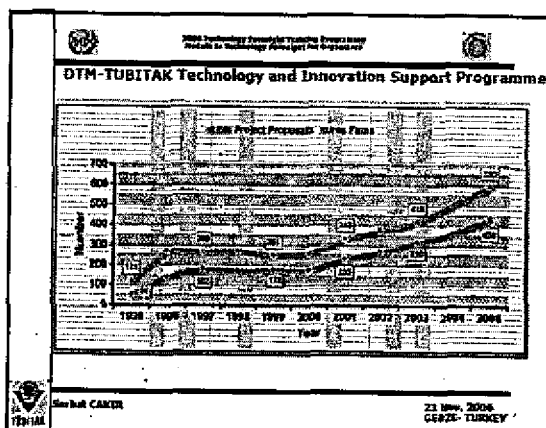
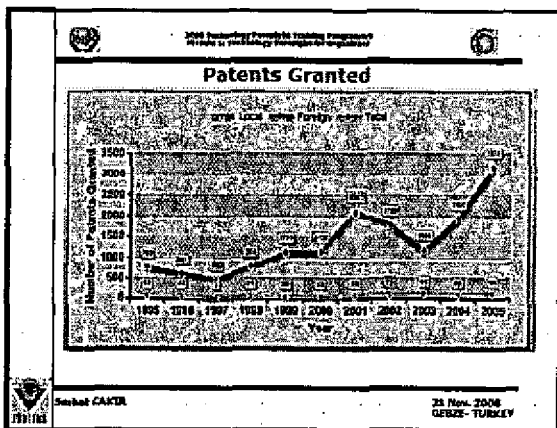
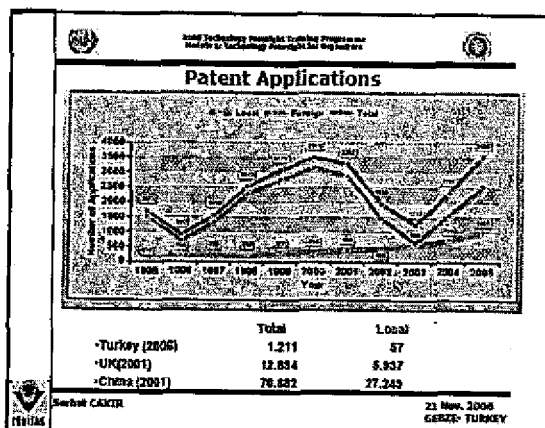
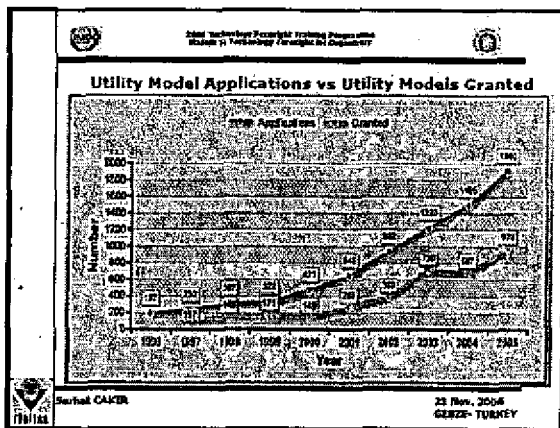
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Presentations (9)



- To Develop STI Capacity**
- HRST development
 - Enhancing research infrastructure
 - Supporting national and international relations
 - To enhance interest in science in the society.
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Modül 2: Technology Foresight for Organisations

HRST Development

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Since 1967...

- Year 1967...
 - "Beside expenditures on scientific and technical research, it is important to develop human resources as well. The first issue to be considered is to increase the number of research personnel immediately, at its currently at a low level."
- Year 1982... 10 years later... (Science and Technology Policy 1983-2003)
 - "To increase FTE researchers per 10,000 total employment, which is 4.2 in 1982, up to 15 in 10 years, and up to 20 in 20 years."
- Year 1989... 6 years later (1. SCST, Decree 99/6)
 - "To increase R&D human resources per 10,000 total employment up to 20 in 10 years."
- Year 1999... 4 years later... (2. SCST, Decree 99/1)
 - "To increase the number of researchers per 10,000 population from 7 and exceed 15"

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HRST per 10,000 Total Employment

In 2004, HRST
R&D Personnel 102
Researcher 20

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FTE R&D Personnel vs FTE Researchers

In 2004, HR-24
FTE R&D Personnel 2.662.422
FTE Researcher 1.178.198

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TUBITAK Support for HRST

*As of 15 August 2006, number of scholarships 2439

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Enhancing Research Infrastructure

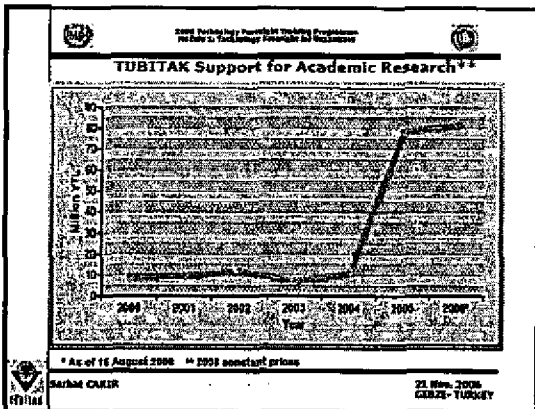
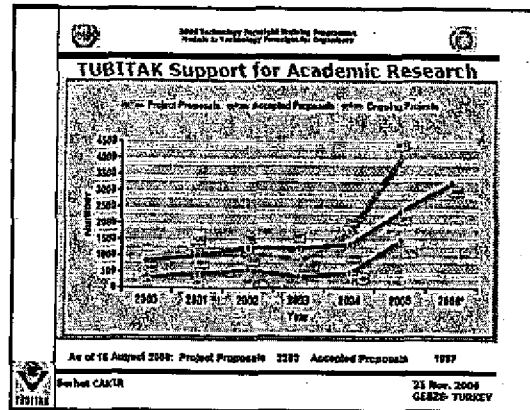
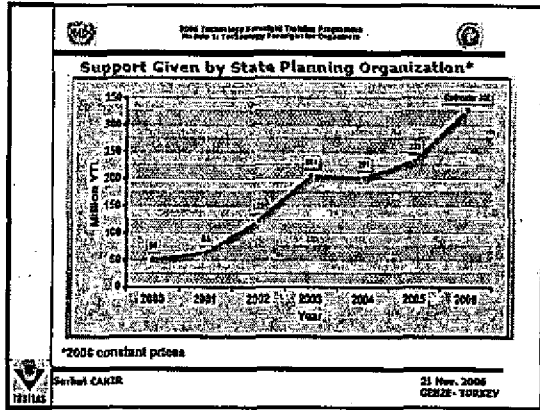
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Appendix C (continued)

21 November 2006

Presentations (9)



- Technology Platforms (in 2006):**
- 1) Textile
 - 2) Automotive Industry
 - 3) Electric/Electronics
 - 4) Metal Industry
 - 5) Marine
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THANK YOU....

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Appendix C (continued)

22 November 2006

Presentations (10)

2006 Technology Foresight Training Programme
Methods in Technology Foresight for Organisations

Overview of Foresight Methods

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 Michael.Keenan@manchester.ac.uk

With special thanks to Rafael Pepper for use of some of his slides

Michael Keenan

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Methods in Technology Foresight for Organisations

Overview

- Why use formal foresight methods?
- Selection criteria for foresight methods
- Types of methods, and types of typology?
- Sequencing methods
- Concluding remarks

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Why use formal methods?

- Make the foresight process more systematic
- Increase transparency of processes
- Aid creativity
- Constitute space for communication and interaction
- Aid visualisation of possible futures

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Methods in Technology Foresight for Organisations

Selection criteria

- Available resources (time, money . . .)
- Nature of desired participation
- Suitability for combination with other methods
- Desired outputs of a foresight exercise (e.g. product vs. process)
- Quantitative / Qualitative data requirements of methods
- Methodological competence often a key factor

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Four key distinctions

- Exploratory (outward bound) vs. Normative (inward bound) approaches
- Quantitative vs. Qualitative approaches
- Methods for different stages / tasks in foresight
- Methods for fostering Creativity, Evidence, Interaction, Expertise

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Methods in Technology Foresight for Organisations

Exploratory Methods [1]

WHAT IF...?

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Appendix C (continued)

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Presentations (10)

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Module 1: Technology Foresight for Organisations

Exploratory Methods [2]

- Exploratory methods essentially begin from the present, and see where events and trends might take us
- They begin with the present as the starting point, and move forward to the future, either on the basis of extrapolating past trends or causal dynamics, or else by asking "what if?" questions about the implications of possible developments or events that may lie outside of these familiar trends.
- Among exploratory tools there are Trend, Impact, and cross-impact analyses, conventional Delphi, and some applications of models

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Normative methods

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Normative methods [2]

- Normative methods ask what trends and events would take us to a particular future or futures.
- They start with a preliminary view of a possible (often a desirable) future or set of futures that are of particular interest.
- They then work backwards to see if and how these futures might or might not grow out of the present – how they might be achieved, or avoided, given available constraints, resource and technologies.
- The tools used here include various techniques developed in planning and related activities, such as relevance trees and morphological analysis
- A fairly recent development is the use of "success scenarios" and "aspirational scenario workshops", where participants try to establish a shared vision of a future that is both desirable and credible, and to identify the ways in which this might be achieved.

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Quantitative methods [1]

- Quantitative methods rely on numerical representation of developments, data that have been mathematically processed, extrapolation of trends
- They allow to examine rates and scales of change but they limit the understanding of many important social and political variables
- It might be more difficult to communicate results (tables and graphs) to less numerate audiences
- Quantitative data may come from statistical sources, or be the products of expert judgement. For instance, in cross-impact studies experts make estimates about the probability of developments; in Delphi, the data we work with derive from the numbers of people agreeing with particular statements or forecasts

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Module 1: Technology Foresight for Organisations

Quantitative methods [2]

- Disadvantages
 - Some issues are difficult to represent in numerical terms
 - The quantifiable elements of a phenomenon do not necessarily represent its essence
 - Too restricted to concepts and indicators, rarely probe the dynamics of a phenomenon
 - Some of the advanced statistical methods and modelling techniques have a high degree of complexity that can be difficult to understand

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Module 1: Technology Foresight for Organisations

Qualitative methods

- Qualitative methods are often employed where the key trends or developments are hard to capture via simplified indicators, or where such data are not available.
- Useful to stimulate creativity and intuition; essential for engagement and dialogue
- The outcomes are illustrations that describe complex processes and interaction among variables

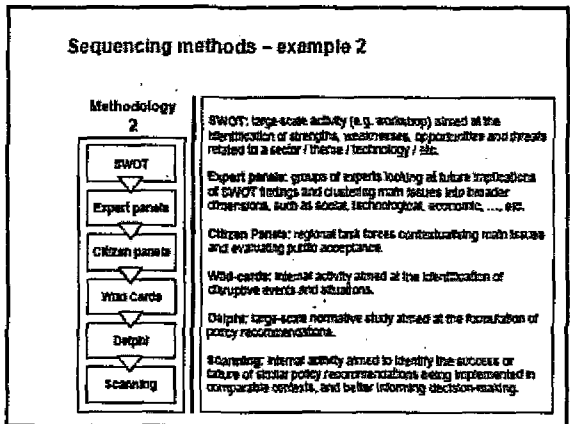
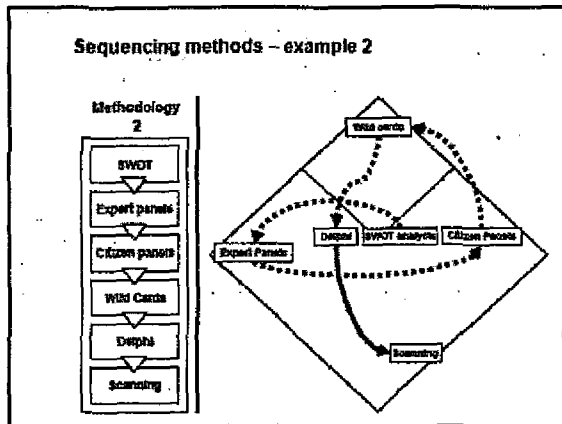
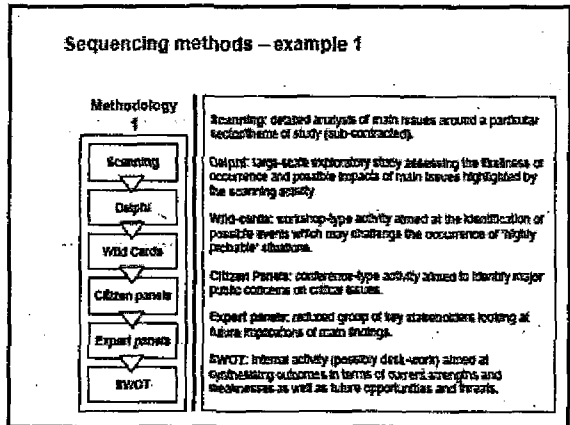
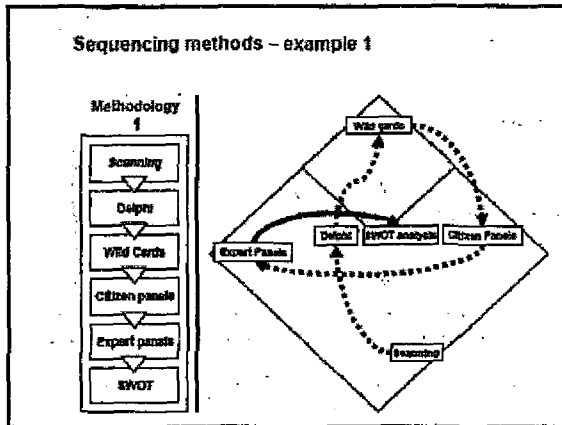
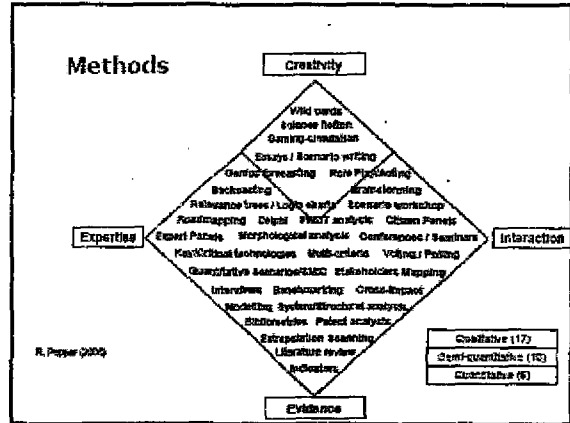
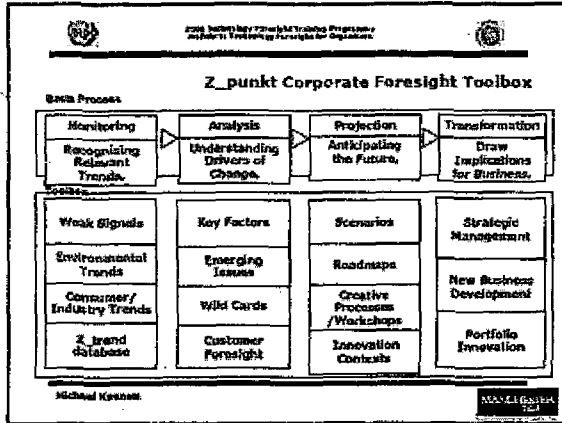
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Appendix C (continued)

22 November 2006

Presentations (10)

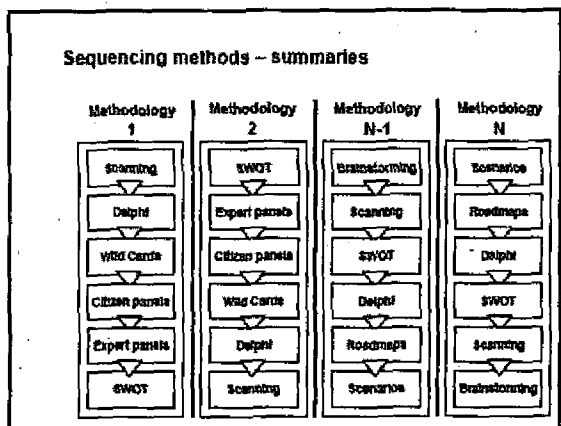
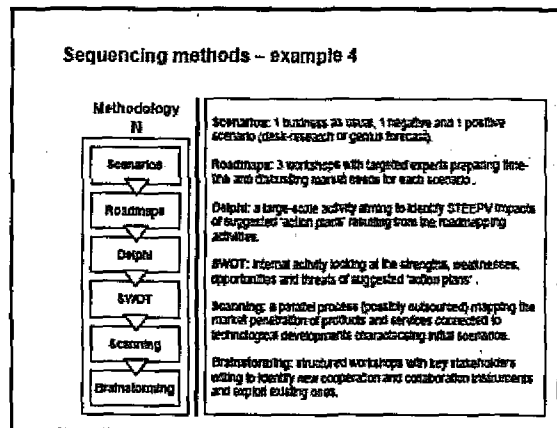
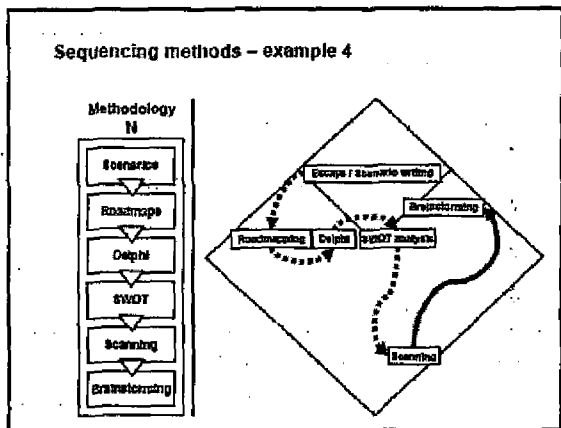
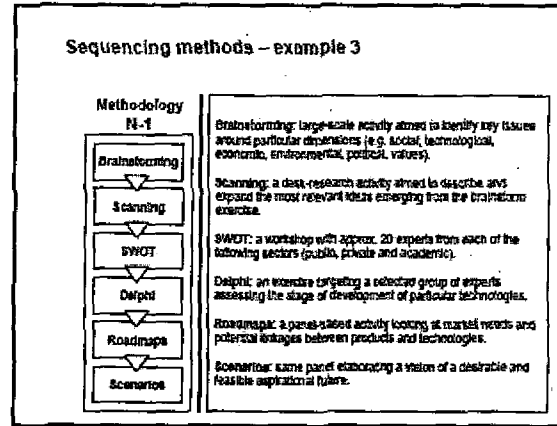
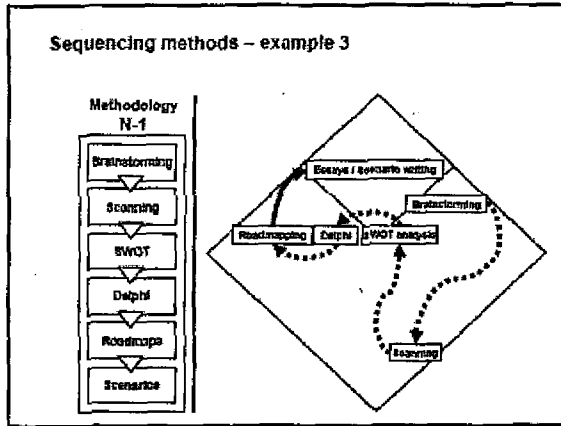




Appendix C (continued)

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Summary remarks

- There are good reasons for using formal methods
- Multiple criteria are used for selecting methods
- No easy classification – methods are rather versatile in how they may be used and combined together
- Consequently, there are no recipe books for doing foresight – different combinations are likely to be needed for different circumstances

Michael Keenan

Appendix C (continued)

22 November 2006

Presentations (11)

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Tools for Generating Ideas and Options

Prof. Dr. T. Erkan TÖRE
International University of Sarajevo
22 November 2006

International University of Sarajevo

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Tools for Generating Ideas and Options

1. Brainstorming
2. Mindmapping

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1. Brainstorming

A technique to encourage creative thinking and generation of ideas for a specific objective.

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What Is It?

It is a disciplined, synergic, informal and fun way to involve people in generating new and diverse ideas or solution alternatives about a given issue (topic or problem.)

It helps the group challenge previous assumptions and paradigms.

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How To Use It

1. The brainstorming group is assembled.
2. A U-shaped sitting arrangement is suggested. Everyone must see the other team members and the flipchart or the board.
3. A facilitator (scribe) is appointed to govern the session and to write the ideas generated.

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How To Use It

4. The purpose of the meeting and the groundrules are explained. An atmosphere of complete freedom must be created.
5. The team may start with a warm-up session. This could be a session for finding a team name.

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Appendix C (continued)


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Presentations (11)

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How To Use It

6. The group agrees on a statement for the topic or issue to be brainstormed.
This is written at the top of the chart, visible by everyone.



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How To Use It

7. You may allocate time to brainstorm and time to review and organize the outputs.
(5-20 minutes is usually sufficient for generating ideas, and 10-30 minutes for organizing and consensus reaching, but brainstorm sessions can be longer.)

8. Agree to the groundrules (see the table below) and ensure that they are obeyed strictly.

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How To Use It

9. Start the ideas coming - make sure that all ideas are heard by everyone in the group.
(You may go around the team repeatedly or allow random contributions or even write on slips.
The idea is to ensure everyone is involved.
Individuals can "pass" if they have nothing to add.
The members should express their ideas as briefly and clearly as possible.)

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How To Use It

10. It is important to capture ideas exactly as expressed. So the scribe should not abbreviate or interpret.

11. When everyone says "PASS" the idea generation phase is finished.

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How To Use It

12. You may now go over the list to seek clarification or suggestions that may not be clear to everyone.
Some repetitive ideas can be combined with the consent of all sides.
Some irrelevant ideas can be discarded or reexpressed properly.

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How To Use It

13. The team can now start reflection on and evaluation of the ideas for relevance and usefulness towards the original objective.
(At this stage analytical techniques and prioritization tools can be used, such as:
Cause-and-Effect Analysis, Paired Comparisons, Consensus Reaching...)

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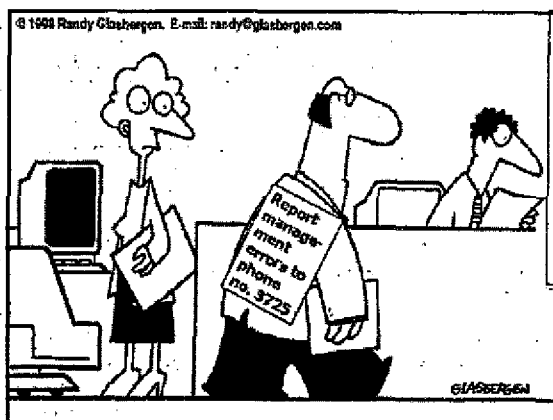
Appendix C (continued)

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Presentations (11)

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Groundrules for Brainstorming	
No criticism, no comments	Crucial for involvement and to overcome the barriers to creative thinking
Encourage a variety of ideas	All ideas (wild, strange, crazy...) are welcome in the creation phase
Strive for creativity	Generate as many ideas as possible. Everyone's ideas are valuable and deserve respect.
Hitch-hike	Build on, add to, and combine ideas
List all ideas	No editing or interpretation by the scribe
Incubate	Take time to reflect on ideas listed to stimulate new thoughts

2006 Technology Foresight Training Programme Module 2: Technology Foresight for Organisations			
Brainstorming Techniques			
Technique	Circular	Random	Silent
Description	<ul style="list-style-type: none"> Members give ideas in order They may pass after 1st round Structured 	<ul style="list-style-type: none"> Members give ideas at random as they wish Unstructured 	<ul style="list-style-type: none"> Members write ideas on slips of paper Slips are collected and written on chart Structured
Properties (Advantages and disadvantages)	<ul style="list-style-type: none"> Good for beginning No one dominates Fast participation Hitch-hiking May forget ideas May people feel under pressure 	<ul style="list-style-type: none"> More creative ideas Coincidentally people feel more comfortable Some people may dominate Confusion and difficulty in writing 	<ul style="list-style-type: none"> Good for sensitive issues or hierarchical groups No one dominates Ideas can be kept anonymous May block creativity



2006 Technology Foresight Training Programme Module 2: Technology Foresight for Organisations	
2. Mind Mapping	
<p>Mind mapping increases creativity and energy by attracting and involving individuals.</p> <p>It stimulates visual thinking by providing a quick and enjoyable method of generating and assimilating ideas.</p> <p>Mind mapping can increase the enthusiasm of the team members who are involved.</p>	

2006 Technology Foresight Training Programme Module 2: Technology Foresight for Organisations	
What Is It?	
<p>Mind Mapping is a method to generate and collate ideas and information that is:</p> <ul style="list-style-type: none"> quick to do and use non-linear pictorial as well as verbal more interesting and colorful than text alone focused on relationships between ideas 	

2006 Technology Foresight Training Programme Module 2: Technology Foresight for Organisations	
How It Helps?	
<p>Mind Mapping is a fun way of involving people in generating ideas, capturing thoughts, and demonstrating the relationships and connections between them.</p> <p>It appeals to visual thinkers as well as those more comfortable with words and avoids the trap of getting into linear thought processes too early.</p>	

Appendix C (continued)

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Presentations (11)

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How To Use It

1. A facilitator (scribe) is appointed to govern the session and to draw the map generated.
2. Identify the topic to be covered.
3. Write this in the middle of a large board or a large piece of paper, visible by everyone.
4. Brainstorm the main elements or attributes of the topic. Add each to the mind map as a main branch.

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How To Use It

5. Whenever possible use pictures, symbols or charts instead of words.
6. Use different colors for different branches so they can be clearly differentiated.
7. If appropriate, draw links between branches and twigs

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How To Use It

8. Review your mind map for completeness and clarity.
9. Once completed your map can be used to:
 - > store information/ideas for future reference
 - > communicate the output to others
 - > spark debate about issues and relationships between elements
 - > develop linear action plans, like order of priorities, time scales etc.

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Imperial University of London

Groundrules for Mind Mapping

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Practical Exercise

What can we do to ensure that:
Creativity techniques like
"Brainstorming and mind mapping"
can be used more commonly and in full effect
in panels and meetings?

A brainstorming session will be conducted to generate ideas to provide answers to that question.

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Appendix C (continued)

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Presentations (11)

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Tools to Analyze Problems and Issues

1. SWOT Analysis

2. STEEP Analysis

Prof. Dr. T. Erkan TORE
International University of Sarajevo
23 November 2006

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1. SWOT Analysis

A SWOT Analysis is a graphical way of studying and summarizing a particular process, department or organization in terms of its

Strengths,
Weaknesses,
Opportunities, and
Threats.

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What Is It?

SWOT analysis is a tool for auditing an organization and its environment. It is the first stage of planning and helps managers focus on key issues. It can be used in:

- strategy development,
- problem identification and solution seeking,
- analyzing a situation in the absence of quantitative data, where the existing expertise is dispersed among various people.

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How To Use It

1. Identify what is to be analyzed. Enter this in the center of your SWOT diagram.
2. Brainstorm the four areas:
 - **Strengths** - those internal aspects / characteristics / behaviours of performance which are strong.
 - **Weaknesses** - those internal characteristics / behaviours / aspects of performance which are weak.

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How To Use It

- **Opportunities** - events, openings, changes external to the body (process, department or organization) being analyzed which give positive opportunities for growth or improvement.
- **Threats** - events or changes external to the body being analyzed which could be detrimental to performance.

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How To Use It

3. List the results of the brainstorming session in the appropriate quadrant of your diagram. Use post-its for convenience.
4. As with any brainstorming session, discuss the items in each quadrant, organize and clarify them as needed, and use some prioritization tool to order them by relative strength or importance.

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How To Use It

5. SWOT analysis must be "customer" focused to gain maximum benefit, a strength is really meaningful only when it is useful in satisfying the needs of customers.

At this point, the strength becomes a capability.

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How To Use It

6. The role of the internal portion of SWOT analysis is to determine:

Where resources are available or lacking so that (internal) strengths and weaknesses can be identified.

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SWOT Analysis Diagram

Strengths <ul style="list-style-type: none"> history of creative and successful product development able to start new projects quickly accepted use of cross functional teams 	Weaknesses <ul style="list-style-type: none"> limited knowledge and experience of latest engineering techniques budget restrictions limited investment in new technology in recent years
Opportunities <ul style="list-style-type: none"> head of department retires soon parent company pushing for new product range 	Threats <ul style="list-style-type: none"> competitor Y has re-equipped its labs at great expense competitor Z is advertising for researchers EC likely to impose restrictions on plant testing

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How It Helps?

Once key issues have been identified, they feed into strategic planning process.

To develop a strategy the relations between strengths and opportunities must be established carefully.

Similarly the relations between weaknesses and threats must be revealed.

SWOT analysis can be used in conjunction with other tools for audit and analysis, such as STEEP (PEST) analysis.

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How It Helps?

Opportunities and threats need to be assessed in terms of:

- the likelihood of them being relevant (evaluating relevance),
- their significance to the organization if they do happen (estimating impact).

It is not enough to identify the strengths, weaknesses, opportunities, and threats of a company, and the relations between them.

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How It Helps?

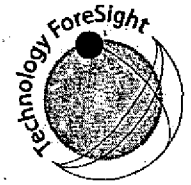
Strengths can be used against (external) threats:

Strengths can be used to take advantage of (external) opportunities.

Weaknesses must be strengthened to provide a shield against threats.

Weaknesses must be strengthened also to take advantage of opportunities.

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Appendix C (continued)

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External Environment	Threats	Confront	Avoid or Prepare
	Opportunities	Exploit	Search
		Strengths	Weaknesses
		Internal Environment	

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2. STEEP Analysis

A STEEP analysis (sometimes called a STEP or PEST analysis) looks at the external business environment. STEEP stands for

- Sociocultural,
- Technological,
- Environmental,
- Economic, and
- Political (dimensions, issues or factors.)

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What Is It?

STEEP analysis examines the impact of each of these factors (and their interplay with each other) on the "business".

The results can then be used to take advantage of opportunities and to make contingency plans for threats.

It is analytic but not quantitative.

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STEEP Analysis

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Socio - Cultural Factors

- > Lifestyle changes, values and traditions
- > Career expectations
- > Consumer activism
- > Rate of family formation
- > Growth rate of population
- > Age distribution of population
- > Regional shifts in population
- > Life expectancies
- > Birth rates ...

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Technological Factors

- > Total government spending for R&D.
- > Total industry spending for R&D.
- > Focus of technological efforts
- > Patent protection
- > New products
- > New technologies
- > New developments in technology transfer
- > Productivity improvements through automation...

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Appendix C (continued)

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Presentations (11)

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Module 10 Technology Foresight for Organisations

Environmental Factors

- Global climate change
- Sustainable development pressures
- Cradle-to-grave product life cycles
- Re-use and recycling industries and related processes and regulations
- Raw material sources
- Biotechnology (from agriculture to drugs)...

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Module 10 Technology Foresight for Organisations

Economic Factors

- Gross Domestic Product trends
- Interest rates
- Money supply
- Inflation rates
- Unemployment levels
- Wage/price controls
- Devaluation/revaluation
- Energy availability & cost
- Disposable income ...

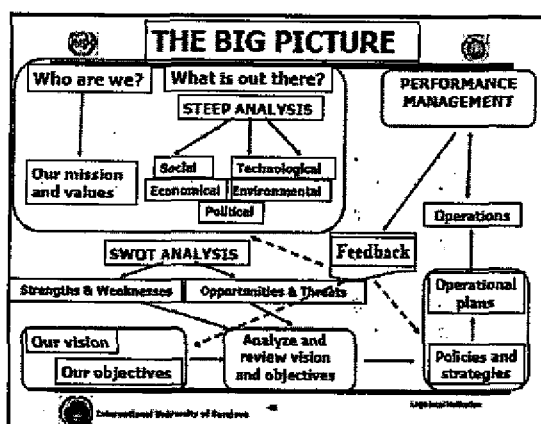
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Political - Legal Factors

- Antitrust regulations
- Environmental protection laws
- Tax laws
- Special incentives
- Foreign trade regulations
- Attitudes toward foreign companies
- Laws on hiring and promotion
- Stability of government...

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Appendix C (continued)

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Presentations (12)

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Module 11: Technology Foresight for Organisations

Setting Priorities

Dr. Ozcan Saritas
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Presentation to UNIDO Technology Foresight Training Seminar, Gebze
November 2006

Ozcan Saritas

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Outline

- What is a priority?
- S&T Priorities
- Setting priorities with TF
- Methods used for priority setting
- CSIRD methodology
- Setting priorities in Turkey

Ozcan Saritas

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Definition

- What is a priority?
 - The condition of being regarded as more important
 - A thing regarded as more important than others
 - Status established in order of importance or urgency

Oxford Webster
- Notions of priority
 - Benefit
 - Value / Importance
 - Urgency

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S&T and Research priorities

- Rationales of setting priorities
 - Rapid industrial and social development
 - Cut-throat competition
 - Increasing demand for quality of life
 - Scarce resources (e.g. natural, financial, time and human)
- S&T and Research priorities
 - S&T is recognised as a source of competitiveness, economic growth and quality of life
 - The alignment of S&T policies with industrial and societal needs has resulted with an interest in the determination of research priorities
- How are the priorities set in a Foresight exercise?

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Setting priorities with TF

- Foresight is:

"the process involved in systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits"

Martin (1993)

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Setting priorities with TF

- TF is an instrument for identifying emerging and critical research, technology and market areas to set national S&T priorities
- A number of TF Programmes have aimed to set (national) research priorities by considering the areas, which potentially:
 - Contribute to a favorable economic and social development
 - Satisfy socio-economic needs
 - Optimise limited public funds
 - Increase national security

Ozcan Saritas

Appendix C (continued)

23 November 2006

Presentations (12)

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Typical questions asked for prioritisation

- What are the key areas of S&T and R&D?
- What kind of research should be preferably supported from public funds?
- What are the most important technologies for favourable economic and social development?

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A generic process of prioritisation

```

graph TD
    A[Identification and selection of experts] --> B[Initial list of technologies]
    B --> C[Prioritization]
    C --> D[Final list of critical technologies]
    
```

Objective: To reduce the initial list of technologies to a list of critical technologies that are the most relevant against the set of applied criteria, which is called as "prioritisation criteria"

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When are the priorities set in a TF exercise?

- During the Foresight process – from scoping to follow-up phases – at multiple points, when
 - Objective and breadth of the exercise is determined
 - Content of the exercise is determined (e.g. the socio-economic sectors are determined)
 - Participants are selected
 - Topics are discussed in work groups/panels
 - Prioritisation criteria is drawn
 - Questions are selected and placed into the survey
 - Collected answers are analysed
 - Decisions by politicians are taken
 - Resources are allocated
 - Follow up activities are decided and implemented

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Who sets priorities?

- Multiple actors throughout the Foresight process
 - Steering Committee
 - Project Office
 - Panels (e.g. Socio-economic and/or thematic)
 - Other interested persons (e.g. via surveys)
 - High ranking persons (e.g. ministers)

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Methods used for setting priorities

- Methods based on data
- Methods based on opinion
- Mixture of data and opinion
- **Typical methods**
 - Ranking from surveys (e.g. from the Delphi survey)
 - Analysing keywords (e.g. Bibliometric analysis and data mining)
 - Deriving priorities from surveys, simulations, extrapolations and other futures studies
 - Voting (e.g. online, offline or postal)
 - Listing priorities based on a set of criteria
 - Consulting to individuals (e.g. to experts)
 - Discussing in workshops and panels
 - Interviewing

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Module 1: Technology Foresight for Decision Makers

CSIRO methodology

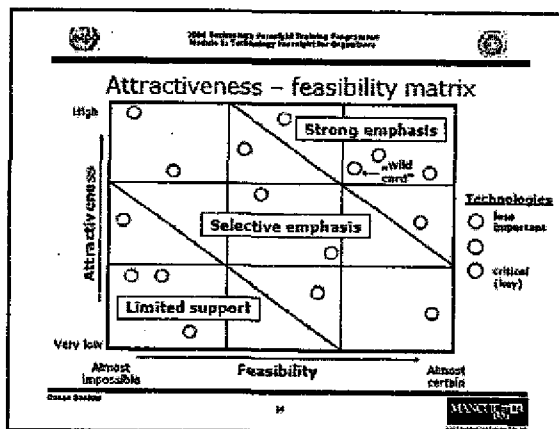
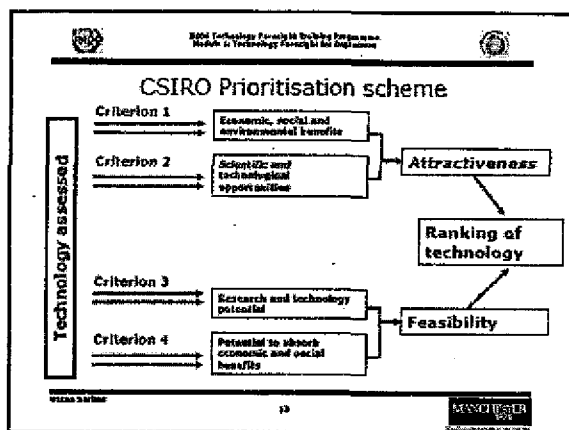
- Used in Australia, UK, Hungary, Czech Republic
- Plots "attractiveness" vs. "feasibility"
- Key steps:
 - Construct list of technologies to be prioritised
 - Set the criteria, their values, and any weighting
 - Establish a cohort to conduct the assessment
 - Provide "data" and "evaluation" information
 - Invite the cohort to score the technologies
 - Process the score and plot into an attractiveness-feasibility matrix
 - Discuss and debate scores – invite cohort to score again
 - Identify policy actions

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Appendix C (continued)

23 November 2006

Presentations (12)



Setting priorities in Turkey

A few points to remember from the earlier presentation on Vision 2023:

- Rationales of Vision2023**
 - A tool for formulating S&T policy for 2003-2023
 - Process benefits
- Focus**
 - Science and Technology
- Expected Outputs**
 - Strategic technologies and R&D priorities
 - Raising awareness on the importance of S&T
 - Wide and effective participation of all stakeholders

Prioritisation of socio-economic areas

- Criteria for the identification of socio-economic areas**
 - Technology Relevance
 - Policy Relevance
 - 10-12 panels
 - Interrelatedness
 - Manageable
- The process of prioritisation**
 - An extended list prepared by the project office
 - Additions
 - Prioritisation / first round
 - Clustering
 - Prioritisation / second round
 - Final revision
 - List of 10 Socio-economic and 2 Thematic panels

Strategic technologies

- Prioritisation based on**
 - Importance Index, and
 - Feasibility Index
- Importance Index: "Strategic Technology" Criteria**
- Feasibility Index: Panels and Delphi Survey**

Prioritisation of strategic technology criteria

- Steering Committee initially identified 22 criteria
- Following a clustering session the number was decreased to 15
- A voting session was run
- 5 Strategic technology areas were prioritised**
 - S&T and innovation capacity (208)
 - Competitive strength (207)
 - Environment and energy efficiency (198)
 - Creation of national value added (176)
 - Quality of life (176)
 - Employment (169)
 - National security (159)
 - Public services (148)
 - Self sufficiency (145)
 - Social equality (143)



Appendix C (continued)

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Presentations (12)

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Decision

Importance index

- Weights given by the Steering Committee
 - Competitive strength: 28%
 - S&T and innovation capacity: 26%
 - Environment and energy efficiency: 16%
 - Creation of national value added: 15%
 - Quality of life: 15%

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Module 3: Technology Foresight for Decision

Feasibility index

Weights

Actual Capability	Researcher potential	R&D Infrastructure	Existence of scale relevant capabilities	Innovation capacity of firms	Existence of competitive firms
Basic research	40%	40%	40%	40%	40%
Applied research and industrial research	40%	40%	40%	40%	40%
Pre-competitive industrial development	40%	40%	40%	40%	40%
Industrial development	40%	40%	40%	40%	40%

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Module 3: Technology Foresight for Decision

The Delphi survey

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Module 3: Technology Foresight for Decision

Strategic technologies for Turkey

- By using the Delphi results, clustering and voting eight strategic technologies were prioritised in Turkey:
 1. Information Technologies
 2. Biotechnology and Gene Technologies
 3. Materials
 4. Nanotechnology
 5. Design Technologies
 6. Mechatronics
 7. Production Methods and Machinery
 8. Energy and Environmental Technologies

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Module 3: Technology Foresight for Decision

Points to consider

- There are often too many actors
- Multiple interests
- Too much information
- Various sources of information
- Difficulty of transmitting information
- The use of complicated quantitative and subjective qualitative methods, and their suitable mixture require attention

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2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Decision

Summary

- Although the establishment of priorities is an acknowledged necessity, it can be a painful and divisive process
- It is a lengthy and costly process, through which building consensus is important among the participants
- Approaches to priority setting must be tailored to match the situation. One size does not fit all

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Appendix C (continued)

23 November 2006

Presentations (13)

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Engineers

Japanese Foresight Programme

Kumi Okuwada Ph.D.

National Institute of Science and Technology Policy (NISTEP)
Japan

NISTEP 1

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Engineers

Contents

- History & backgrounds of Japanese Foresight
 - International / Domestic Dimension
 - Political implications
- The latest foresight in Japan
 - Relation between foresight and policy making
 - Design of multi-methodology foresight

NISTEP 2

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Engineers

Genealogical tree of National foresight applications

NISTEP 3

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Engineers

Structure of National Foresight Activities

NISTEP 4

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Engineers

Generation of Technology Foresight

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2006 Technology Foresight Training Programme
Methods to Technology Foresight for Engineers

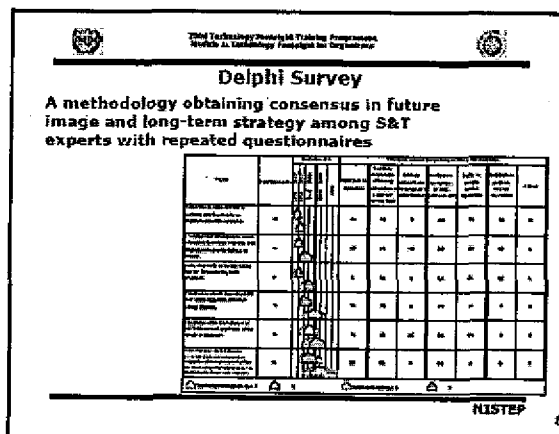
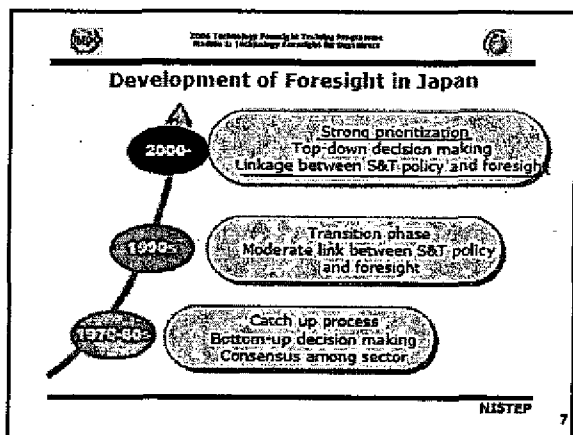
S&T Administrative Structure in Japan

NISTEP 6

Appendix C (continued)

23 November 2006

Presentations (13)

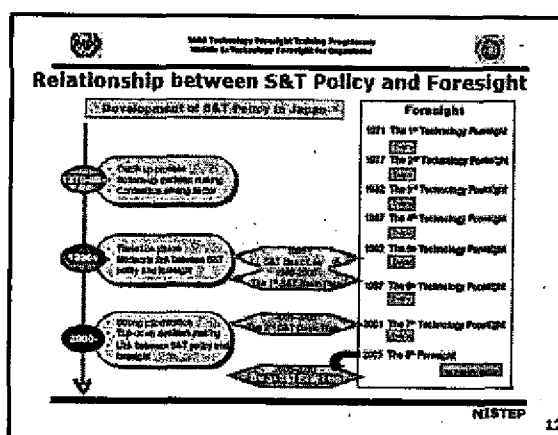
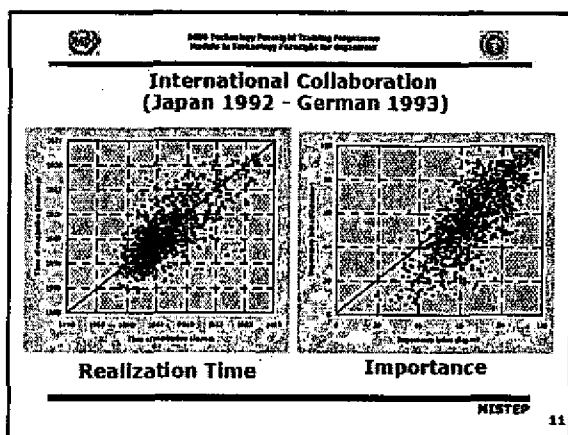
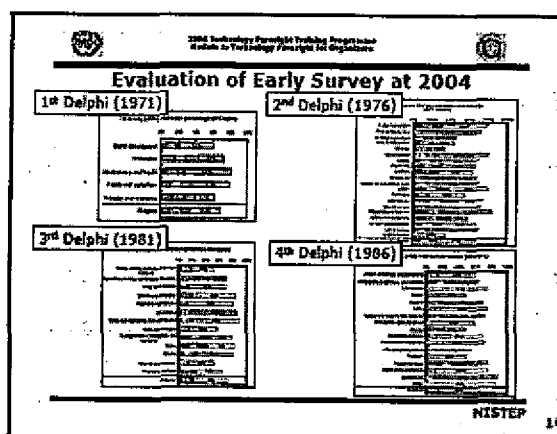


History of Japanese Delphi Survey

NO.	Survey Year	Fields	Topics	Experts
1	1970-71	5	834	2482
2	1976	7	656	1316
3	1981-82	13	800	1727
4	1986	17	1071	2007
5	1991	18	1149	2385
6	1996	14	1072	3888
7	2000	16	1066	3188
8	2004	13	858	2239

Experts= Respondents (2 cycles of the questionnaires)

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Appendix C (continued)

23 November 2006

Presentations (13)

2004 Technology Foresight Training Programme
Module 1: Technology Foresight for Organizations

What are "new" in the 8th program (2003-04) ?

1. Clear Target on Client and Timing
 - > Strong linkage with policy making process
 - > Political Message by coupling with Review Program
 - > Contribution to discussion for 3rd Basic Plan
2. Multi-methodology Foresight
 - > Improvement in Delphi and complementary three analysis but also Science and Social
 - > Wider variety of participants
 - > Post-foresight program

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2004 Technology Foresight Training Programme
Module 2: Technology Foresight for Organizations

Two research projects conducted by NISTEP

(supported by Special Coordination Funds for Promoting S&T in FY 2003-04)

Multi - methodology Foresight

Review of the last 10 years (learning 1st & 2nd S&T Basic Plans)

S&T indicators
Evaluation of achievements
Benchmarking
Impact study etc.

Delphi Survey
Science and Technology
Technology Foresight
Policy Impact

More "political" message by coupling with Review Program

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2004 Technology Foresight Training Programme
Module 1: Technology Foresight for Organizations

Design of the 8th foresight program

Multi - methodology Foresight

Improved Delphi and Complementary three others

Delphi Survey
Science and Technology
Technology Foresight
Policy Impact

Improvement with new approaches
Needs list through participatory process
Database analysis to find rapidly-developing areas
Scenario writing to individual view

Not only Technology, but also Science and social
Wider variety of participants

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2004 Technology Foresight Training Programme
Module 2: Technology Foresight for Organizations

Improved Delphi Survey

- Accumulation of experiences in past Delphi survey
 - > 80 - 70% of past topics has been realized
 - > Some collaboration with foreign activities
- Improvement by new approaches based on the experiences
- Respondents of 8th Delphi : around 2200 (Experts in Japan)

13 fields
130 areas
860 topics

Impact for S&T economy, society
Japanese position in the world
Realization time for technological/social

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2004 Technology Foresight Training Programme
Module 1: Technology Foresight for Organizations

New Approaches in Delphi Survey

1. Structure of issues of 13 Fields-Areas-Topics

2. Two different stages of the realization flow of each topic

Technology in realization
Promoting measures
When will the technology be realized?

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Module 2: Technology Foresight for Organizations

13 fields including 130 areas and 858 topics

- Information and communications
- Electronics
- Life sciences
- Health, medical care and welfare
- Agriculture, forestry, fisheries and food
- Space, marine and earth sciences
- Energy and resources
- Environment
- Nanotechnology and materials
- Manufacturing
- Industrial infrastructure
- Social infrastructure
- Science and technology for society

Field selection and classification

Area: Unexplored/with

Search for subject/area topics for database will begin 1,000 items but only 100 items will be selected and specific selected will be listed for research and follow-up.

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Appendix C (continued)

23 November 2006

Presentations (13)

Design of the 8th foresight program

Multi - methodology Foresight

Improved Delphi and Complementary three others

> Not only Technology, but also Science and Social
 > Wider variety of participants

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Scenario Analysis

- > written by experts with deep insight.
- > normative and subjective.
- > schematic future image with time scale.

Themes:
47 themes

Writers:
2 experts selected by specification in each theme

Scenarios:
88 scenarios

Analyze the present state

→ FUTURE SCENARIO

→ Actions (through a policy)

Program of studies in mathematics and mathematical education	Dr. Peter FRANKS
New healthcare that meets individual needs	Dr. Masahiko HIRAYAMA
Life support robotics	Dr. Masahiko HIRAYAMA
Methods design through computer simulation	Dr. Masahiko HIRAYAMA

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Example of Scenario : Life support robotics

In Health Care Support Robotics and Comprehensive Education
Advanced Technological Education Institute

Development scenario

The development of health support robotics will be in Stage 1 from now until 2010, with technology for "functional robot" and "technical robot" being developed separately. Improving about 2010, Stage 2 will fully see the development of integrated technology.

Development during Stage 1 in study in program in 10 years.

Stage function/needful robot:

- Supporting of medicine through network
- Overcoming tasks by substituted robot

Category	Item
Strategy 1	Cooperating robot with human interaction and device function integration in living space
Strategy 2	Power source technology aimed to clean energy in environment
Strategy 3	Thin robot as social intelligence communication with human robot and in human environment

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Example of Scenario : New healthcare that meets individual needs

Professorial Chair
Tajiri Institute of Health Sciences

Development of present

- 1. Development of present technology
- 2. Development of present technology
- 3. Development of present technology

Development of future

- 1. Development of future technology
- 2. Development of future technology
- 3. Development of future technology

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Post foresight activities : Workshop

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Design of the 8th foresight program

Multi - methodology Foresight

Improved Delphi and Complementary three others

> Not only Technology, but also Science and Social
 > Wider variety of participants

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Appendix C (continued)

23 November 2006

Presentations (13)

2006 Technology Foresight Training Programme
Methods in Technology Foresight for Organisations

Bibliometric Analysis of rapidly-developing research areas

Database analysis
 > Research Front database
 in Essential Science Indicators (Research Indicator)
 > Scrutiny of papers by co-citation relation

Highly cited papers
 ↓
 Research Fronts (RFs)
 ↓
 Research Areas (RAs)

Case studies:
 - 1st stage: 1990-2005
 - 2nd stage: 2005-2006

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Methods in Technology Foresight for Organisations

Procedure

Massive database analysis
 + Expertise of cutting edge RAs

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Methods in Technology Foresight for Organisations

Example of RAs

Proteomics

Hardware development for mass spectrometry, software development for data real time information processing

Protein analysis on gel and protein

RF	1st stage	2nd stage	RF	1st stage	2nd stage	RF	1st stage	2nd stage
1	141	1549	2	524	2802	3	3	1

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Methods in Technology Foresight for Organisations

Examples of Rapidly-developing RAs

RF	1st stage	2nd stage
1	141	1549
2	524	2802
3	3	1

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Methods in Technology Foresight for Organisations

Map of 153 Rapidly-developing RAs

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Methods in Technology Foresight for Organisations

Design of the 8th foresight program

Multi-methodology Foresight

Improved Delphi and Complementary three others

> Not only Technology, but also Science and Social
 > Wider variety of participants

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Appendix C (continued)

23 November 2006

Presentations (13)

2004 Technology Foresight Training Programme
Module 11: Technology Foresight for the Producer

Procedure of Socio-economic Needs Analysis

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2004 Technology Foresight Training Programme
Module 11: Technology Foresight for the Producer

Summarized Needs List

- I. Japan continues as a leader in scientific and technological achievement.
- II. Build hopes and dreams by seeking the challenge of uncharted science and technology frontiers.
- III. Actively contribute to solving global problems.
- IV. Japan maintains its international economic competitiveness by pioneering new industrial fields.
- V. Build new frameworks aiming for a sustainable social system (resolving unbalanced bias and the preservation of primary industries).
- VI. Respond to changes in social structure (respond to the declining population due to the low birthrate and the aging society).
- VII. Society is peaceful, safe, and provides peace of mind (prevent traffic accidents, crime, and terrorism).
- VIII. Resistant to disasters.
- IX. Able to live a healthy life.
- X. Individual potential expands, enabling people to experience the richness of life.
- XI. Everyone is needed at home and as part of society; people fulfil their various roles and support one another.
- XII. Children and adults learn purposefully, developing one's abilities.

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2004 Technology Foresight Training Programme
Module 11: Technology Foresight for the Producer

Concluding Remarks

Japanese 8th foresight programme

- * Strong and direct linkage between foresight and policy making
 - Supporting more evidence-based policy making
- * Multi-methodology foresight
 - Compilation of various aspects of information
- * Post-foresight
 - Positive inputs through comprehensive discussions

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Appendix C (continued)

23 November 2006

Presentations (14)

2004 Technology Foresight Training Programme
Module 11 Technology Foresight for Organisations

The Latest Japanese Delphi


Kumi Okuwada Ph.D.
National Institute of Science and Technology Policy (NISTEP)
Japan

NISTEP 1

2004 Technology Foresight Training Programme
Module 11 Technology Foresight for Organisations

Contents

- Delphi Survey
 - Methodology
 - Effectiveness and Limits
- In the latest foresight program in Japan (2003-04)
- Improvements in the New Delphi
- Obtained Results



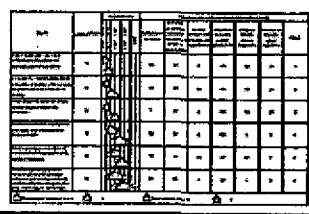
DELPHI

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2004 Technology Foresight Training Programme
Module 11 Technology Foresight for Organisations

Delphi Survey

A foresight methodology obtaining consensus in future image and long-term strategy among S&T experts with repeated questionnaires



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2004 Technology Foresight Training Programme
Module 11 Technology Foresight for Organisations

History of Japanese Delphi Survey

NO.	Survey Year	Fields	Experts	Experts
1	1970-71	5	644	7492
2	1978	7	650	1910
3	1981-82	13	900	1727
4	1989	17	1071	2907
5	1991	10	1140	2385
6	1996	14	1072	3585
7	2000	10	1065	3105
8	2004	13	853	2230

Experts= Respondents (2 cycles of the questionnaires)

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2004 Technology Foresight Training Programme
Module 11 Technology Foresight for Organisations

Delphi Survey: Effectiveness and Limits

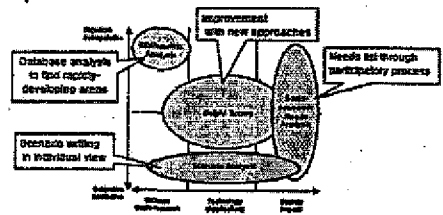
- Helpful to form consensus
 - High correlation between experts view and investments as a result
- Acceptable credibility
 - Feasibility of technology : universal
 - Priority of technology : regional
- Difficulty to extract outstanding but minor insights
 - High temperature superconductive material
- Difficulty of participation from demand side
 - Social stakeholders
- Difficulty to design cross-field communication

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2004 Technology Foresight Training Programme
Module 11 Technology Foresight for Organisations

Design of the 8th foresight program

Multi - methodology Foresight
Improved Delphi and Complementary three others



- Not only Technology, but also Science and Social
- Wider variety of participants

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Appendix C (continued)

23 November 2006

Presentations (14)

2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Organisations

The 8th Delphi Survey in Japan

- On accumulation of experiences in past Delphi survey
 - > 60 - 70% of past topics have been realized
 - > Some collaboration with foreign activities
- Improvement by new approaches based on the experiences

Respondents of 8th Delphi : around 2200 (Experts in Japan)

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2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Organisations

A New Approach in Delphi Survey - Three-layered structure -

Field: ex. Nanotechnology and materials

Area: ex1. Nano processing, mixing, and manufacturing technology; ex2. Nanoscience for a safe and secure society

Topic: ex 1. Three-dimensional packing technology at the nanometer scale; ex 2. Establishment of safety standards for ODS organic molecules and clones.

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2006 Technology Foresight Training Programme
Module 11: Technology Foresight for Organisations

13 fields including 130 areas and 858 topics

- Information and communications
- Electronics
- Life sciences
- Health, medical care and welfare
- Agriculture, forestry, fisheries and food
- Space, marine and earth sciences
- Energy and resources
- Environment
- Nanotechnology and materials
- Manufacturing
- Industrial infrastructure
- Social infrastructure
- Science and technology for society

Notes: An administrative system for Delphi survey with about 12000 users that can automatically connect topics and separate activities with no need for a subject-substance.

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Another new approach in Delphi - Two stages of realization time -

Technological realization
> Time
> Promoting measures

Social realization
> Time
> Promoting measures

When will a topic be feasible technologically?
When will a topic have an impact to socio-economic?

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Module 11: Technology Foresight for Organisations

Delphi Result Sheet

Topics

Other questions

1st Round of Survey (Realization Period)

2nd Round of Survey (Realization Period)

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Module 11: Technology Foresight for Organisations

Distribution of realization time responses in the questionnaire

Forecasted realization time

Technological realization

Social realization

1st round

2nd round

Q1: The earliest, the first one-fourth of all answers
Q2: The median point of those answers
Q3: The third-quarter point of those answers

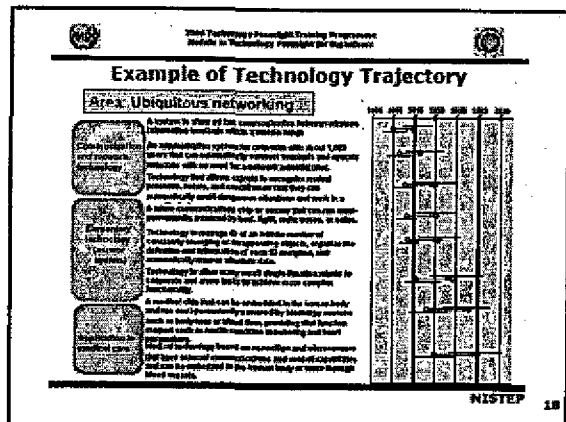
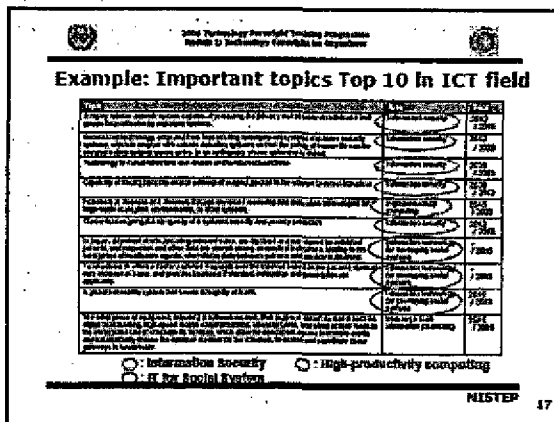
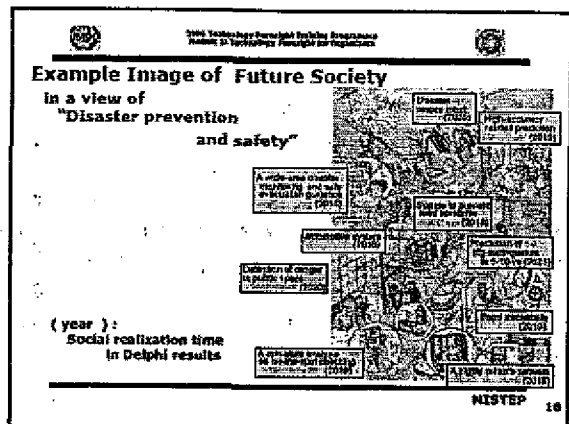
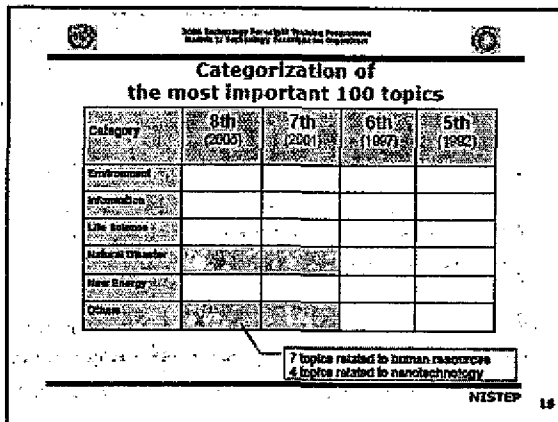
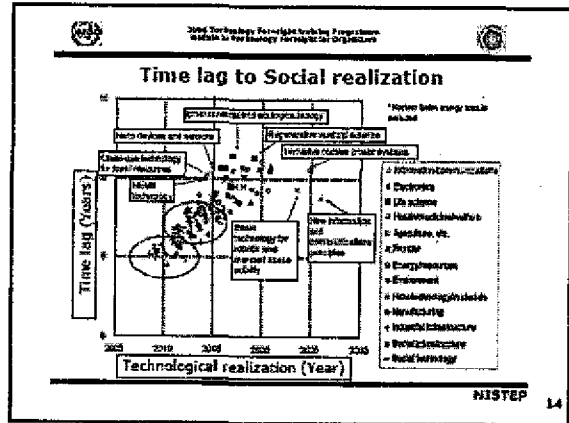
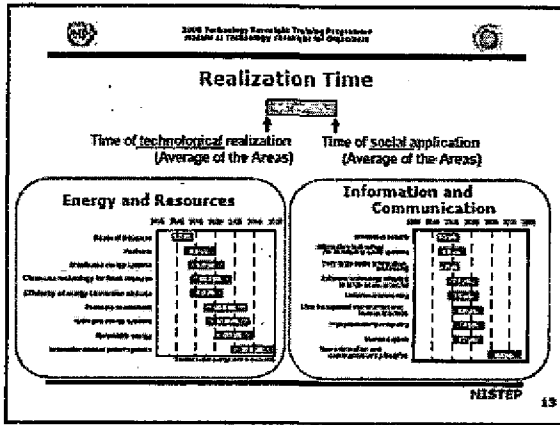
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Appendix C (continued)

23 November 2006

Presentations (14)



Appendix C (continued)

23 November 2006

Presentations (14)

Example of Roadmap: Renewable energy

Technological realization time (Social realization time)

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Example of Change in Impact Index

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Evaluation of Future impacts of the prioritized fields

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Expected Impacts

NISTEP 22

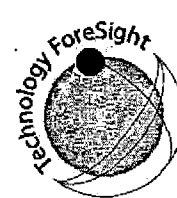
Measures (Government should adopt) Example : Environment field

Environment field
All topics (average)

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Current R&D Level of Japan - Strength and Weakness, Self-evaluation -

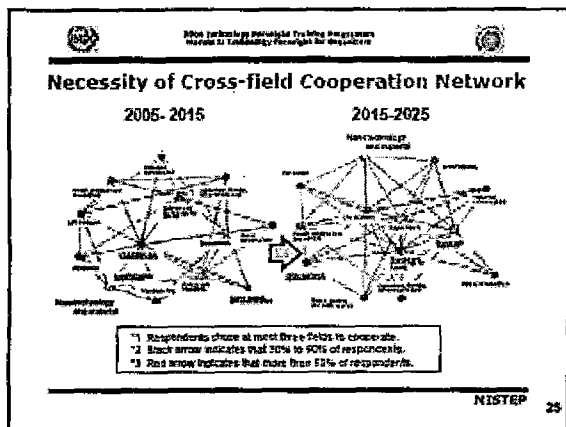
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Appendix C (continued)

23 November 2006

Presentations (14)



2006 Technology Foresight Training Programme
Workshop 23 Technology Foresight for Decision Makers

Concluding Remarks

Japanese 8th Delphi Survey

- * On accumulation of rich experiences in the past Delphi survey
- * Center of Multi-methodology Foresight
- * Improvements - New approaches -
- * Comprehensive outlook of S&T in Japan

More evolution ? → Next generation of Delphi

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Appendix C (continued)

24 November 2006

Presentations (15)

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

CSIRO: Australian Commonwealth Scientific and Industrial Research Organisation

Ozcan Saritas

MANCHESTER

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Scenario Planning

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Presentation to UNIDO Technology Foresight Training Seminar, Gabor
November 2006

*With thanks to Tim Miles & Michael Keenan who have kindly provided some of these slides

Ozcan Saritas

MANCHESTER

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Outline

- Definition and historical background
- Characteristics of scenarios
- Variations in the use of scenarios
- Scenario generation process
- Methods used
- A CASE: Health Scenarios

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Module 2: Technology Foresight for Organisations

Definition

- Common definitions of the term "scenario":
 - An outline of the plot of the dramatic work giving particulars of the scenes, characters, etc.
 - The outline or sometimes the complete script of a motion picture or a shooting script
 - An imagined sequence of events, especially any of several detailed plans and possibilities

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Module 2: Technology Foresight for Organisations

Definition

- Scenarios in the context of Foresight
 - Wack (1984):
"a discipline for rediscovering the original entrepreneurial power of creative foresight in contexts of accelerated change, greater complexity and genuine uncertainty"
 - Schwartz (1991):
"tools for ordering one's perceptions about alternative future environments in which one's decisions might be played out"
 - Gausemeier et al. (1998):
"a generally intelligible description of a possible situation in the future, based on complex network of influence factors"

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Module 2: Technology Foresight for Organisations

Historical background

- The concept first emerged following World War II, as a method for military planning. The U.S. Air Force tried to imagine what its opponents might do, and to prepare alternative strategies
- In the 1960s, Herman Kahn, who had been part of the Air Force effort, refined scenarios as a tool for business prognostication
- Scenarios reached a new dimension in the early 1970s with Pierre Wack's work in Shell, which enabled the company to anticipate the rise and subsequent fall of oil prices in 1973

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Appendix C (continued)

24 November 2006

Presentations (15)

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Module 2: Technology Foresight for Organisations

Key assumptions in using scenarios

- The future not only is a continuum of past relationships and dynamics but also can be shaped by human choice and action
- The future cannot be foreseen completely, but extrapolation of the future can inform the decisions of the present
- There is not one possible future only. Uncertainty calls for a variety of futures mapping a 'possibility space'
- Development of scenarios involves both rational analysis and subjective judgement. It therefore requires interactive and participative methods

(Berkhout and Herbin, 2002)

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Module 2: Technology Foresight for Organisations

Dual meaning of scenarios

- Image of the future: a state of affairs, describing the circumstances at a particular point in future time
- Future history: a "story" of the evolution of affairs, in the form of a sequence of events or developments of trends

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Module 2: Technology Foresight for Organisations

Essential characteristics of scenarios

- Internally consistent
- Link historical and present events with hypothetical events in the future
- Carry storylines that can be expressed in simple diagrams
- Plausible
- Reflect predetermined elements
- Identify signposts or indicators that a given story is occurring

(van der Meijden, 1997)

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Module 2: Technology Foresight for Organisations

A successful scenario

- Describes the possible future changes in a particular 'system', domain, environment, society, etc.
- Involves the imagination
- Are written in the past or present tense - as if the visualized trends & events had already happened
- Indicates the causes and consequences of key developments
- Challenges our current images & conjectures about the future
- Helps us to create and evaluate alternative policies, strategies and actions
- Is seen as relevant and an important element of the strategic decision/policy making process

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Module 2: Technology Foresight for Organisations

Variations: Single vs. Multiple

- Single Scenario**
 - To illustrate and communicate features of forecasts and future-relevant analyses
 - To provide a framework in terms of which views of different aspects of future developments can be integrated and their consistency or otherwise examined
 - To structure and guide discussion so that visions, elements of visions, and the assumptions that underpin such visions, can be explicated and elaborated.
 - To set a target (e.g. for aspirational purposes)

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Module 2: Technology Foresight for Organisations

Single vs. Multiple

- Multiple Scenarios**
 - To illustrate alternatives, indicate a range of plausible developments (not one inevitable future path); to assess robustness of strategies; to stimulate reflection on underlying assumptions
 - To give insight into contexts and outcomes (intended or otherwise) of actions, & conditions when objectives may be realised; to help identify turning points, key decisions, indicators, early warnings of change

Common to use 3 or more scenarios

Appendix C (continued)

24 November 2006

Presentations (15)

2004 Technology Foresight Training Programme
Module 2: Technology Foresight for Engineers

Normative vs. Exploratory

- Normative scenarios
 - Starts with preliminary view of a possible future and look backwards to see if and how this might or might not grow out from the present
- Explorative scenarios
 - Starts with the present as starting points and move forward to the future by asking "what if" questions about implications of possible events outside familiar trends
 - Use data about the past and present bearing in mind the possible, probable and desirable

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Inward vs. Outward

Starting from the present ("exploratory"):
What next?
What if?

Starting from the future ("normative"):
Where to?
How to?

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Module 2: Technology Foresight for Engineers

Outward Scenarios - Example

Trends and events of particular interest to users - not necessarily preferable ones

A common framework for workshop and expert groups is STEEPV:

- Social
- Technological
- Economic
- Environmental
- Political
- Values

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Module 2: Technology Foresight for Engineers

Inward Scenarios - Example

Futures of particular interest to users - not necessarily desirable ones : a PROFILE approach

Will world economic development mean:

High Growth / Low Growth

High Equality / Low Equality

Profile 1, Profile 2, Profile 3, Profile 4

What would it be like?
Worldviews
How do we get there?

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Methods for scenario planning

- Forecasts
- Deskwork
- Expert Groups
- "Modelling" tools like simulation, cross-impact; gaming
- Surveys, clustering articulated viewpoints
- Workshops

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Scenario workshops

- A scenario workshop allows the participants to:
 - exchange information, views and insights,
 - identify points of agreement, disagreement and uncertainty
 - create new shared understandings
 - develop action plans and other instruments so as to help mobilise future activity

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Appendix C (continued)

24 November 2006

Presentations (15)

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Organisations

A model for the organisation of a scenario workshop

- Step 1: Set up a preliminary objective including the time horizon
- Step 2: Establish a broad learning programme under the STEEPV guidelines to enable the boundaries appropriate to the objective to be derived and the broad trends that influence the objective to be identified; and by asking 'who and what' is important to the objective, map out more specifically the driving forces for your organisation in creating its future
- Step 3: Make explicit the assumptions that will be used in writing the scenarios; examine these assumptions for their relevance, reasonableness and robustness in relation to the assumed objective; and, through iteration, modify both until a convergence is achieved
- Step 4: Assemble a framework of alternative event strings and trends that are the skeletons for the scenarios
- Step 5: Write the scenarios using whatever presentational technique seems to be most suited to the objective and the organisation's culture
- Step 6: Analyse the scenarios with particular reference to turning or branch points that may constitute a crisis
- Step 7: Derive from the analysis, the policies within which the organisation ought to work (the limits of actions the organisation ought not to exceed in seeking to achieve its objective), the instruments of policy over which the organisation has control and those that are beyond its control
- Step 8: Using the instruments of policy, derive alternative strategies
- Step 9: Evaluate these strategic alternatives over the chosen timescale, paying particular attention to the strategic allocation of resources, including financing, and the best routes to achieving the desired financial returns

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Methods to Technology Foresight for Organisations

Product & process benefits of scenario planning

- Product (codified outputs) - reports, books, videos. Discursive accounts, summaries, action lists and priorities. Inputs to decision making.
 - Scenarios: integrate diverse studies, concretise and communicate visions; suggest action points and key indicators
- Process (embodied knowledge) - forging and enriching networks, developing knowledge about knowledge. Establishing and empowering constituencies for action.
 - Scenarios: recruit support, integrate diverse viewpoints; share & fuse visions, provide focus for joint work.

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Methods to Technology Foresight for Organisations

How to get it wrong (Coates)

- Mechanical Extrapolation
 - limits, ceilings, qualitative change
- Unexamined assumptions
- Limited Expertise
 - failure to see limits, connections
- Limited Vision
 - failure to see outsiders, novelty, significant events

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Integrating scenarios with other methods

- Scenarios can be used with other methods such as
 - Expert panels
 - STEEPV analysis
 - SWOT analysis
 - Some research on the area of interest
 - Road mapping and/or
 - Delphi

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Health scenarios

- The future of Health and Social Services in Europe for the European Monitoring Centre of Change (EMCC)
- Step 1: Understanding the healthcare system
 - A review of Health and Social Services in Europe
 - Trends and driving forces
- Step 2: Scenarios
 - Analysis of the Healthcare and Social Services system
 - Health and Social Services Scenarios
 - Towards integrated visions
 - Wildcards
- Step 3: Policy and action proposals
 - European health policy landscape
 - Community action programme for public health
 - Specific policy challenges

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Step 1: Understanding the healthcare system

- Definitions of "healthcare sector" and "social services"
 - The healthcare sector refers primarily to those services provided by hospitals, general practitioners and community clinics in the prevention, diagnosis, and treatment of illness
 - Social services is confined to work rendered by any person or organisation in furtherance of the general welfare of citizens. This includes,
 - children and their families;
 - disabled people of all ages;
 - elderly people (especially those with mental health problems);
 - people who misuse drugs and alcohol; and
 - services in relation to HIV/AIDS

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Appendix C (continued)

24 November 2006

Presentations (15)

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Regulators

Step 1: Understanding the healthcare system

- Statistical data:

Figure 1: Total expenditure on health as % GDP

Source: OECD, 2003

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Regulators

Step 1: Understanding the healthcare system

- Trends and driving forces:
 - Demographic and societal change
 - Rising expectations and consumerism
 - Health informatics and telemedicine
 - New medical technologies
 - Increasing costs of health and social services provision

Figure 2: Age groups 15-24 and 65-64 as % of population 1980-2025

Source: OECD, 2004

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Regulators

Step 1: Understanding the healthcare system

- Demographic and societal change

Table 1: Trends and drivers affecting the health and social services system

Demographic and societal change	Agents (high agents)
<ul style="list-style-type: none"> Increasing life expectancy Implications for emergency to health and social services jobs acute shortages of doctors, nurses and social workers increase in the age profile of the professional workforce increasing costs of training workers in the health care sector pressure to increase the international mobility of health workers shrinking the age of retirement 	<ul style="list-style-type: none"> Technology (high agents)
	<ul style="list-style-type: none"> Decreasing world of consumers of other people, upward trend in able people living alone Declining health care giving, rising health expenditure costs Reduction in national care, more demand on professional care

Source: OECD, 2004

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Regulators

Step 2: Scenarios

- Understanding of the interdependencies and dynamics of the health and social services system

Figure 3: Interdependency of subsystems in the welfare system

Source: OECD, 2004

Source: OECD, 2004

2006 Technology Foresight Training Programme
Module 3: Technology Foresight for Regulators

Step 2: Scenarios

- Existing scenarios from the health and social services

Scenario	Year	Health Expenditure as % GDP	Health Expenditure as % of GDP
OECD Health Care in 2002	2002	10.3	10.3
The World Bank of the 19th 2002	2002	10.3	10.3
The Maastricht Scenario	2002	10.3	10.3
Health and Education 2015	2015	10.3	10.3
Health and Education 2025	2025	10.3	10.3
Health and Education 2035	2035	10.3	10.3
Health and Education 2045	2045	10.3	10.3
Health and Education 2055	2055	10.3	10.3
Health and Education 2065	2065	10.3	10.3
Health and Education 2075	2075	10.3	10.3
Health and Education 2085	2085	10.3	10.3
Health and Education 2095	2095	10.3	10.3

Source: OECD, 2004



Appendix C (continued)

24 November 2006

Presentations (15)

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Step 1: Vision

• **Three integrated visions**

1. A best 'guesstimate'
2. Problem plagued
3. Visionary

Excerpt from presentation slide showing text about 'Three integrated visions'.

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Step 2: Scenarios

• **Nine indicators around which there are variable degrees of uncertainty**

1. Health status of the population; life expectancy; morbidity rates, especially amongst the elderly; health divides and health financing
2. Lifestyles and values: individualism versus collectivism; standing of expert knowledge; consumption; intergenerational harmony and/or animosity; life-style drugs
3. Health and social care funding regimes: dependency ratios; public versus private/market provision; cost containment measures; co-payments and self-funding; incentives (e.g. reduced insurance payments) to encourage self-care
4. Prevention and self-care
5. Growing and changing demand on services
6. Widespread use of ICT
7. Genomics and biotechnology
8. Primary and community care
9. Employment organisation and workforce skills

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Step 2: Scenarios

• **Three integrated visions**

1. A best 'guesstimate'
2. Problem plagued
3. Visionary

Excerpt from presentation slide showing text about 'Three integrated visions'.

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Step 2: Scenarios

• **Three integrated visions**

1. A best 'guesstimate'
2. Problem plagued
3. Visionary

Excerpt from presentation slide showing text about 'Three integrated visions'.

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Step 2: Scenarios

• **Wildcards**

• ...events that have less than a 10 per cent chance of occurring, but will have a tremendous impact on society and business if they do occur" (R.Amara et al, p.cxii)

Excerpt from presentation slide showing text about 'Wildcards'.

2006 Technology Foresight Training Programme
Module 2: Technology Foresight for Organisations

Step 3: Policy and action proposals

• **European health policy landscape**

• **Community action programme for public health**

Figure 20: Action programmes on public health (2007-2008)



Appendix C (continued)

24 November 2006

Presentations (15)

2006 ForeSight Foresight Training Programme
Health & Technology Foresight for Medicine

Step 3: Policy and action proposals

- Specific policy challenges:
 - reforming health and social care funding systems;
 - exploiting ICT;
 - tackling major health determinants;
 - exploiting and regulating developments in genomics and other biotechnologies

Ozcan Saritas 28 MANCHESTER

2006 ForeSight Foresight Training Programme
Health & Technology Foresight for Medicine

Summary

- Future is uncertain and thus there is multiplicity
- Scenarios are helpful
 - to create multiple images of the future, thus
 - to be ready for the alternative courses of future developments
- Scenarios elicitate and represent knowledge of participants in an interactive and coherent way
- Scenarios are widely used in Foresight exercises, not only for the product benefits, but also for the process benefits

Ozcan Saritas 28 MANCHESTER

2006 ForeSight Foresight Training Programme
Health & Technology Foresight for Medicine

UNIDO Training Programme on TF 2006
TF 04 Organizers - Module 1

Questions / Comments?

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Appendix C (continued)

24 November 2006

Presentations (16)

2004 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

Understanding different Foresight techniques

Attila Havas
 Institute of Economics,
 Hungarian Academy of Sciences

1

2004 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

Foresight Methods

A Havas
 Institute of Economics, HAS

2

2004 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

The design and use of foresight techniques in emerging economies

3

2004 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

Choice of level

A) Catching-up challenges ⇒ start with a holistic foresight programme at a *national* level
 Skills, experience, process results and 'products' obtained → sectoral and/or regional foresight programmes with a higher probability of success

B) *Sectoral or regional* programmes as pilot projects to 'test' the willingness of potential participants, collect experiences about various techniques, etc.
 'On-the-job' training and preparation for a national foresight programme

A Havas
 Institute of Economics, HAS

4

2004 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

Choice of focus, objectives, methods ...

Definition/ Selection of

- focus
- objectives (holistic - sectoral, time horizon)
- methods (e.g. Delphi (2 types), panels: micro, mezzo, macro)
- topics/ issues for discussion (Delphi, panels)
- people (SG, panel chairs, secretaries, members) expertise, affiliation, age, gender, openness, geo coverage, language skills, etc.

A Havas
 Institute of Economics, HAS

5

2004 Technology Foresight Training Programme
 Module 10: Technology Foresight for Organisations

Choice of methods

Transition => emphasis on "futures" (visions, not fully fledged scenarios)

Taxonomy of scenarios (L. Miles)

	Top-Down Approaches	Mixed Approaches	Bottom-Up Approaches
Exploratory Approaches	1	2	3
Mixed Approaches	4	5	6
Normative Approaches	7	8	9

Trade-off between methodological sophistication vs. social & financial costs, willingness to embark upon a demanding project

A Havas
 Institute of Economics, HAS

6



Appendix C (continued)

24 November 2006

Presentations (16)

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Organisations

Delphi-survey: benefits

- (i) collects information (experts' opinion)
- (ii) disseminates those pieces of information, thus contributes to consensus building, or identifies dissenting views
- (iii) involves more participants in the process (as opposed to the case when only panels are used)

A Horne
Director of Research, IAG

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Organisations

Delphi-survey: questions

Number of technical/ technological experts: a large-scale postal survey vs. a supporting tool at experts' meetings

Collecting opinion vs. a decision-oriented Delphi

Balance between the strictly technological and non-technological issues in the Delphi-statements (rows of the questionnaire)

Appropriate questions (the column headings): focus and objectives of the programme

How to create consistency among the questions (column headings), the nature of statements/ issues (rows in the questionnaire) and the country characteristics?

Appropriate size of the questionnaire (the number of statements and questions)

A Horne
Director of Research, IAG

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Methods to Technology Foresight for Organisations

Delphi vs. Futures

Statements are single events (phenomena)	Complex inter-relationships, causalities
Answers in the context of the current situation	How to change the current situation
Actions/ strategies for firms, R&D institutes (Japan: policies, too?)	Policy recommendations (How to 'sell' them?)

A Horne
Director of Research, IAG

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Methods to Technology Foresight for Organisations

Methodological difficulties

Panel & macro visions
timing, harmonisation, structure, variables

Visions (futures) — Delphi

A Horne
Director of Research, IAG

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Methods to Technology Foresight for Organisations

Complex issues vs. prog. structure

Education, life-long learning

Environmental issues

Impacts (threats and opportunities) of ICT

Social cohesion

Competitiveness

Large firms (MNCs), SMEs (indigenous)

Manufacturing, services, marketing

R&D, innovation processes, diffusion

New materials

Σ conscious efforts to discuss cross-cutting issues, facilitate co-operation among panels

A Horne
Director of Research, IAG

2006 Technology Foresight Training Programme
Methods to Technology Foresight for Organisations

Conclusions

No 'best practice' ('optimal', 'ideal' blueprint) for programme design ↔ good practices

No 'hierarchy' ('absolute advantages') of particular methods/ techniques

Costs and benefits of certain methods (their 'fit' to the context) vs. their actual conduct (efficiency, transparency, 'fairness', representation, etc.)

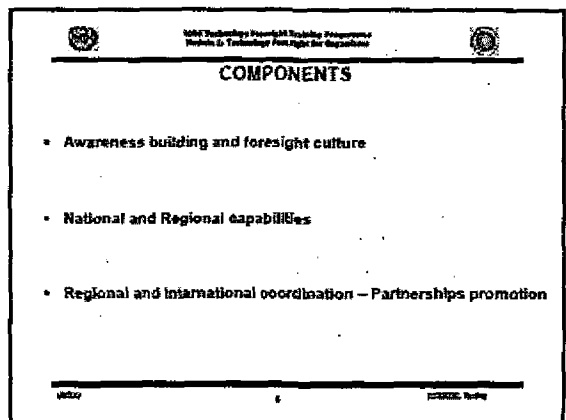
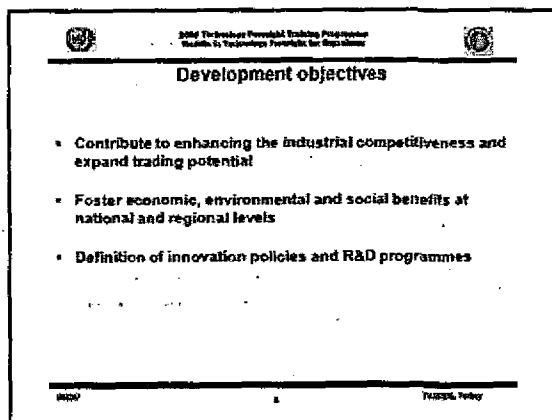
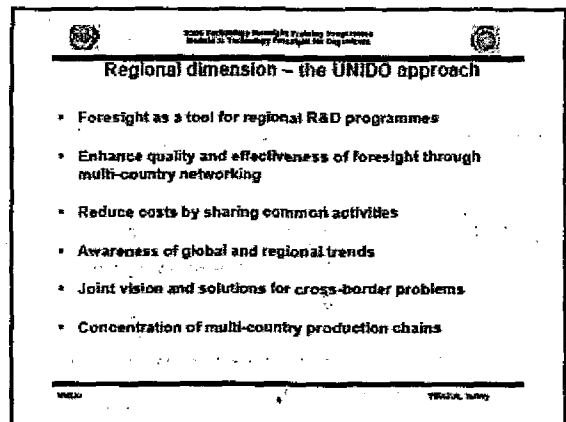
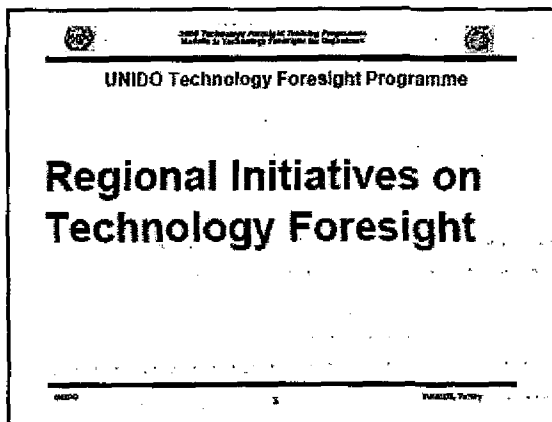
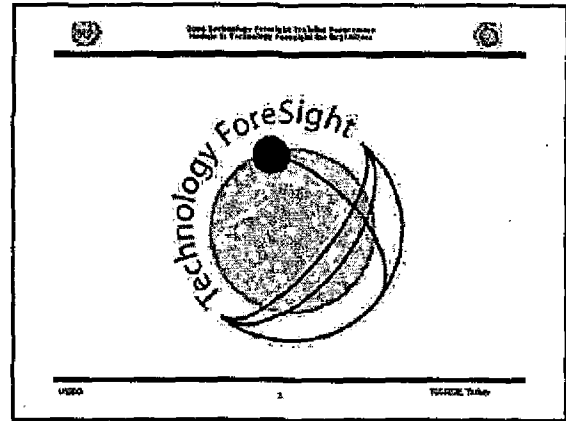
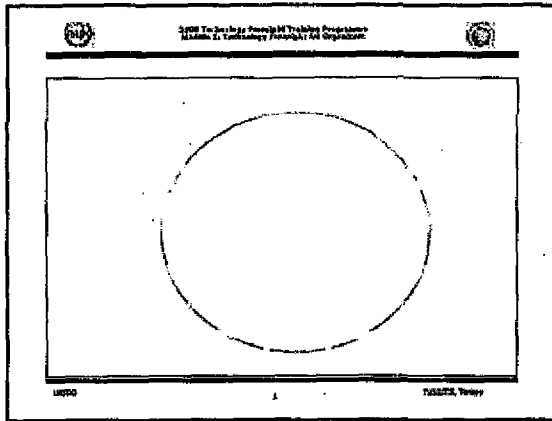
A Horne
Director of Research, IAG



Appendix C (continued)

24 November 2006

Presentations (16)





Appendix C (continued)

24 November 2006

Presentations (16)

UNIDO Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

UNIDO support

- International Conferences and workshops on best practices and methodologies (national and regional)
- Integration in the regional initiative
- Promote industry participation
- Task force of experts and methodology development during the foresight exercise
- Cooperation in the post-foresight process

UNIDO 7 TUBES, Turkey

UNIDO Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

TOOLS AND METHODOLOGIES

- Book on Technology Foresight principles
- Web page (linked to UNIDO Exchange)
- CD-ROM
- Manuals
- Delphi on-line
- TF for Production Chains (national and supra-national)

UNIDO 8 TUBES, Turkey

UNIDO Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

UNIDO Technology Foresight Programme

- Regional Initiative on Technology Foresight in CEE/NIS
- Regional Initiative on Technology Foresight in CEE/NIS

UNIDO 9 TUBES, Turkey

UNIDO Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

Policy Transfer EU -> CEE

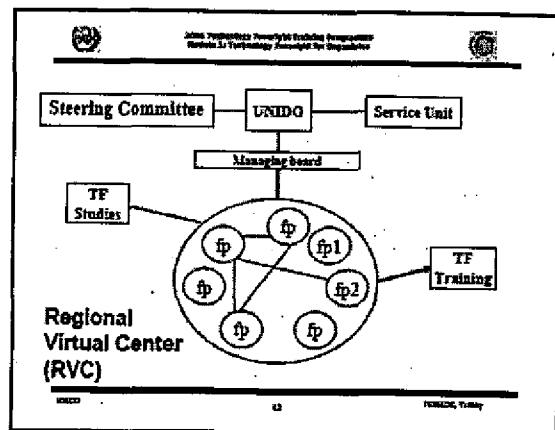
UNIDO 10 TUBES, Turkey

UNIDO Technology Foresight Training Programme
Module 11: Technology Foresight for Engineers

IMPLEMENTATION OF THE TF INITIATIVE CEE/NIS

ACTIVITIES/ BUILDING	EVENTS	TRAINING	STUDIES	COORDINATION AND PARTNERSHIP
2001	INTERNET LIFE - REGIONAL CONFERENCE - Experts Group	MODULE 1 Background	METHODS and TOOLS	CEE GROUP
2002	WEB PAGE - New Database	Network CO-OP	EU ACCESSION 2004 Autonomous Approach	NATIONAL FOCAL POINTS
2003	+ WEB TF Summit 2003 Background	MODULE 2 Delphi - MODULE 2 Process	BIOTECHNOLOGY	INDUSTRIAL PARTNERS
2004-05	+ POLICY TF Summit 2004 Background	MODULE 3 Delphi - MODULE 3 Process - MODULE 4 Delphi, Delphi - MODULE 4 Process	PRODUCTION CHAINS Pattern/Panel	- REGIONAL R&D PROGRAMS - REGIONAL VIRTUAL CENTRE

UNIDO 11 TUBES, Turkey





Appendix C (continued)

24 November 2006

Presentations (16)

2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Companies

REGIONAL FORESIGHT STUDIES IN CEE

- Impact of EU-Accession to local industries
 - Agro-food industry
 - Automotive industry
- Challenges and opportunities of Biotechnology
- Water resources protection
- Networking, e-business and market access
- Competitive Production Chains
 - Food industry

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2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Companies

FORTHCOMING EVENTS

- Training on Corporate Foresight, Bratislava, February 2007
- 2007 Technology Foresight Summit - Budapest, Hungary - September 2007

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2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Companies

UNIDO Technology Foresight Initiative

- Regional Initiative on Technology Foresight in Latin America

Regional Initiative on Technology Foresight in Latin America

UNIDO 24 TURKISH, Turkey

2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Companies

REGIONAL LATIN AMERICA

- National foresight programmes:
 - Chile - Identify strategic economic and technology sectors
 - Brazil - Production chains: textiles, plastics, wood, construction
 - Uruguay - Macro-sectors trends: food biotechnology, energy and transportation and logistics
 - Venezuela - Application of the results of the TF exercise

UNIDO 24 TURKISH, Turkey

2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Companies


REGIONAL LATIN AMERICA

- Regional foresight studies and activities:
 - Brazil - Technology Fair of the Future (2004)
 - Chile, Colombia, Ecuador, Peru - Future of the Fishery Industry in South American Pacific coast (2005)
 - Bolivia, Ecuador, Peru - Future of the Andean Products (2006)

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2006 Technology Foresight Training Programme
Module 1: Technology Foresight for Companies

Regional Foresight Exercises



Regional foresight exercise can contribute to raise awareness and create consensus among the stakeholders interested on the sustainable reorganization of the corresponded production chain.

UNIDO 24 TURKISH, Turkey

Appendix C (continued)

24 November 2006

Presentations (16)

2006 Technology Foresight Training Programme
Module 4: Technology Foresight for Organisations

Perspectives of Regional Foresight Exercise for Production Chains

Products Production processes Markets

Identification of:
Opportunities for the regional production chains and industries
Needed technology enhancement

14/20 27 TÜRKİYE, Turkey

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Module 4: Technology Foresight for Organisations

Special characteristics of the exercise:

Participation of different countries
↓
Plurinational
↑
Multisectorial
Complex production chains

15/20 28 TÜRKİYE, Turkey

2006 Technology Foresight Training Programme
Module 4: Technology Foresight for Organisations

REGIONAL LATIN AMERICA

THE FUTURE OF
THE FISHERY INDUSTRY
South American Pacific Coast

10078
Fishery Industry LATAM

16/20 29 TÜRKİYE, Turkey

2006 Technology Foresight Training Programme
Module 4: Technology Foresight for Organisations

Fishery Productive Chain

RESOURCES - Marine Fresh water Agriculture	EXTRACTION Factory ships Salts Small scale Agriculture	PROCESSING Canned Frozen Cured Concentrated Hydrolysed Meats and stock oils	HUMAN CONSUMPTION Dietary oil Refined oil Branched food Animal feed
INDUSTRIAL INPUTS Input materials and fuel agricultural goods - Industrial intermediate goods Production services Capital goods Infrastructure			

17/20 30 TÜRKİYE, Turkey

2006 Technology Foresight Training Programme
Module 4: Technology Foresight for Organisations

Methodology

Strength and weakness of the environment National productive chains: Sectors, industry, markets

National Diagnostics

Regional Panel Regional Situation

National Panels National Foresight Studies Consultations

Regional Panel and Report

Critical Technologies Decision Making Processes Tools of Action

18/20 31 TÜRKİYE, Turkey

2006 Technology Foresight Training Programme
Module 4: Technology Foresight for Organisations

Future of the Fishery Industry in South American Pacific coast

Main results

- 1) Agreements on regional cooperation for improving productivity and competitiveness of selected sectors of the fishery industry.
- 2) Definition of regional R&D programmes.
- 3) Application of up-graded technologies in selected products and sectors of the fishery industry

19/20 32 TÜRKİYE, Turkey



Appendix C (continued)

24 November 2006

Presentations (16)

2006 Technology Foresight Technical Programme
Module 2: Technology Foresight for Organisations

Future of the Fishery Industry in South American Pacific coast

Recommendations for follow up programmes

- Definition of a regional policy
- Technology up-grading and investment promotion for re-conversion and modernization
- Creation of new regional center for capability building and technology watch/trend mapping
- Establishing a quality mark of origin for the fish products of the region

UNIDO 25 TUNGBA, Turkey

2006 Technology Foresight Technical Programme
Module 2: Technology Foresight for Organisations

Conclusion

The value of foresight is that it provides us the means to look ahead and reflect on the steps that may be required for coping with the coming future needs and challenges. Foresight studies provide us the chance not just to be prepared for the future but also....

to be able to shape it

UNIDO 26 TUNGBA, Turkey

2006 Technology Foresight Technical Programme
Module 2: Technology Foresight for Organisations

**UNIDO
TECHNOLOGY FORESIGHT
PROGRAMME**

 www.unido.org/foresight

Ricardo Seid da Fonseca
INDUSTRY PROMOTION AND TECHNOLOGY BRANCH

UNIDO 27 TUNGBA, Turkey

Appendix D - List of Participants

List of Participants 1/4

**Technology Foresight for Organizers
Training Course
20 - 24 November 2006 Gebze (Turkey)**

Title	First Name	Last Name	Organization	Job Title	City	Country	E-Mail Address
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Appendix D (continued)

List of Participants 2/4

Technology Foresight for Organizers
Training Course
20 - 24 November 2006 Gebze (Turkey)

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Appendix D (continued)

List of Participants 3/4

**Technology Foresight for Organizers
Training Course
20 - 24 November 2006 Gebze (Turkey)**

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Mr.	Samuel	Olusunle	National Agency for Science and Engineering Infrastructure (NASENI)	Chief Engineer	Abuja, Nigeria	Nigeria	tolusunle@yahoo.co.uk
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Appendix D (continued)

List of Participants 4/4

Technology Foresight for Organizers
 Training Course
 20 - 24 November 2006 Gebze (Turkey)

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