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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
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TÜSSİDE

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

TÜBİTAK


Technology ForeSight

Contents

Appendix

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)


Technology ForeSight

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 arosen.

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


Technology ForeSight

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&Horison&Themes

- CLIENTS/USERS
  Government (100%) / universities, R&D institutions, private firms (beneficaries 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

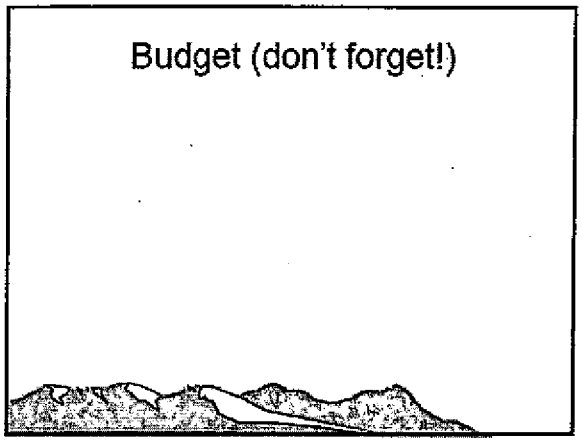
- Phase A:
  - 3 panels
    - New resources
    - Transition
    - New model
  - Diversity Panel
- Phase B:
- Depend on Phase A

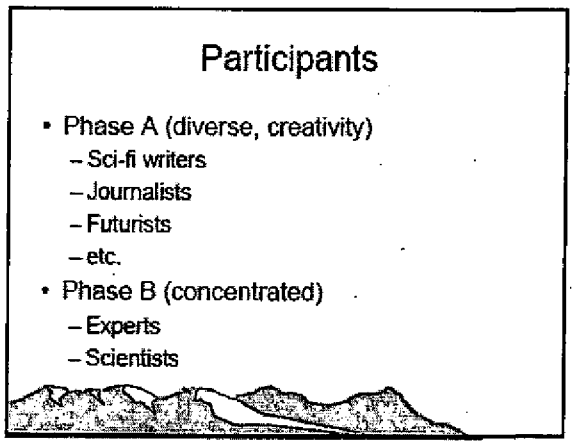
Methods

- 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





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**

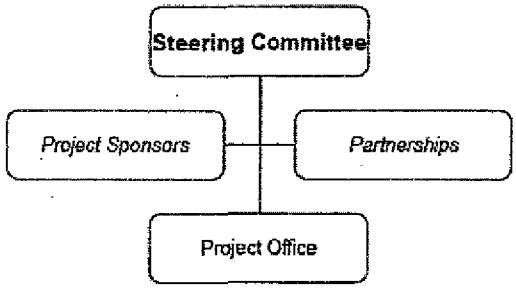
Methods

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

Appendix B - Completed Projects (continued)

GROUP B

Organizational Aspects



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?**

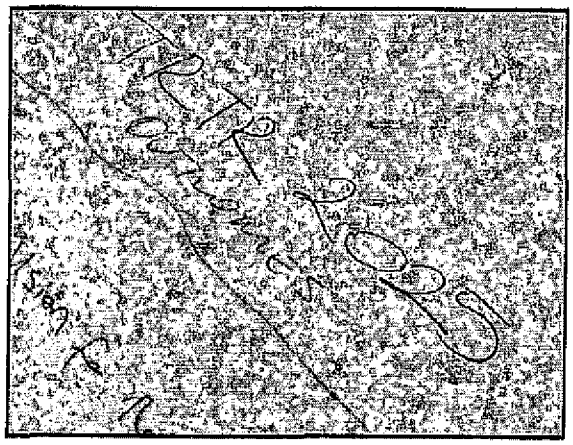
groupB@tusside.unido.org

Appendix B - Completed Projects (continued)

GROUP C

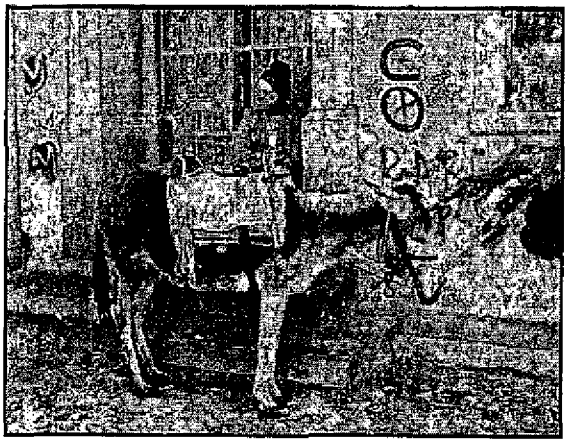
A SECTORAL FORESIGHT EXERCISE FOR AUTOMOTIVE INDUSTRY

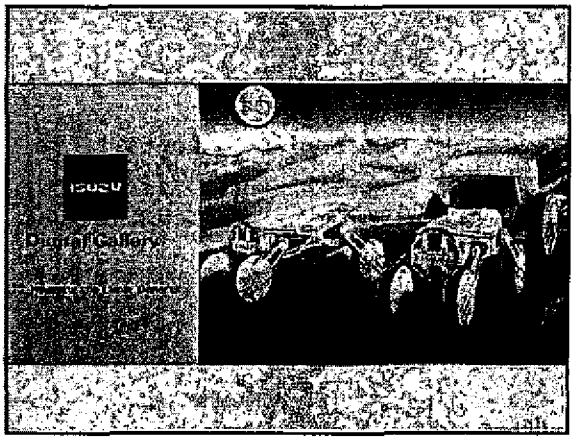
GROUP 3

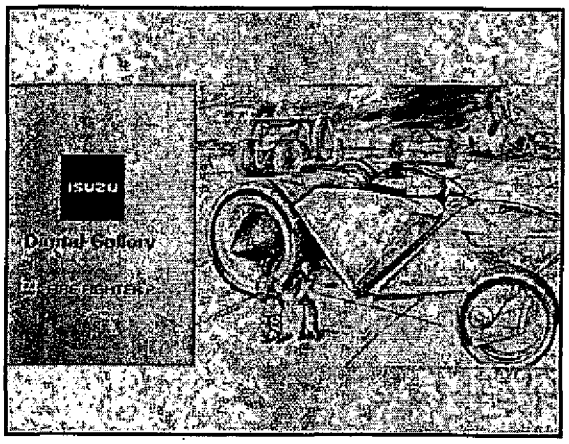


WHY TRTR 2025?

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

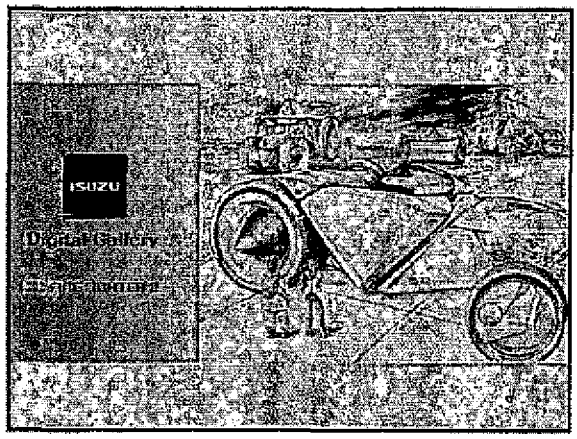






Appendix B - Completed Projects (continued)

GROUP C

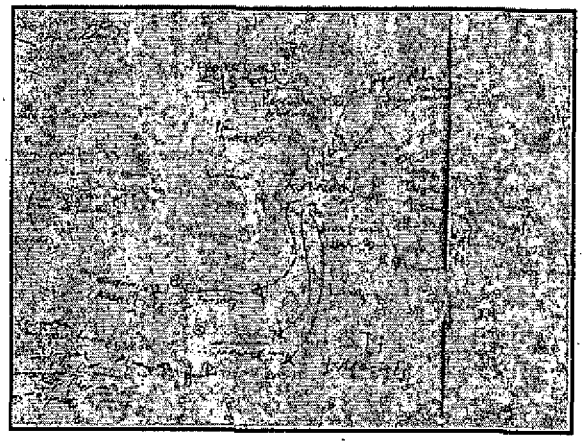


EXPECTED OUTCOMES

- 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 otside the country)
- Constructers (Inside and otside the country)
- NGOs (Enviromental, health related)
- Internatonal 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 NGGOs)
- 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

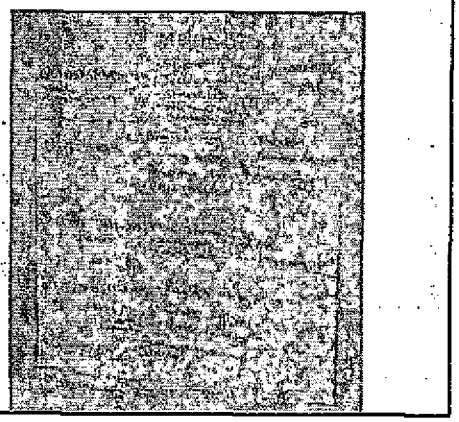
2.SYNTHESIS
- Brainstorming, scenario writing,relevance trees, wild cards, simulation,interaction diagnosis,analogies

METHODS

3.ANALYSIS & SELECTION
- Panels, Benchmarking, Conferences, Delphi, Prioritization

4. TRANSFORM
- Workshops with other experts, roadmapping, cross impact, interviewing

5. ACTION
- Roadmapping, seminars

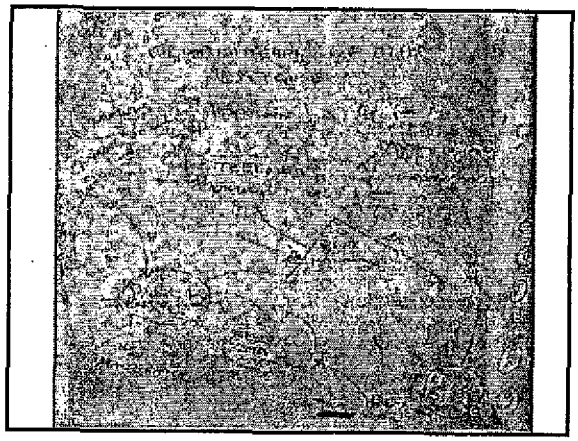


EXPERTISE NEEDED FOR METHODS

- 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 (Reprenentatives from automotive ind., government, NGO...)
- Panels
- Project manager
- External experts
- Participants app. mixture

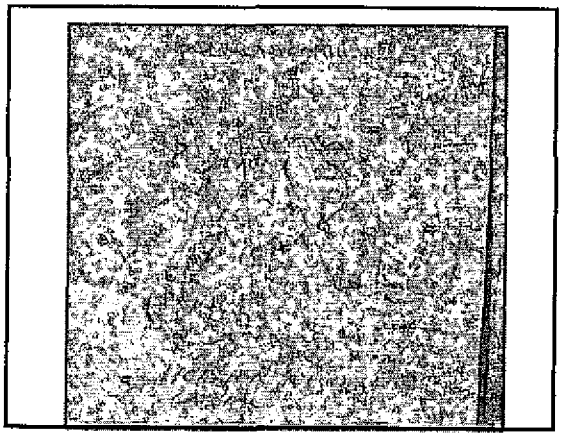


Appendix B - Completed Projects (continued)

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
- Indentify pnonbes 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 intergrator and etc.)
- Types of priorities (research. Development and etc.)
- Objectives...
- Technical opportunities
- Tasks

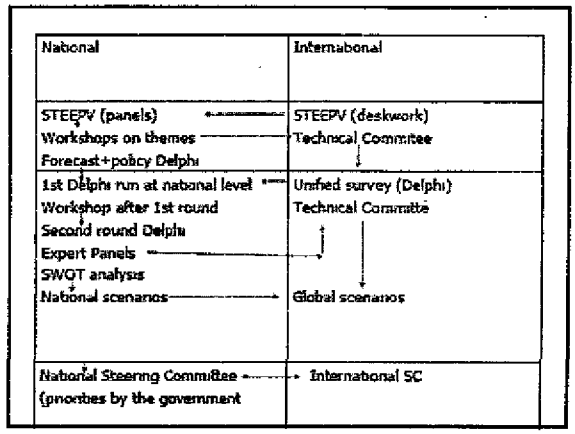
Budget

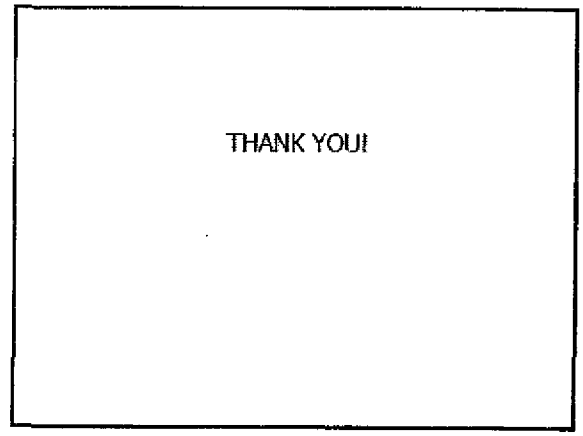
- Meetings of International Steering Committee – 5
- Meetings of Technical committee – 9
- External Consultants
- National panels and workshops

Total = $1.5 mln.

Appendix B - Completed Projects (continued)

GROUP D

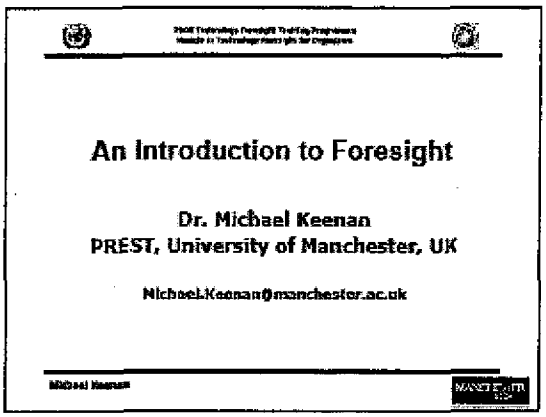


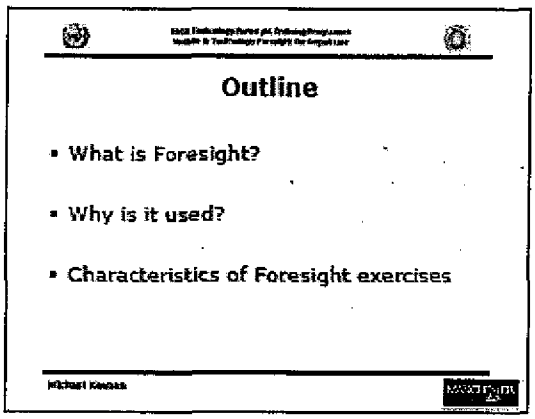


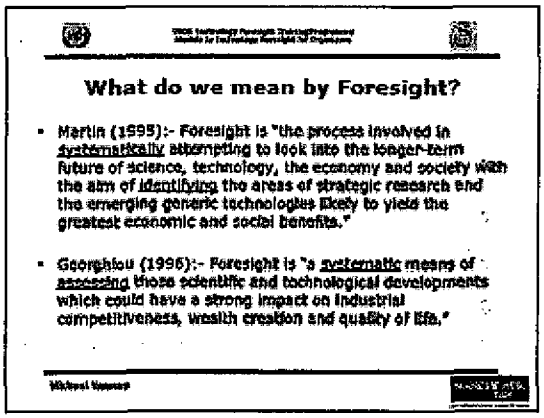
Appendix C- Presentations

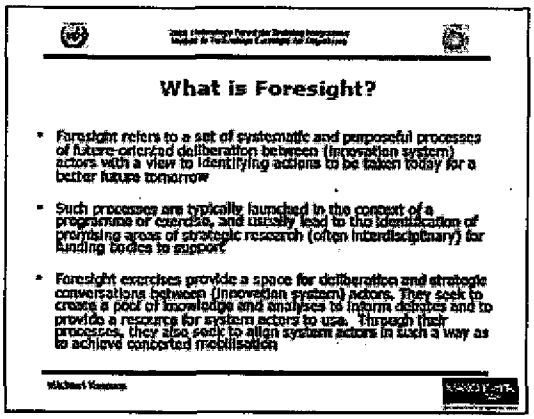
20 November 2006

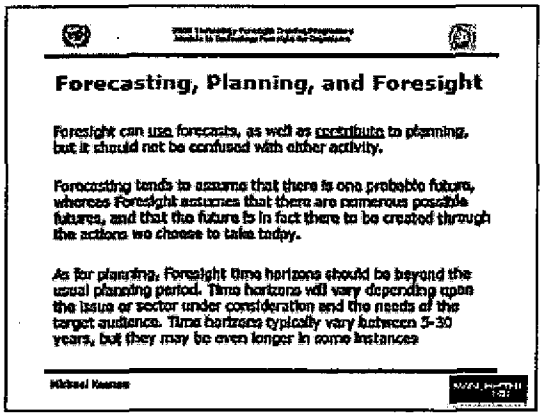
Presentations (1)

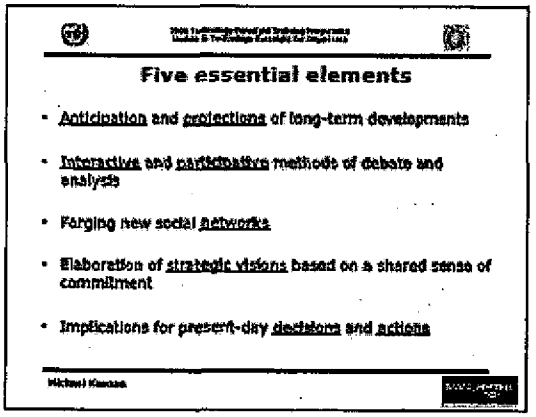








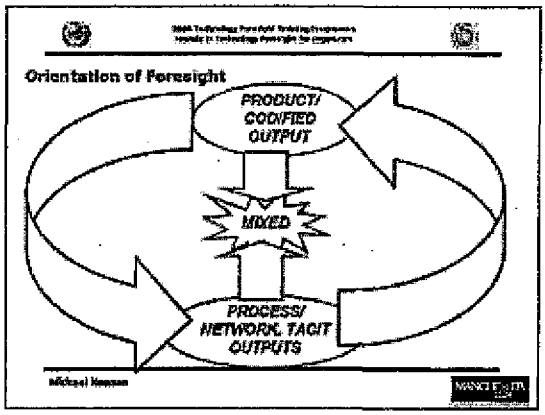


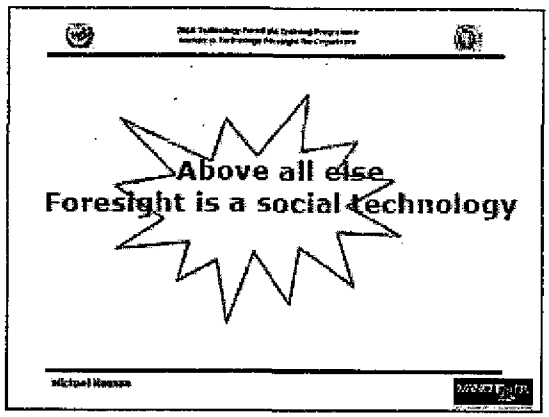


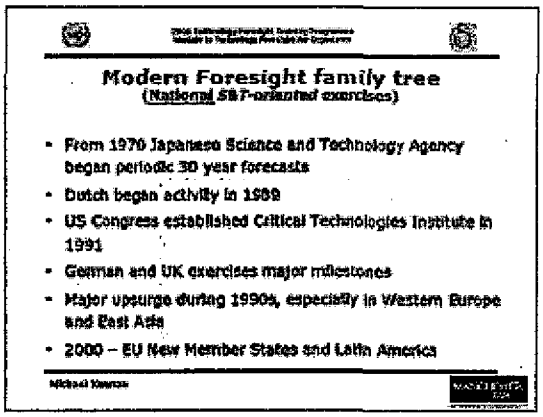
Appendix C (continued)

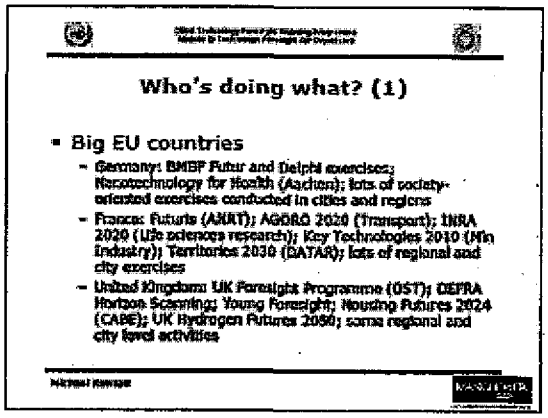
20 November 2006

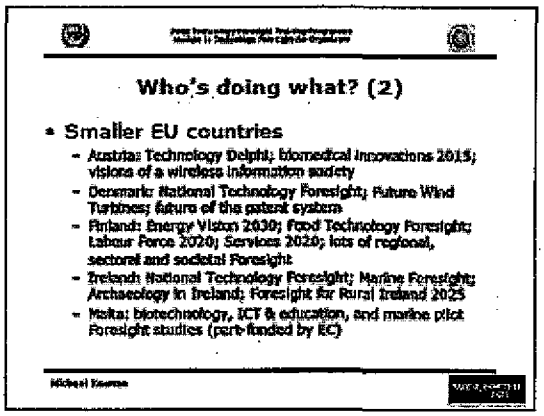
Presentations (1)

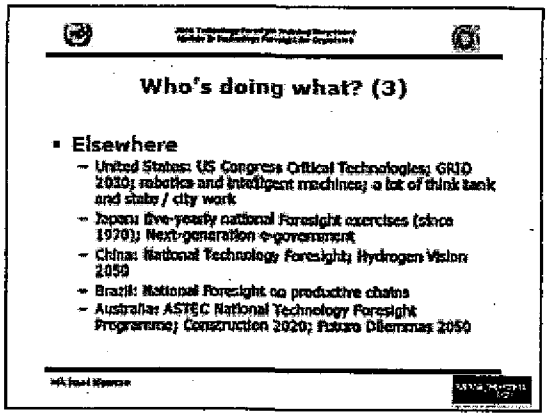












Appendix C (continued)

20 November 2006

Presentations (1)

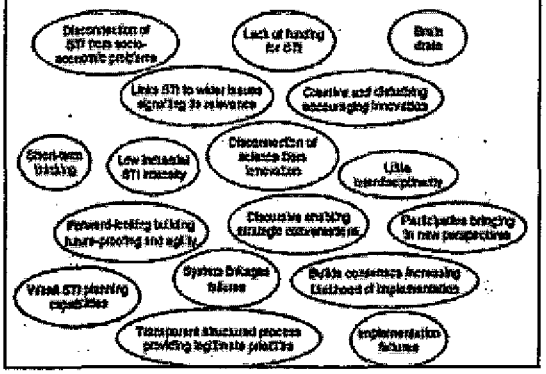
Explaining the diffusion of Foresight...

- 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 coalitions => from elitism to pluralism? From hierarchies and markets to networks?
- Policy transfer (bandwagon effects?)
- The "Millennium Effect"
- Activities of international organisations, e.g. EC, UNIDO, etc.

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:
  1) Creation of visions and/or priority-setting
  2) Better wired innovation systems
  3) Development of a "Foresight culture"
- Often more locally-specific objectives too

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



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

Examples of results to expect

- During the Exercise
  - Production of baseline and benchmarking reports
  - Building of new linkages
  - Changing perceptions / new understanding / enlightenment
  - Articulation 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

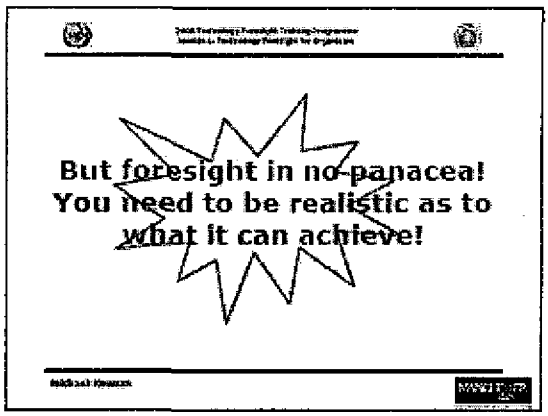
Reported Impacts (www.cfms.es)

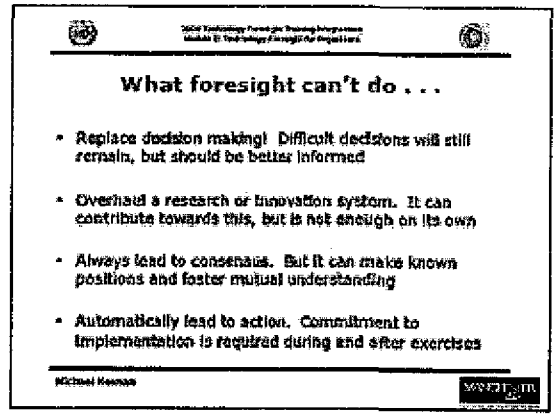
- Better informed strategies in general
- Making the case for increased investments in R&D
- Using foresight results to evaluate and future-proof strategies
- More informed STI priorities
- Development of new ways of thinking
- Creating a language and practice for thinking about the future
- Highlighting the need for a systemic approach to both policymaking and innovation
- Development of reference material for policymakers and other innovation actors
- Better evidence-based policy
- A source of inspiration for strategic ministerial actions
- Creation of new networks and clusters
- Establishment of communication structures between innovation actors
- Collective learning through an open exchange of experiences
- Enhanced organisational position and positive image of those regions running a foresight
- Better visibilities of a region's strengths and competencies
- Interest from the general public
- Achievement of long-term visions of the productive system through a refined emphasis on high technology
- Accumulation of experience in using foresight tools and thinking actively about the future
- Stimulation of others to conduct their own foresight exercises after being inspired
- ...

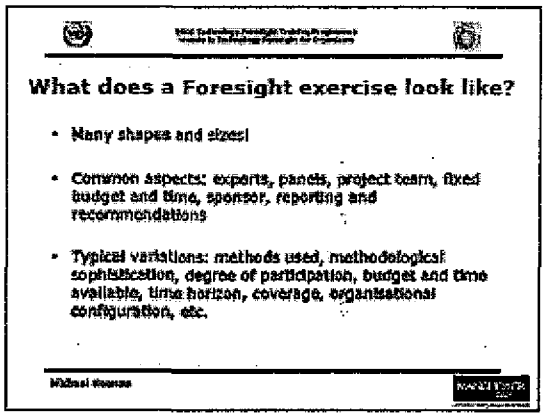
Appendix C (continued)

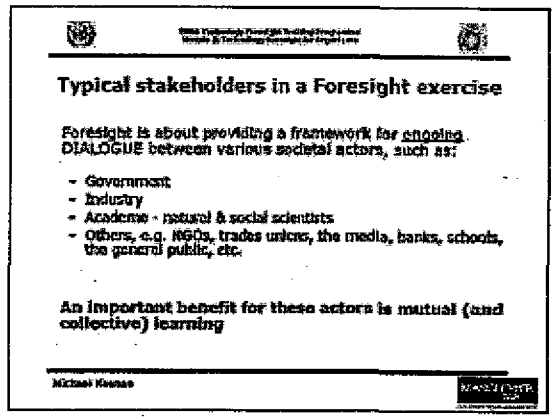
20 November 2006

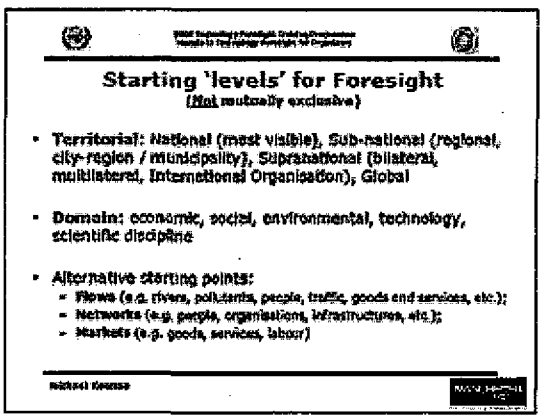
Presentations (1)

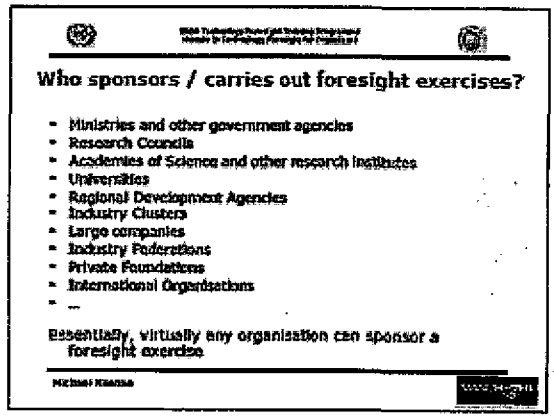








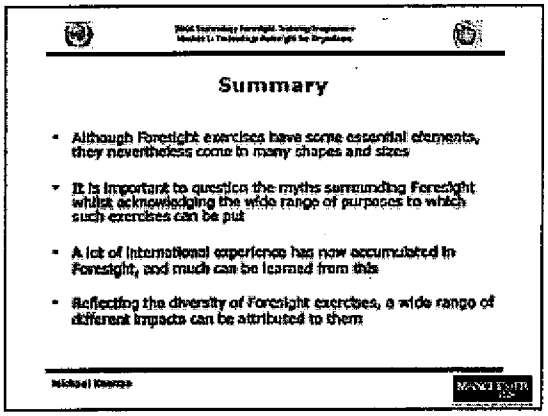


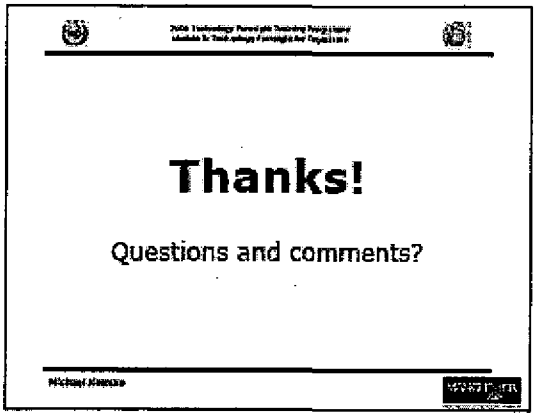


Appendix C (continued)

20 November 2006

Presentations (1)





Appendix C (continued)

20 November 2006

Presentations (2)

The Role of Foresight in Strategic Thinking and Policy Formation

Attila Havas
Institute of Economics,
Hungarian Academy of Sciences

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

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 → 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)*

Competitiveness and RTDI

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

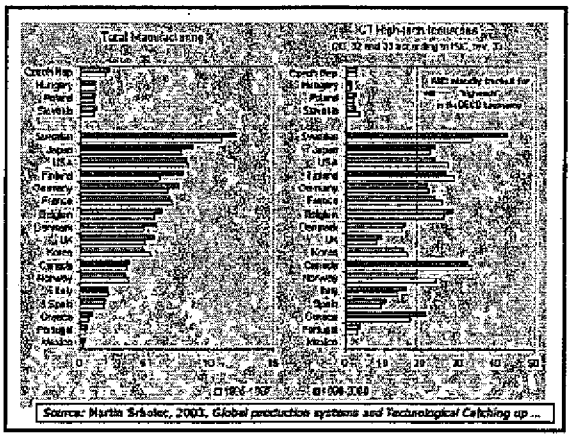
Innovation, knowledge-intensive activities ⇒ higher local knowledge content, better paid jobs, long-term (sustained) competitiveness

Innovation ≠ 'high-tech'!!

Different sets of policies

'wholesale' subsidies, keeping low wages

orchestrated RTDI, FDI, HR, regional dev., (...) policies



Source: Martin Srholec, 2003, *Global production systems and Technological Catching up ...*

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)

⇒ competitiveness

Evolutionary, systemic approach to RTDI

Not only in emerging/ transition economies

Appendix C (continued)

20 November 2006

Presentations (2)

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 ⇒ growth, improved competitiveness

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
- ...

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

Theoretical Background: Economics of Innovation

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 ⇒ heterogeneity (diversity) vs. 'repr. agent'

Linear vs. network (interactive) model

Policy Implications

Uncertainty ⇒ 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 ⇒ 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 ⇒ adequate policy tools to foster

Co-ordination of various policies

Appendix C (continued)

20 November 2006

Presentations (2)

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

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.

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

Hypes vs. Evolutionary, Systemic Approach: Transition economies

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

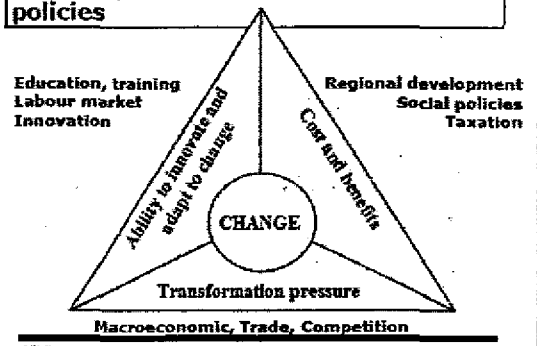
R&D – innovation (competitiveness) should NOT be separated

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)

3. Policy Context/ Challenges

Change (innovation) and government policies



Appendix C (continued)

20 November 2006

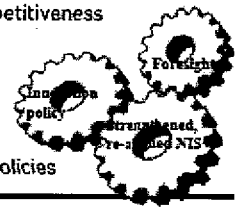
Presentations (2)

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

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



4. The Relevance of Foresight

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
- ??

Differentiating Foresight

Action-oriented [vs. 'contemplative' (passive)]

Participatory [vs. non-participatory]
(see next slide)

Alternative futures [vs. a single future state]

Participatory Programmes

Meet *all* the 3 criteria below:

a) involve participants from at least two different stakeholder groups (e.g. researchers and business people; experts and policy-makers; experts and laymen)

b) 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

c) seek feedback from this wider circle

Appendix C (continued)

20 November 2006

Presentations (2)

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.

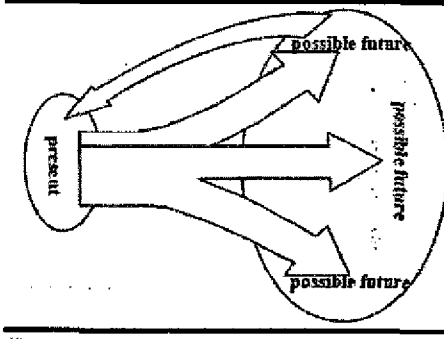
Definition: EU HLEG, 2002

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

Foresight can improve the policy formulation process by

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



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)

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)

Appendix C (continued)

20 November 2006

Presentations (2)

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

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

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

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)

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

Thanks!

Questions, comments?

havasatt@econ.core.hu

Appendix C (continued)

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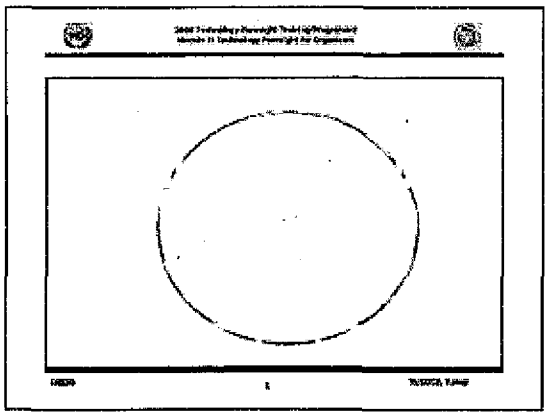
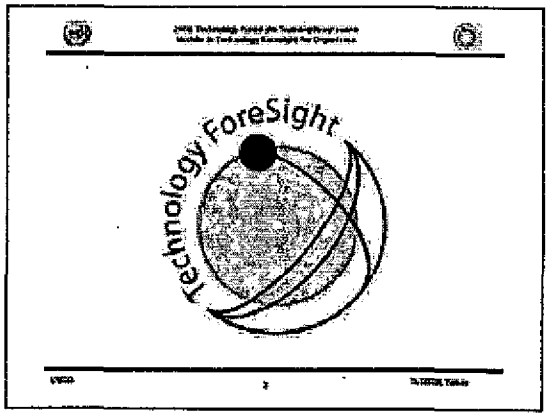
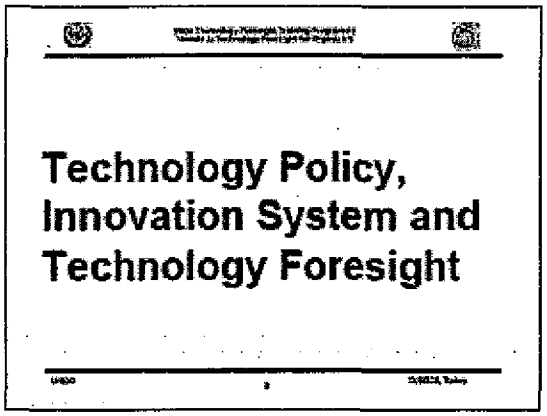
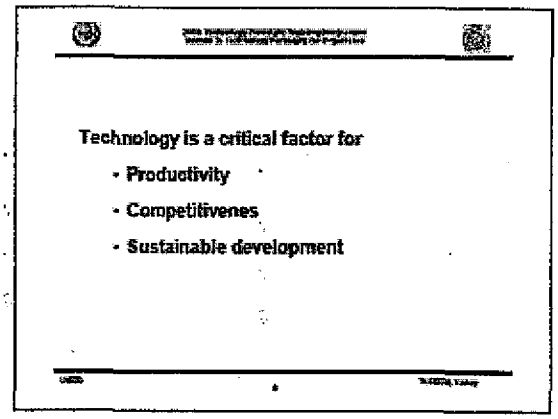
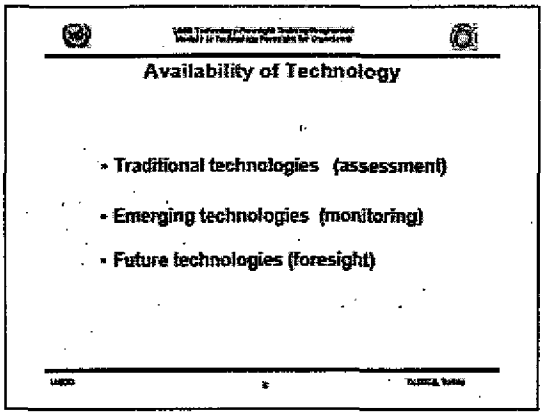
Presentations (3a)

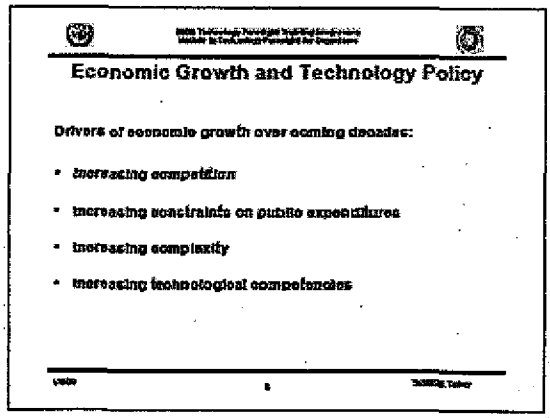












Appendix C (continued)

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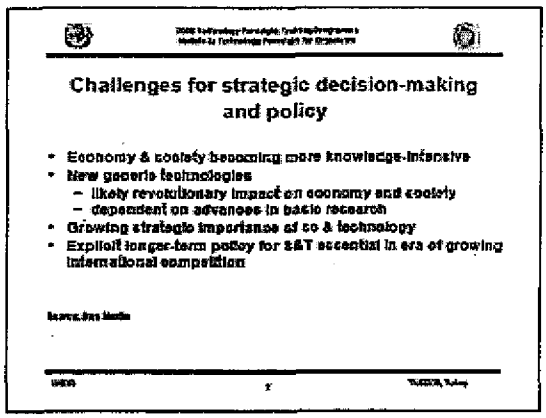
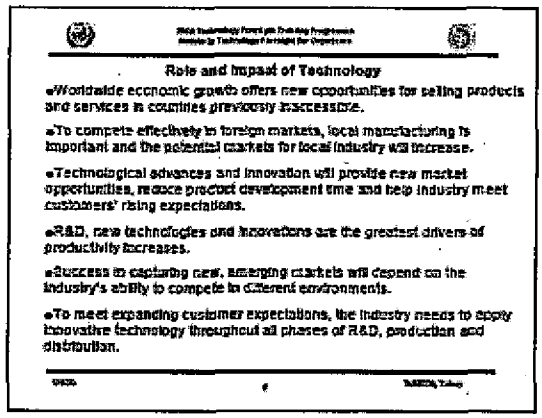
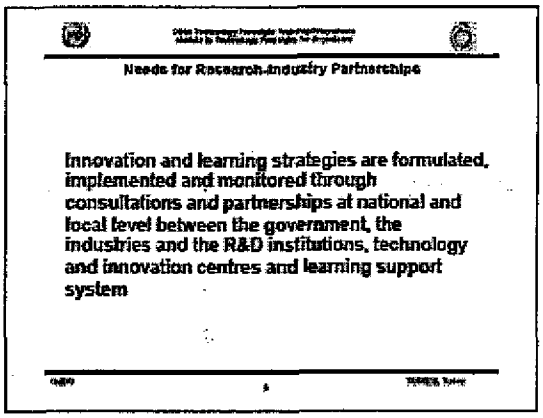
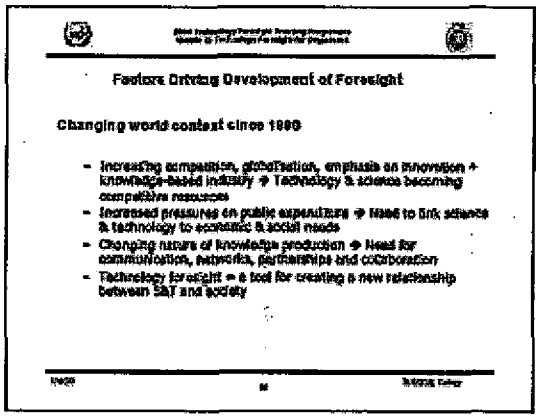
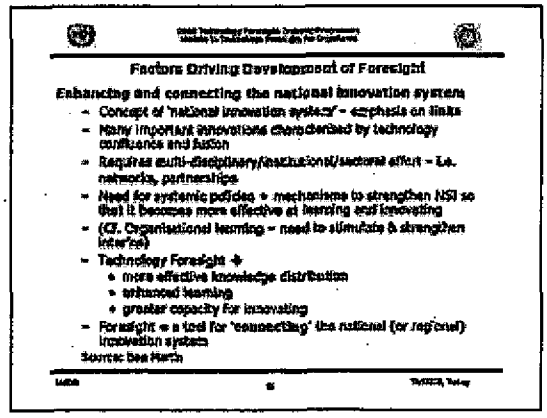
Presentations (3a)

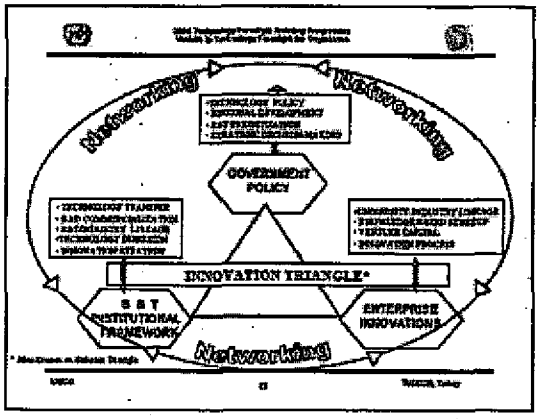








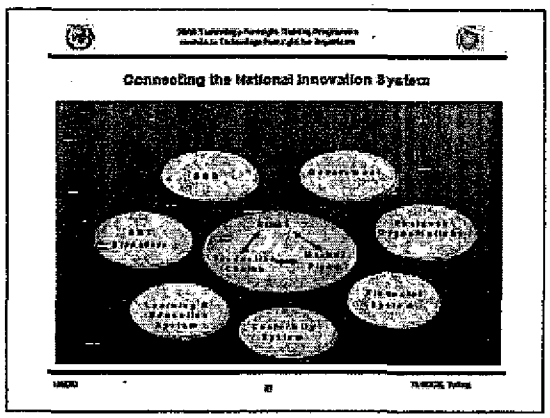


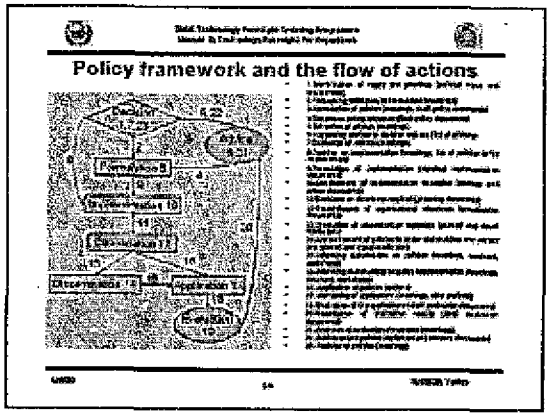


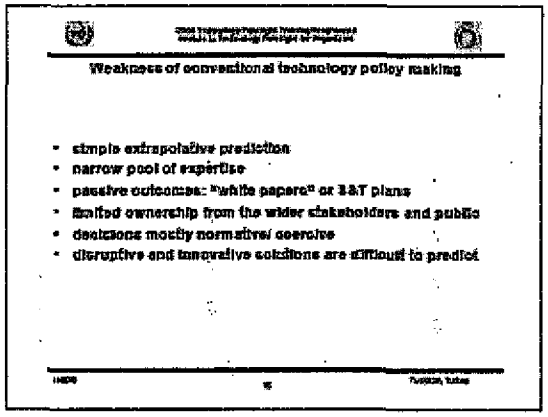
Appendix C (continued)

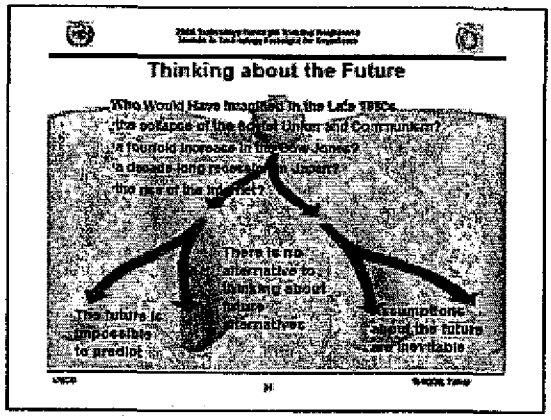
20 November 2006

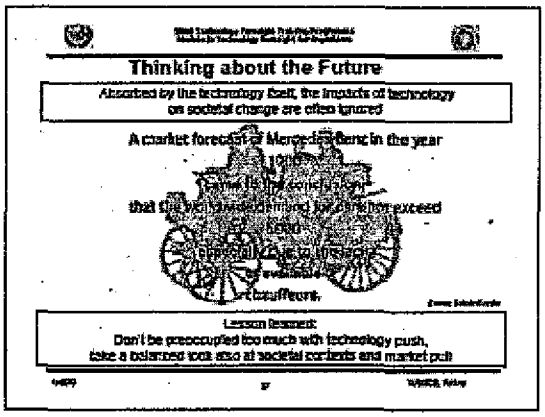
Presentations (3a)

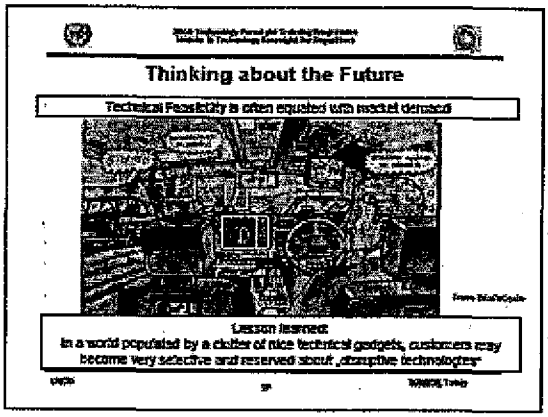








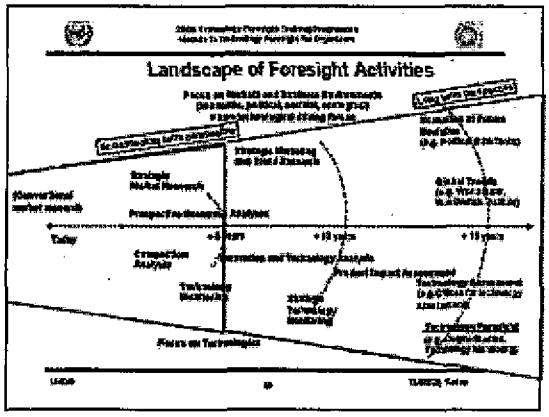




Appendix C (continued)

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. It is not 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 in 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.

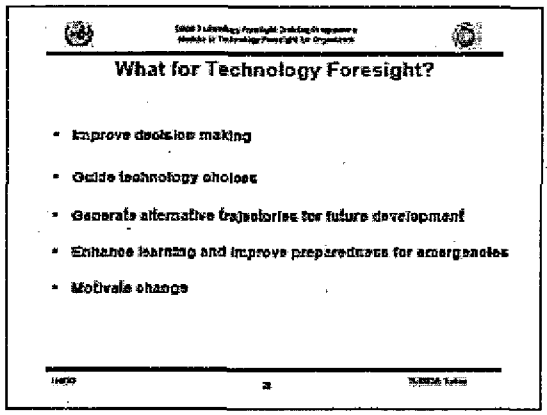
Foresight – Why?

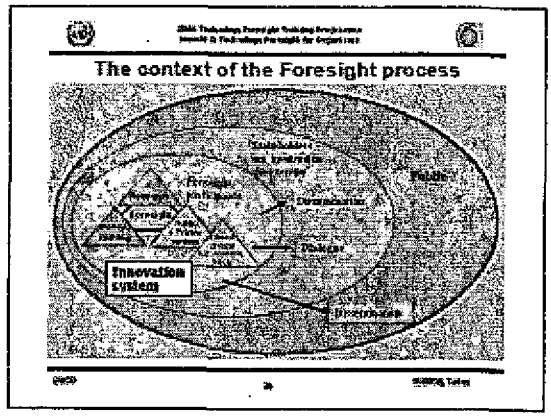
- Funding agencies have to be able to set priorities (ideally based on consensus) due to fund constraints.
- Future technologies will require modified structures in R&D. The state has to shape these in time ("interdisciplinarity!").
- Governmental funding has to be transparent and accountable to the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

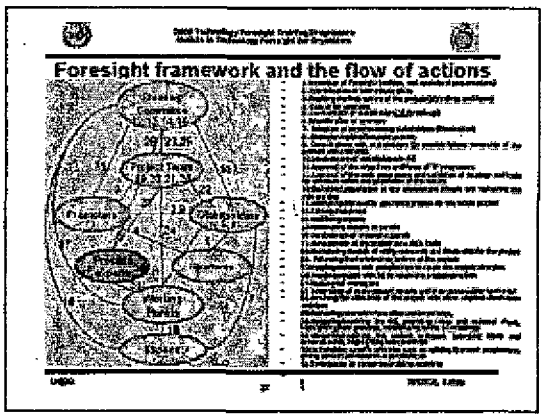
Appendix C (continued)

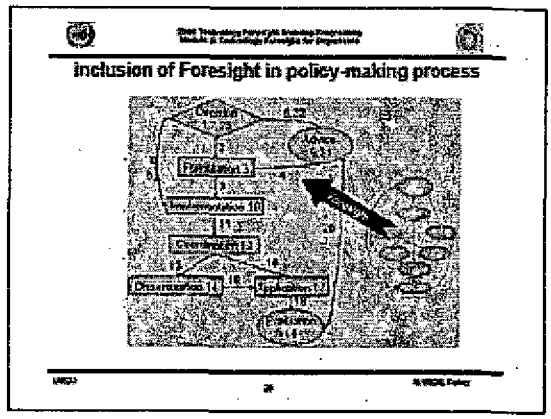
20 November 2006

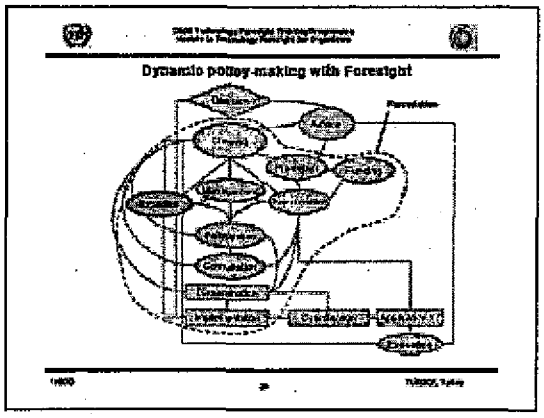
Presentations (3a)

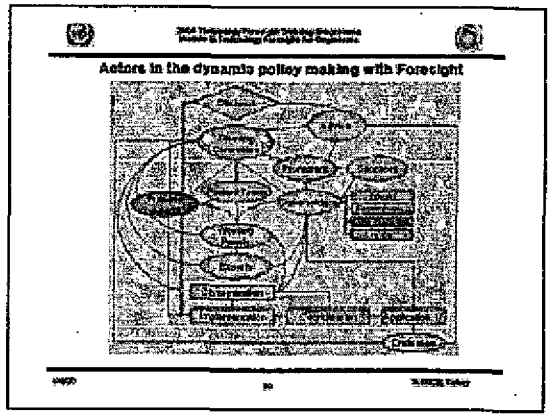








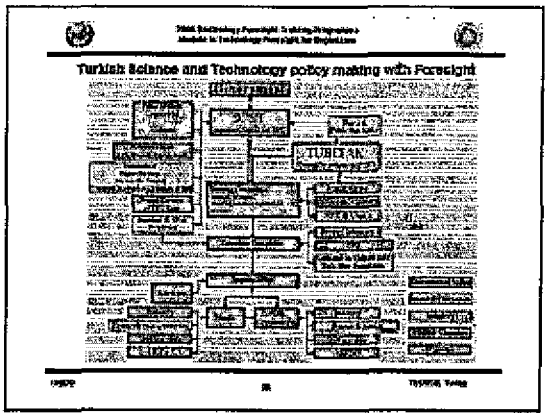


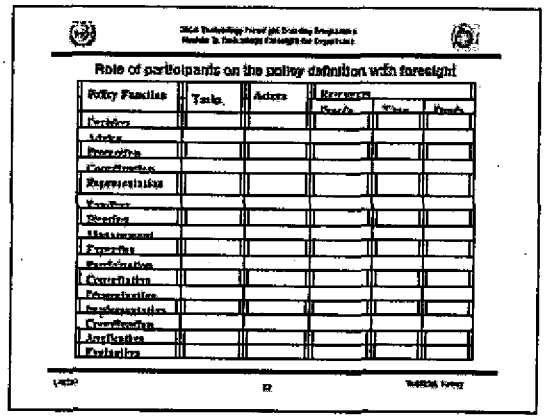


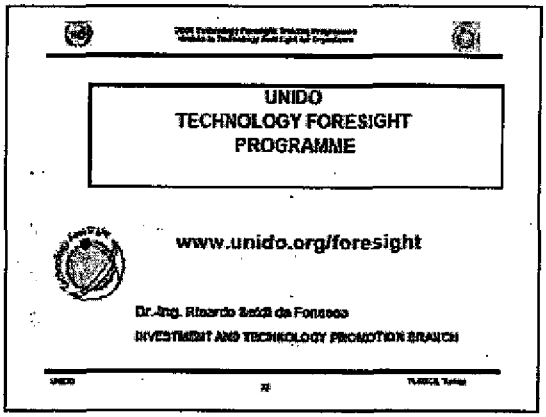
Appendix C (continued)

20 November 2006

Presentations (3a)







Appendix C (continued)

20 November 2006

Presentations (3b)

Some key elements of the Foresight process

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EARMA

UNIDO Course: 20/11/06 Gebze, Turkey

EARMA

EARMA

European Association of

Research Managers & Administrators

Working Group on Intangible Assets

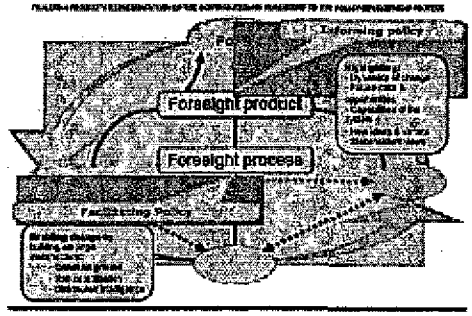
V2H3K in HERO's

(Valuing Intangibles and Managing Knowledge in Higher Education and Research Organisations)

www.earma.org

EARMA

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



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?"

BEFORE STARTING....

Identify & acknowledge:

what are the external limiting factors

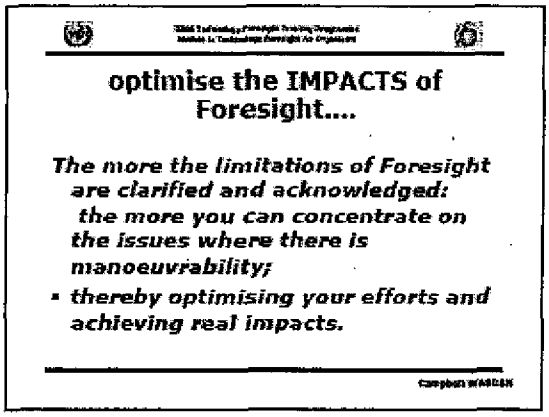
Why?

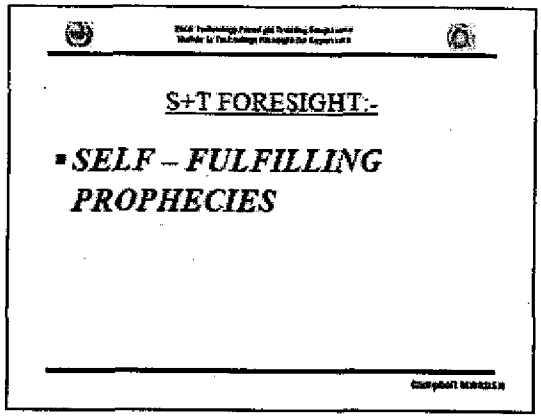
So as to ensure the achievement of a realistic impact.

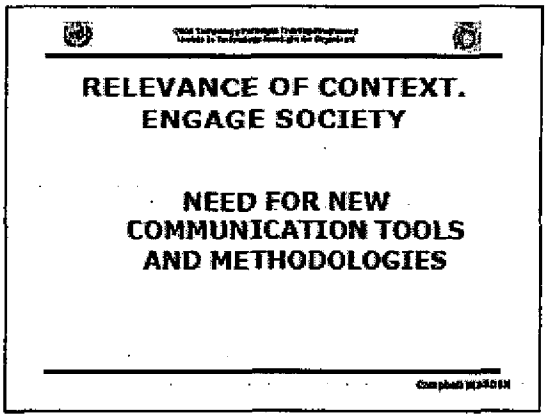
Appendix C (continued)

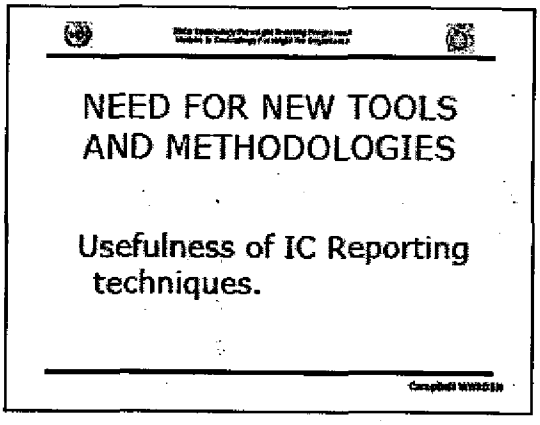
20 November 2006

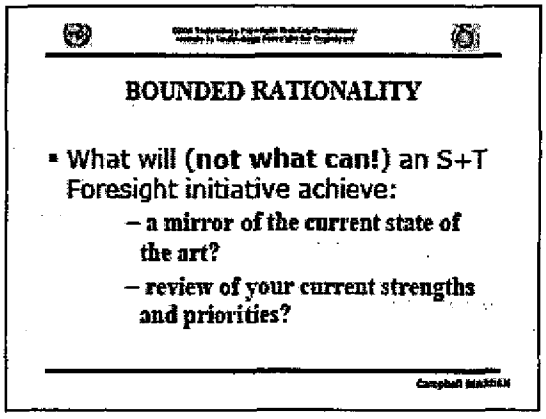
Presentations (3b)

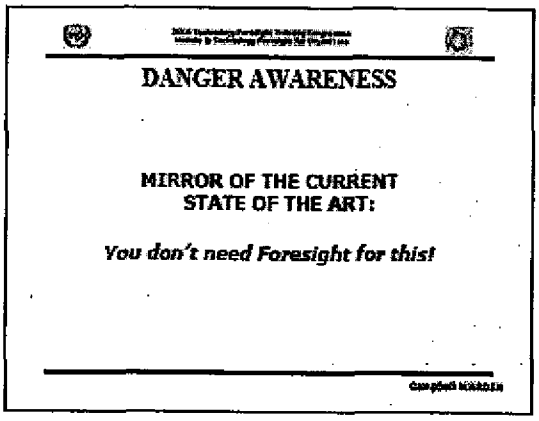












Appendix C (continued)

20 November 2006

Presentations (3b)

DANGER AWARENESS

Make sure that the

FUTURE

is firmly embedded in your Foresight!

DANGER AWARENESS

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

Role of participants on the policy definition with foresight

Policy Function	Tasks	Actors	Resources		
			People	Time	Funds
Decision					
Advice					
Prescription					
Coordination					
Representation					
Pipeline					
Steering					
Measurement					
Expertise					
Participation					
Creativity					
Stimulation					
Implementation					
Coordination					
Application					
Evaluation					

A SKILL YOU NEED TO MASTER

- COMMUNICATION

&

- MANAGING RELATIONSHIPS ACROSS THE EXERCISE

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?*

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

Appendix C (continued)

20 November 2006

Presentations (3b)

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?

The rôle of the external adviser

As seen by the organiser of the Foresight exercise

Some factors you should consider ...

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

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?

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".

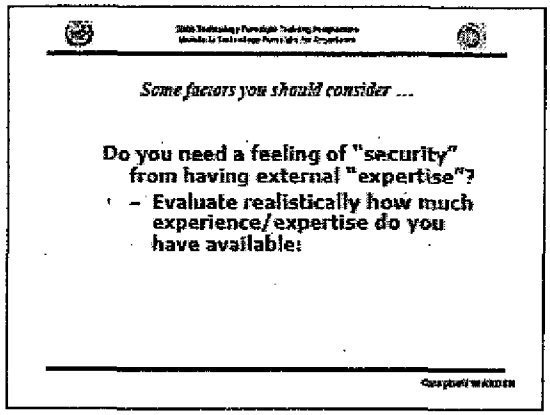
Some factors you should consider ...

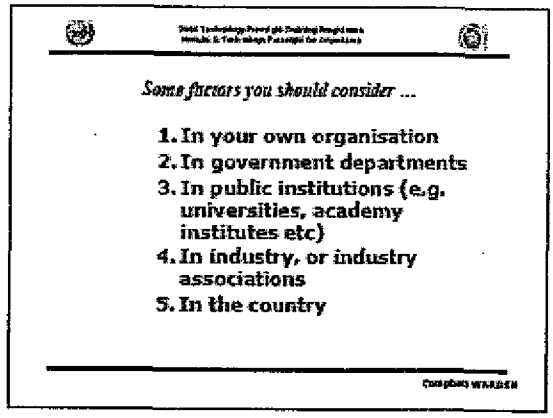
This may require choosing a few who are real experts and some who are "political heavyweights" (e.g. currently have or have had senior government or international organisation positions)

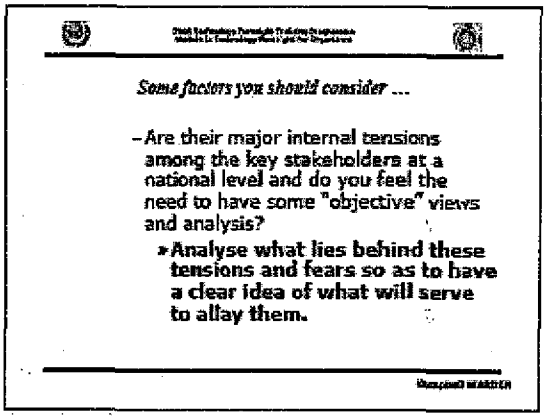
Appendix C (continued)

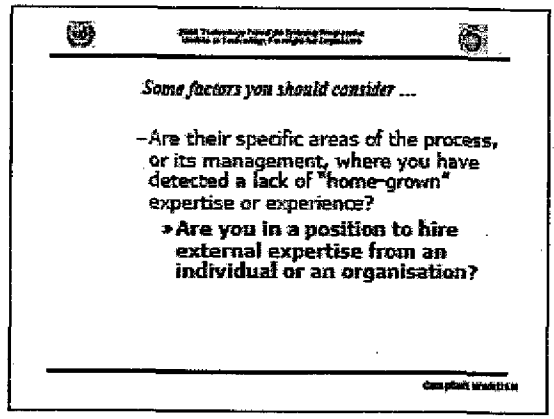
20 November 2006

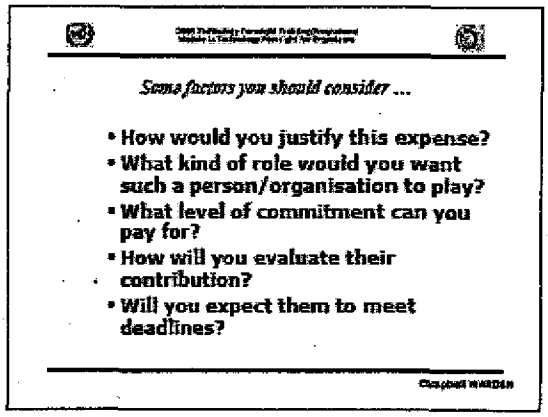
Presentations (3b)

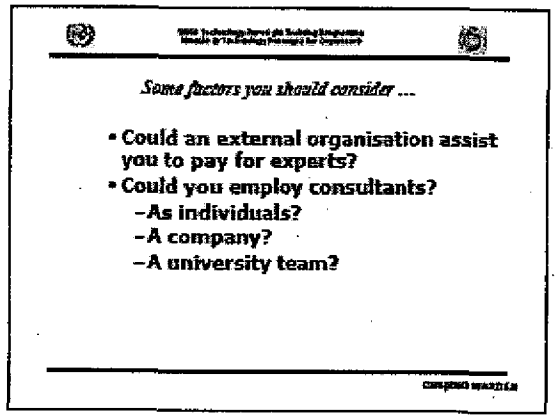












Appendix C (continued)

20 November 2006

Presentations (3b)

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

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?

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?**

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?**

Some factors you should consider ...

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

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?**

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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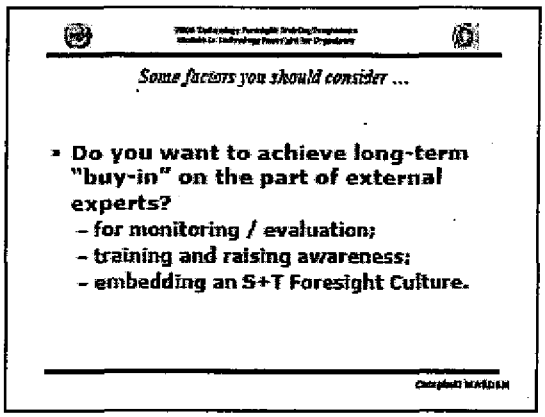
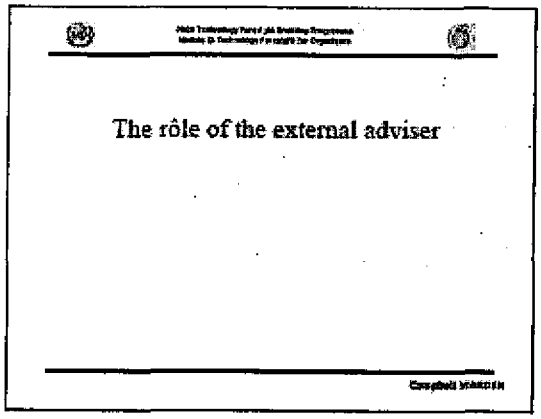
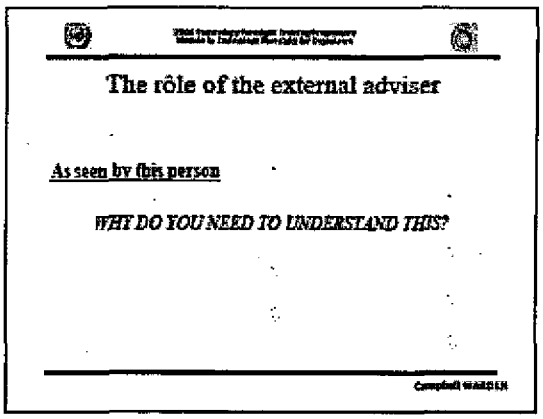
Appendix C (continued)

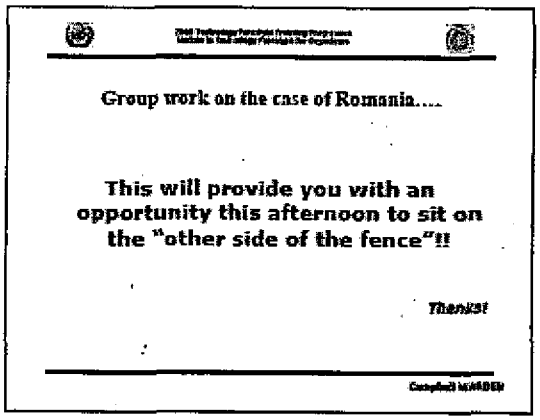
20 November 2006

Presentations (3b)









Appendix C (continued)

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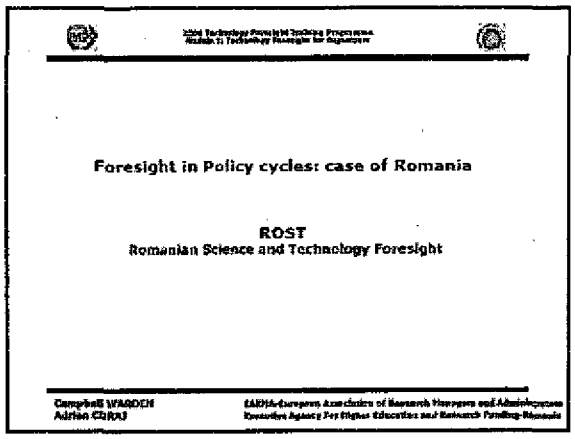
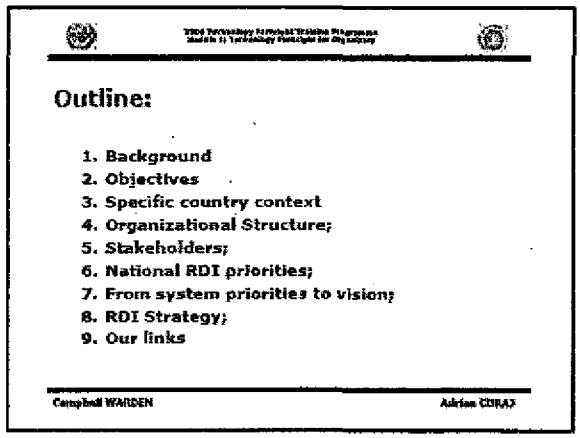
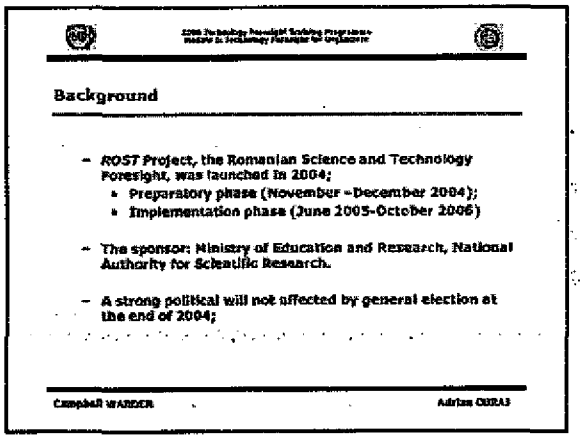
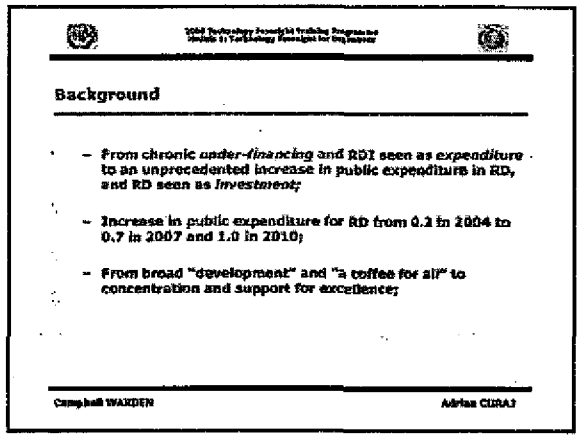
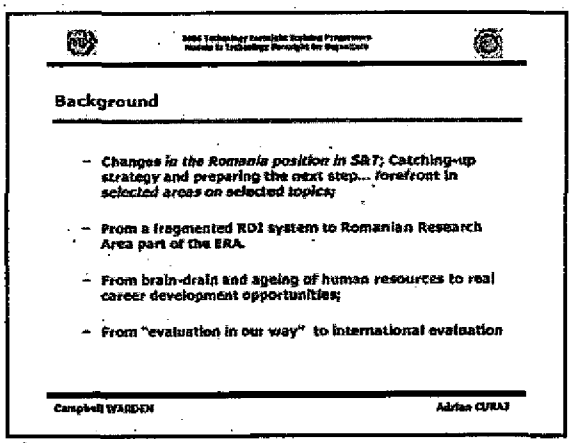
Presentations (4)

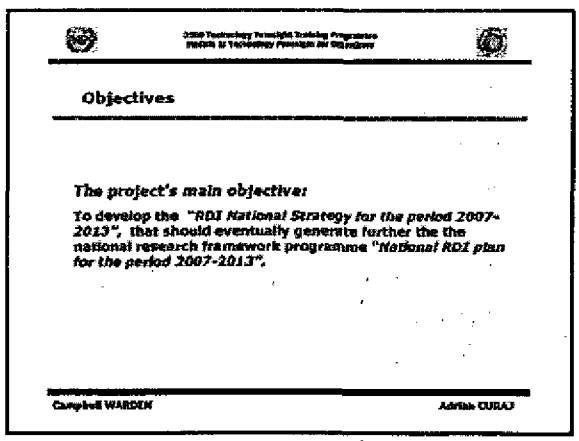








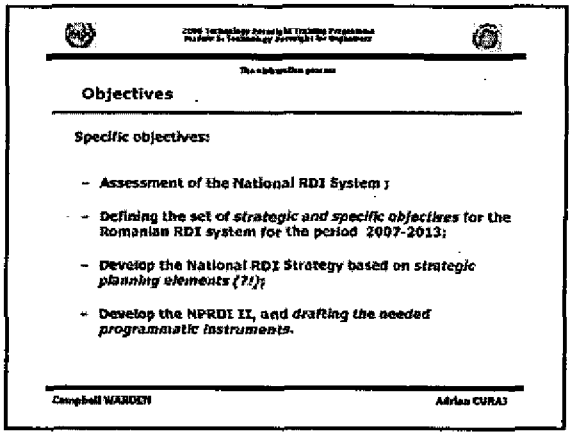


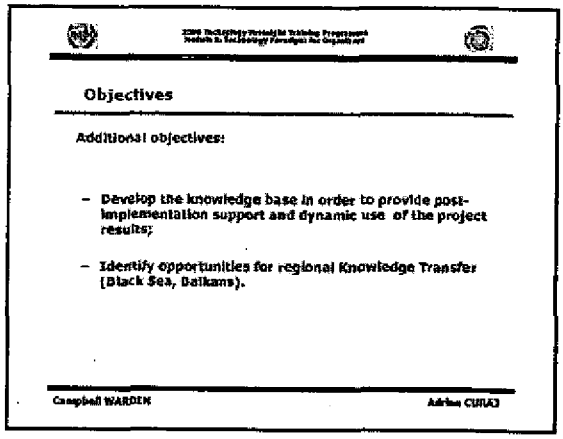


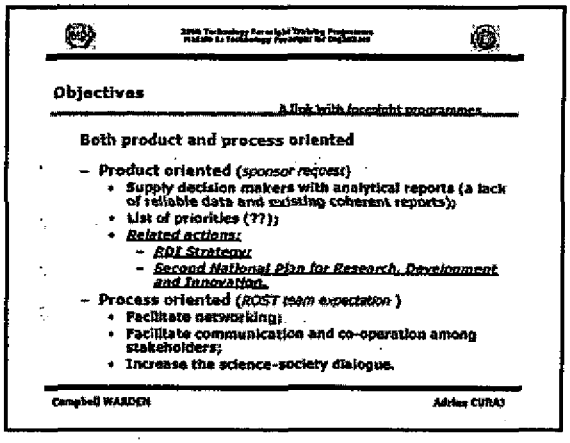
Appendix C (continued)

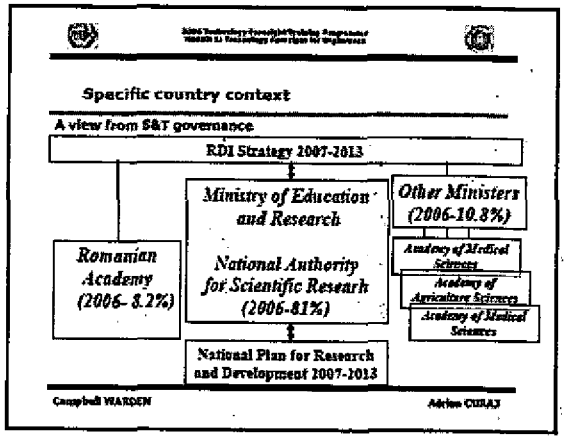
20 November 2006

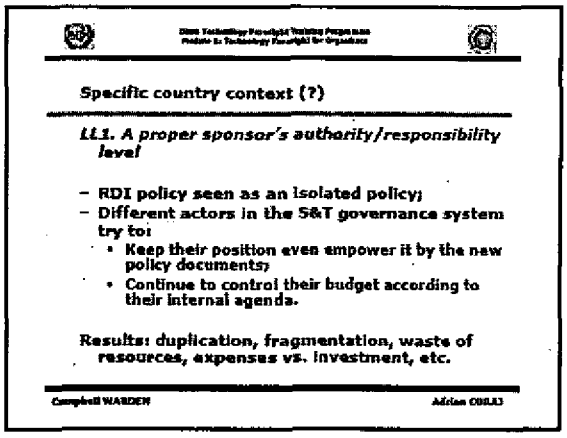
Presentations (4)

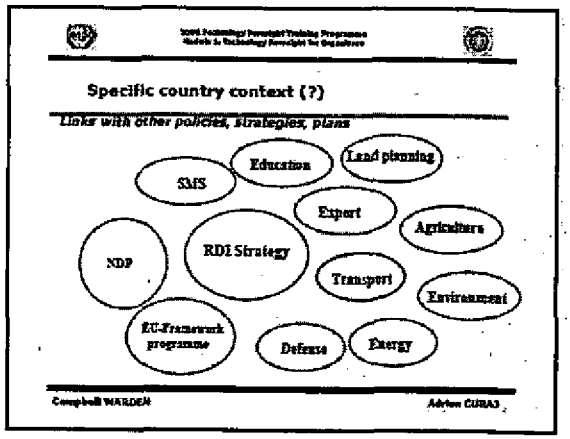












Appendix C (continued)

20 November 2006

Presentations (4)

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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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 contributes to its strategic objectives;
- ToR are not well defined;
- The expectations are not realistic (foresight a panacea?!);
- 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 (?!?)

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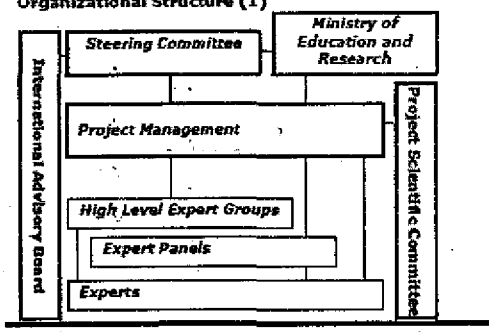
Organizational Structure (1)



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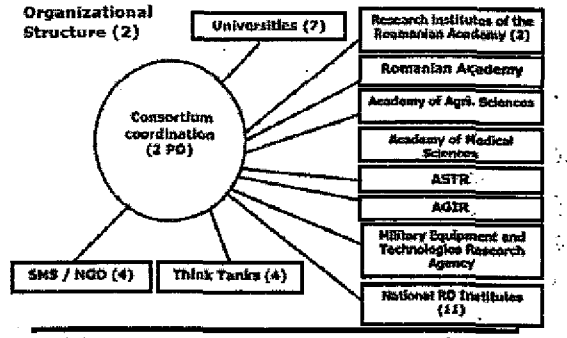
Organizational Structure (2)



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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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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 1 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?

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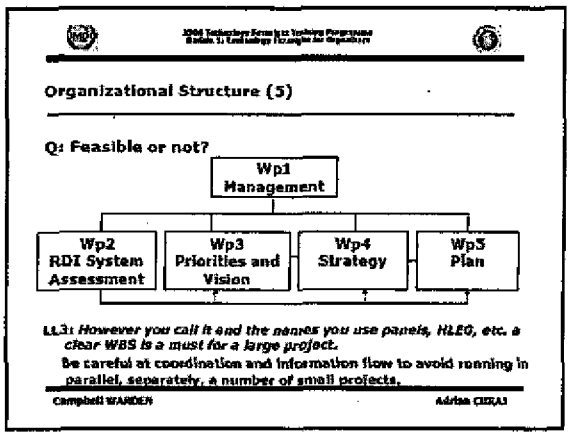
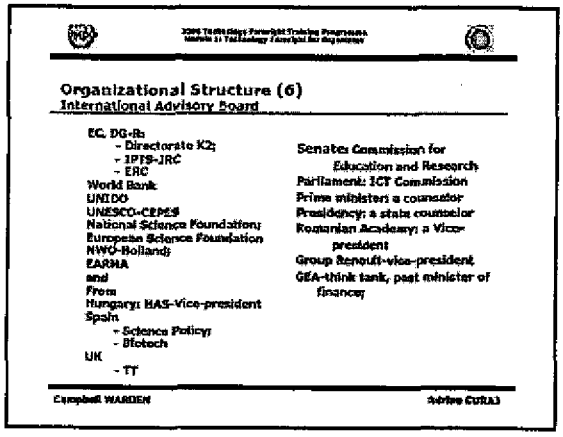
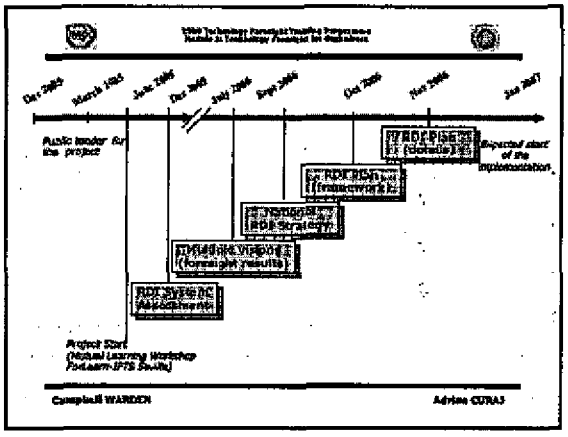
Appendix C (continued)

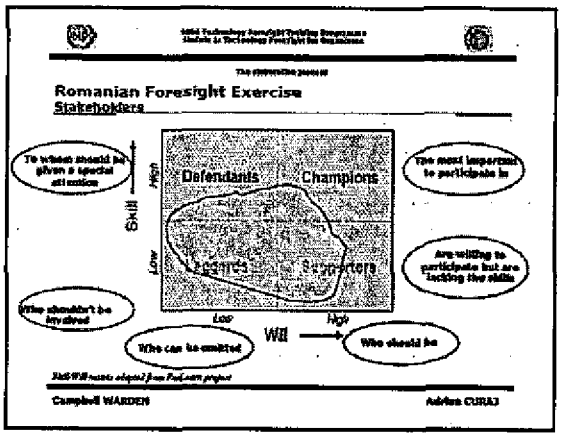
20 November 2006

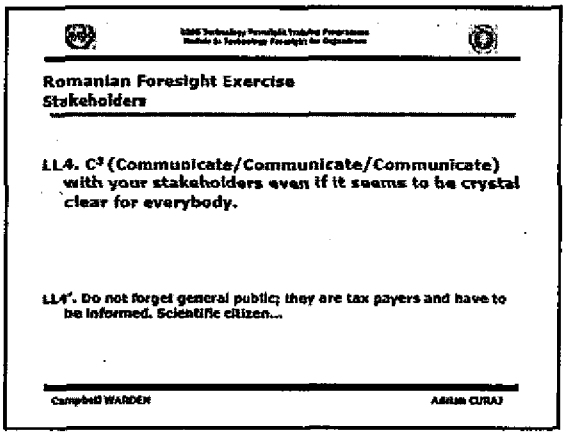
Presentations (4)

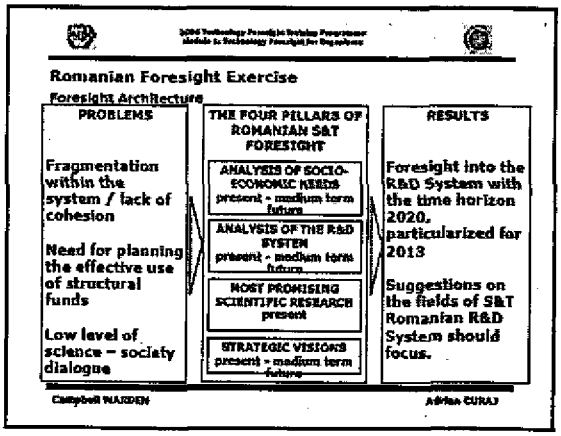








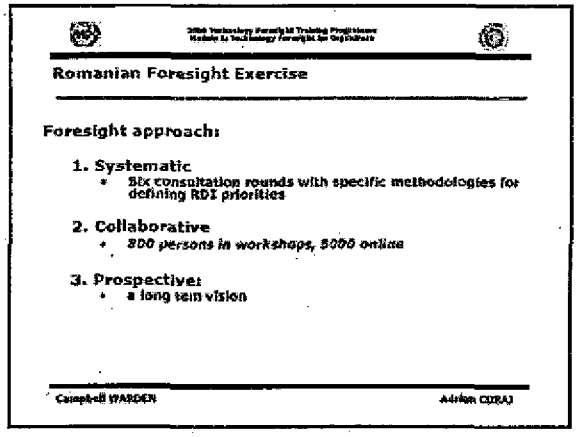


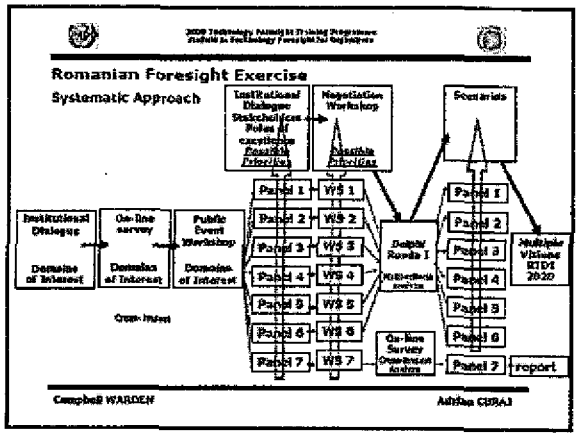


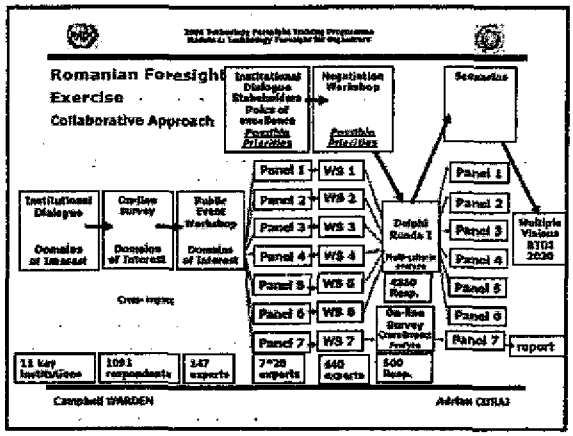
Appendix C (continued)

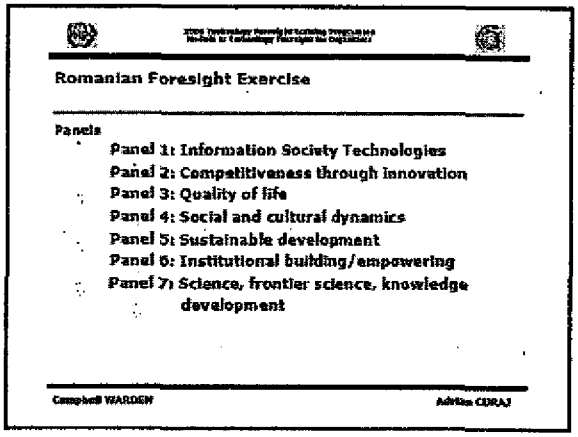
20 November 2006

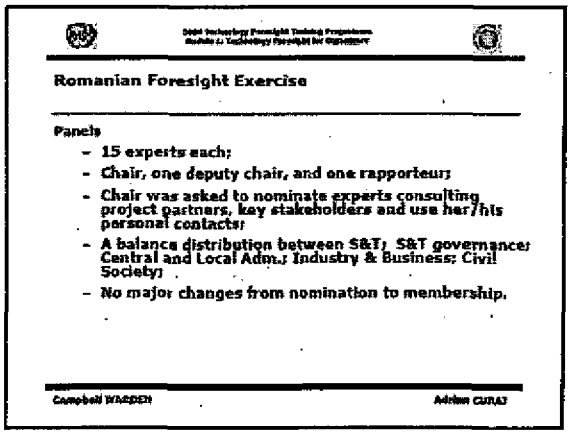
Presentations (4)

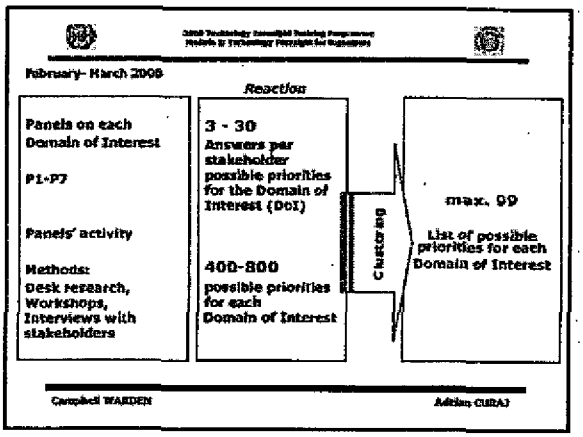












Appendix C (continued)

20 November 2006

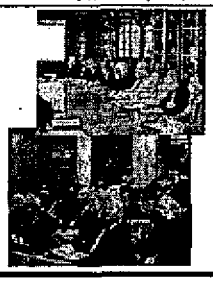
Presentations (4)

14-30 March 2006 — Reaction

7 Negotiation Workshops

Parallel and plenary sessions

60-100 participants /Workshop



15 Possible RTDI Priorities on each Domain of Interest D1-D6

Preparing the statements for the Delphi survey

+

32 Possible RTDI Priorities

D7

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April – May 2006 — Reaction

Delphi Survey

Round I (D1-D6)

4880 persons saving sessions:

- 1164 for D1: *Information Society Technologies*
- 850 for D2 : *Competitiveness through innovation*
- 549 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 RDI System in the knowledge society*

Criteria:

- Economic Growth
- Job Creation
- Social Cohesion
- Environmental Impacts
- Attractiveness for private investments
- Knowledge production
- RTDI System Capacity to deliver significant results.

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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-D5); links with the socio-economic needs

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Business representatives in foresight

November 2005 (Institutional consultations)
- ADEIT (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 800 institutions

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

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Romanian Foresight Exercise
Prospective dimension

Vision 2020

A. Priorities for further research (26)

B. Priorities of the RDI system transformation

C. Scenarios of RDI system development (4)

D. 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 8 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)

Romanian Foresight Exercise
Prospective dimension

I.I.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 draft, discuss the draft and make adjustments a.s.o until the moment the key person takes the ownership of a fiche.

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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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Romanian Foresight Exercise
From system priorities to vision

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

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RDI Strategy

Scenario building
RDI system assessment
Personalities Workshop
Foresight Basic research potential
Foresight National RDI priorities
Foresight RDI system transformation priorities
Key persons Focus groups

RDI Strategy
- Introduction;
- Vision;
- Current status;
- RDI system objectives;
- Human resources;
- Capacities;
- Exploratory research;
- Priorities of public RDI investment;
- Innovation;
- Institutional performance;
- RDI system governance

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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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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)

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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RDI System Objectives

Priorities of public RDI investment

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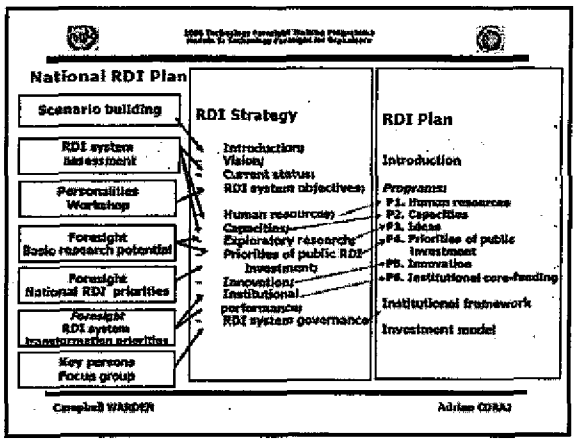
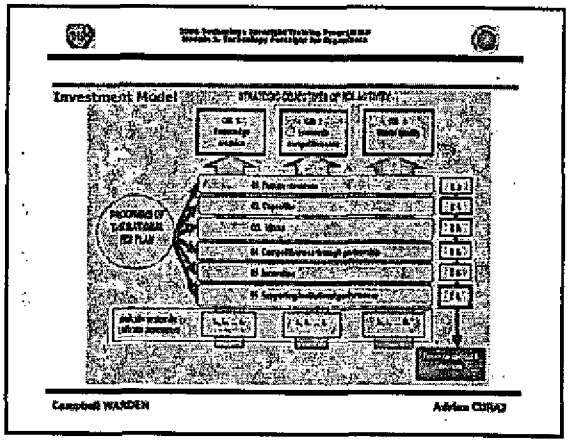




Our links:

- 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 Romanian" (?!?)

Campbell WARDEN Adrian CURAJ

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

UNIDO - Technology Foresight Latin America 1

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 - Technology Foresight Latin America

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

UNIDO - Technology Foresight Latin America

The future of the Fishery Industry
South American Pacific Coast

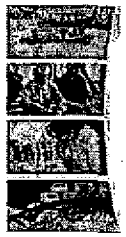
New technology is changing the fishery world

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...

UNIDO - Technology Foresight Latin America 4

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.

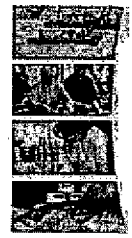
This will be possible through the use of programmes which promote the development of science and technology, applicable to different sectors within the fishery industry.

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

UNIDO - Technology Foresight Latin America 5

The future of the Fishery Industry
South American Pacific Coast

A Regional Initiative for Latin America



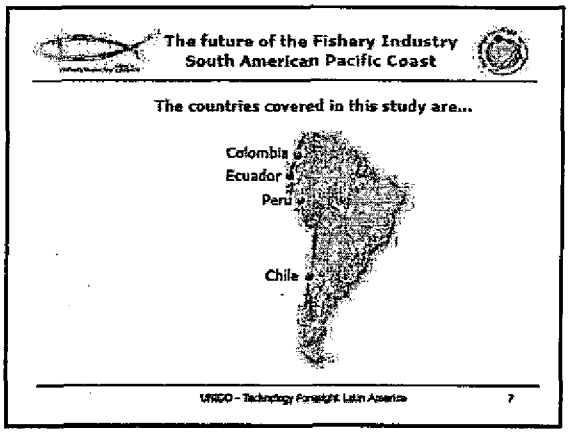
UNIDO, in cooperation with the Government of Spain, implemented within the Regional Technology Foresight Initiative for Latin America and the Caribbean, a technology foresight study of the productive chain of the fishery industry in the region of the South American Pacific coast.

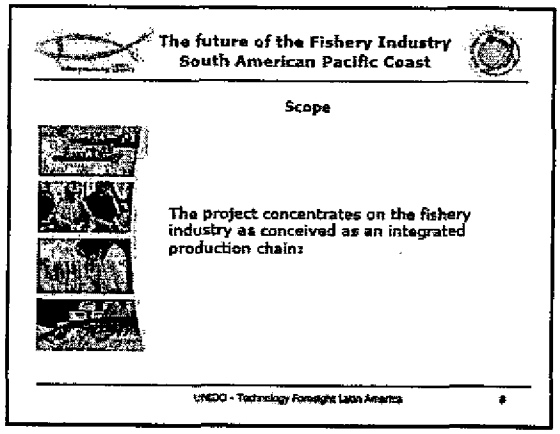
UNIDO - Technology Foresight Latin America 6

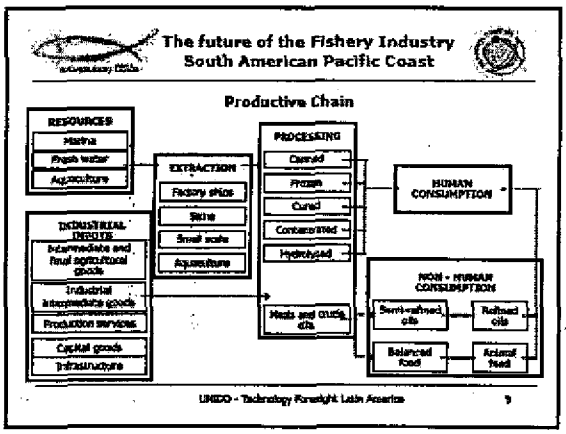
Appendix C (continued)

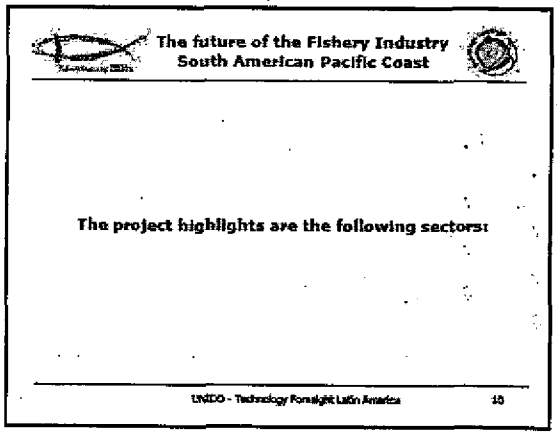
20 November 2006

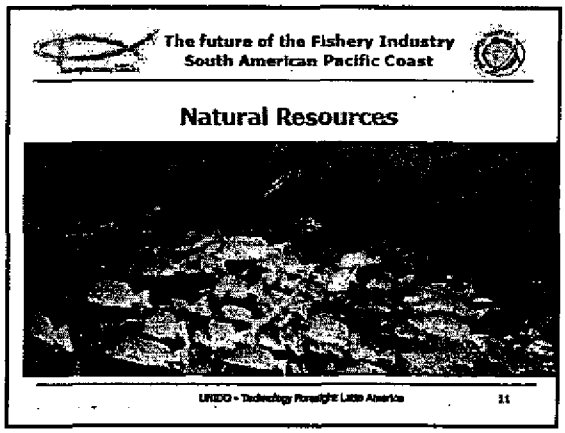
Presentations (5)

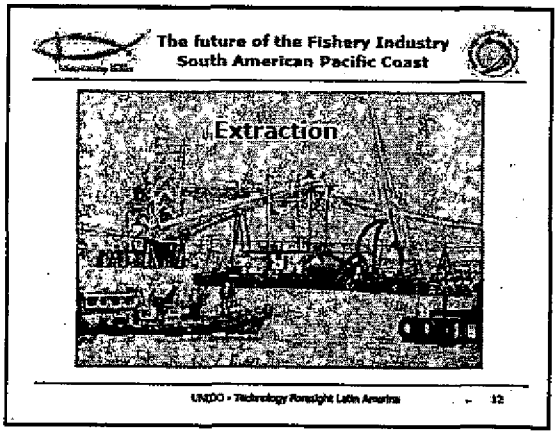








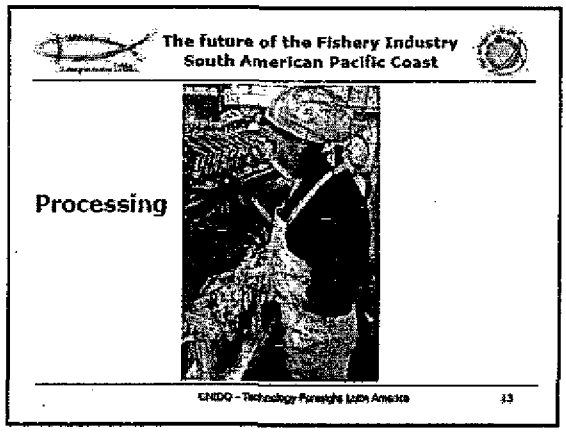


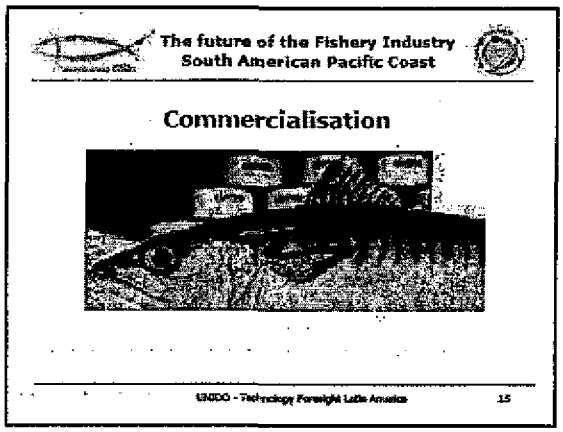


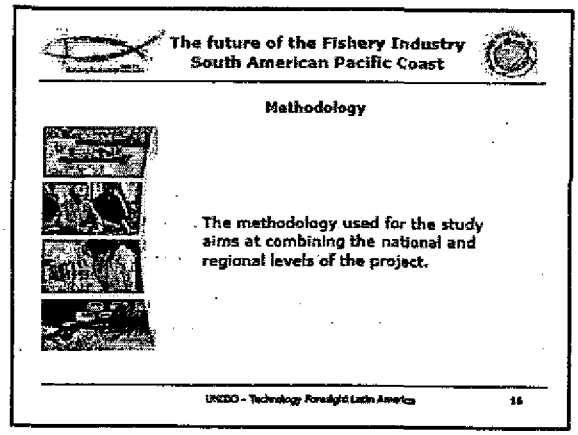
Appendix C (continued)

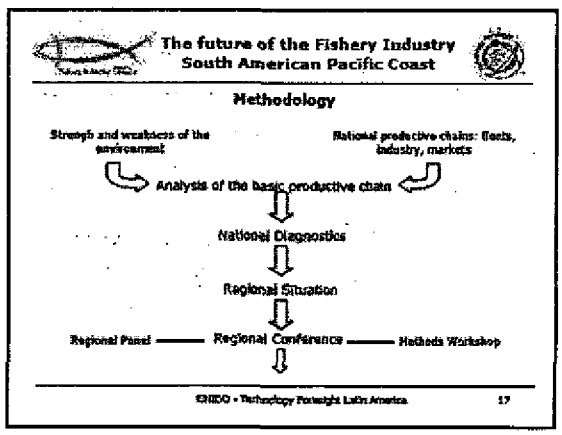
20 November 2006

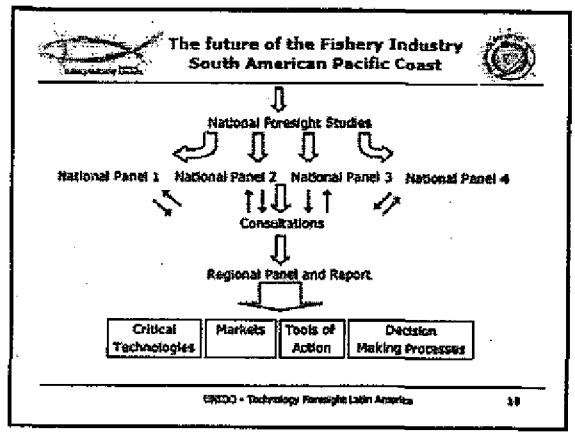
Presentations (5)







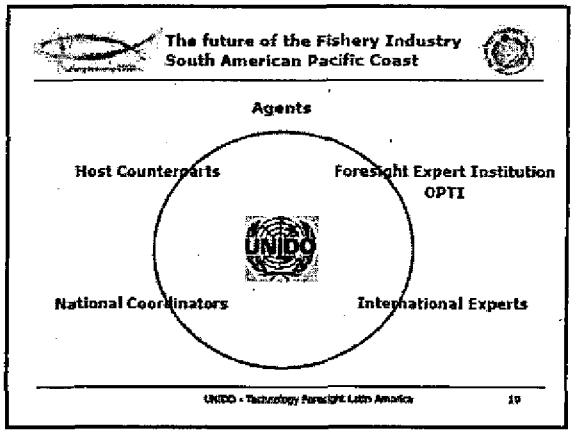


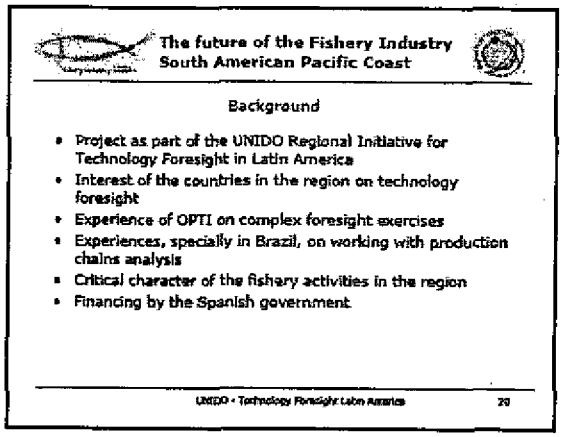


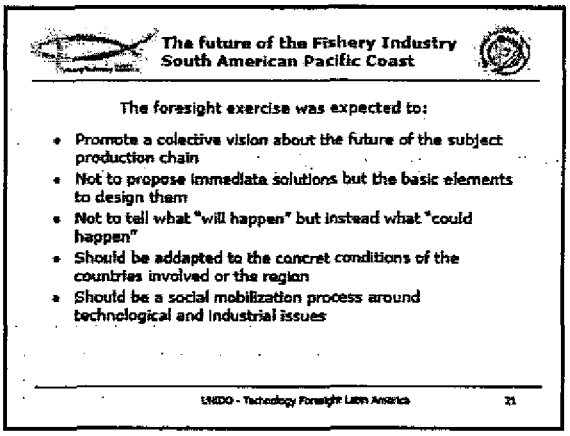
Appendix C (continued)

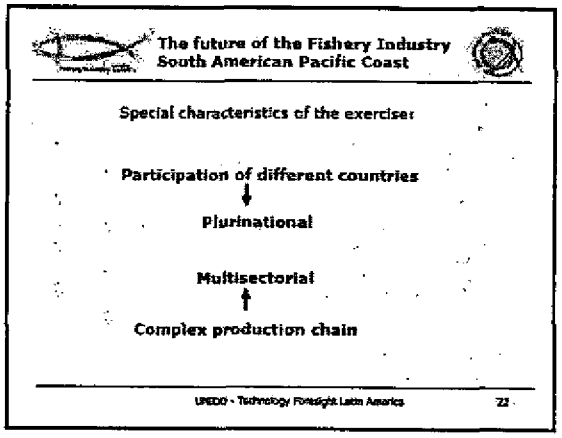
20 November 2006

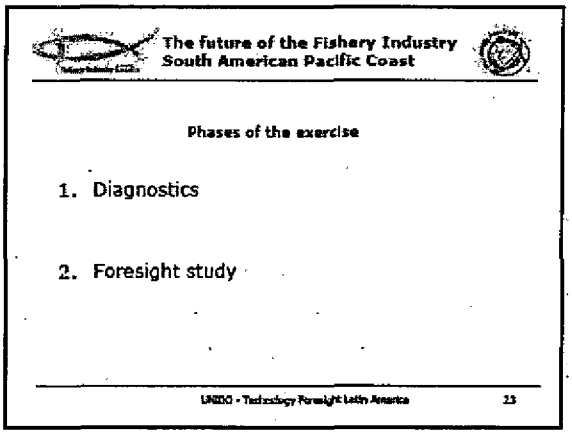
Presentations (5)

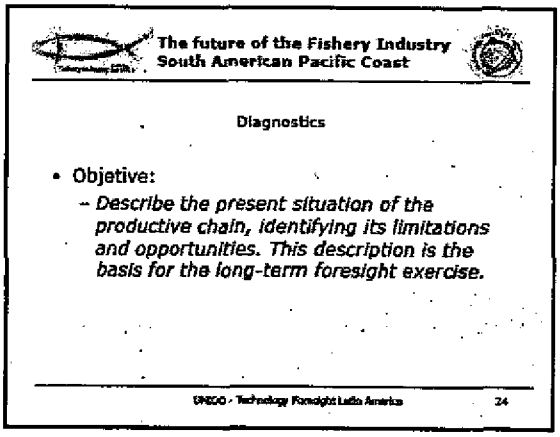








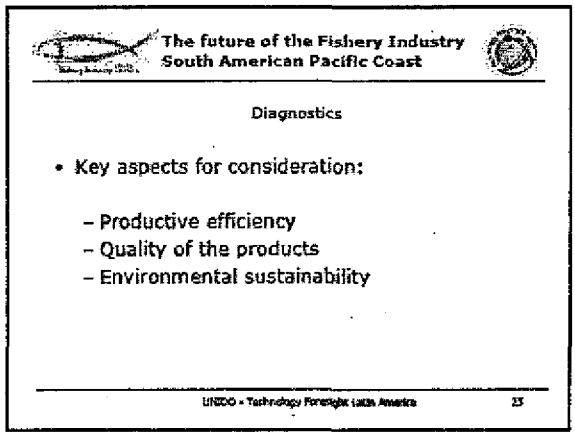


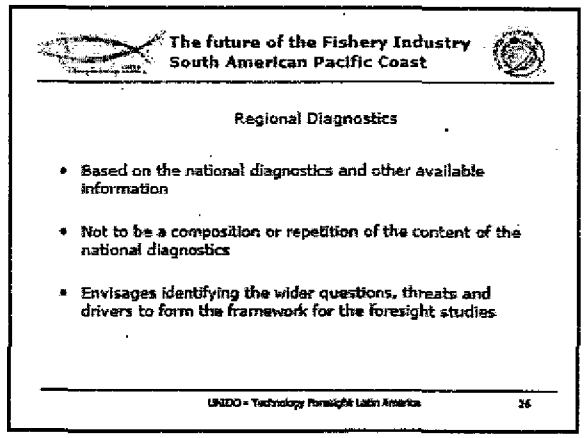


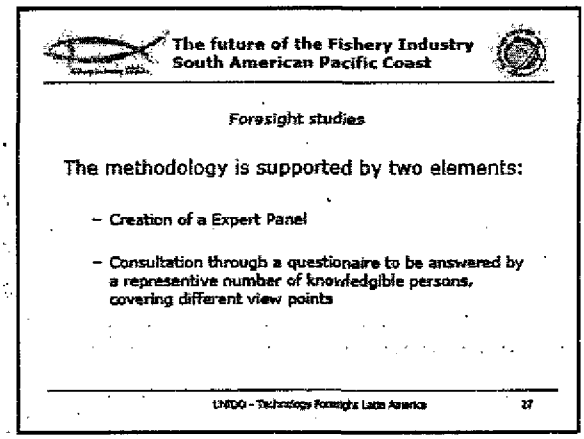
Appendix C (continued)

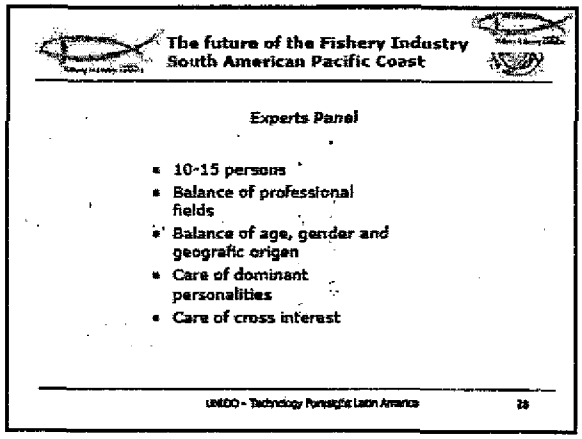
20 November 2006

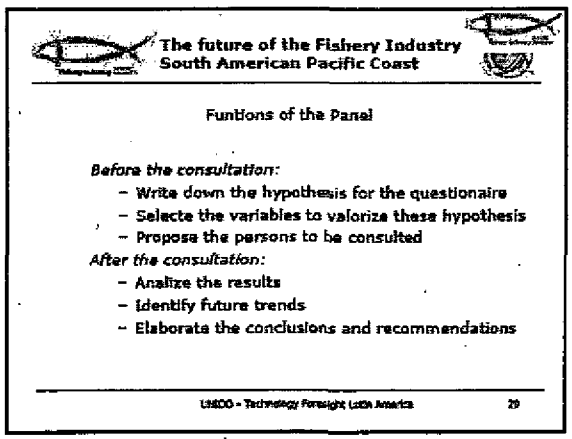
Presentations (5)

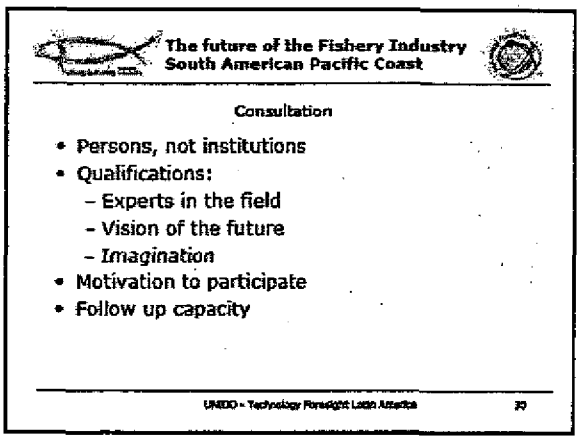








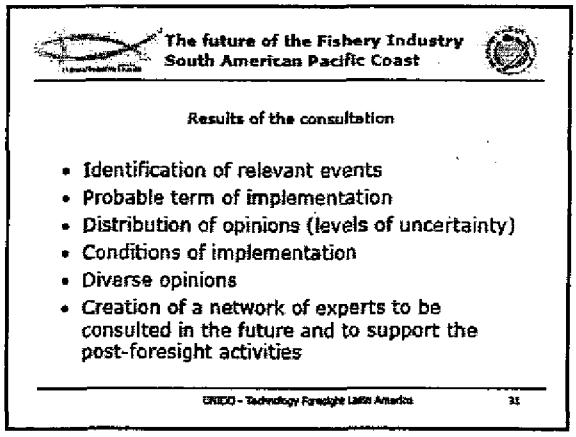


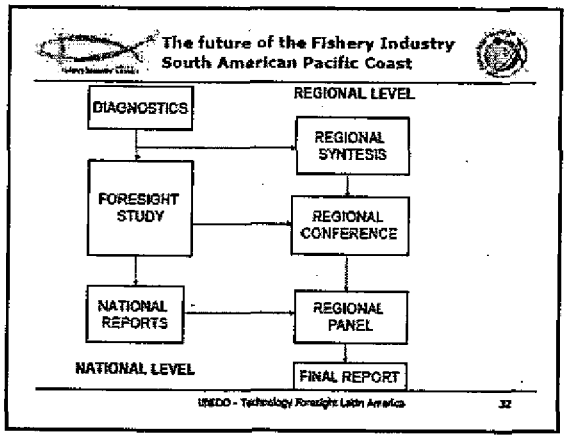


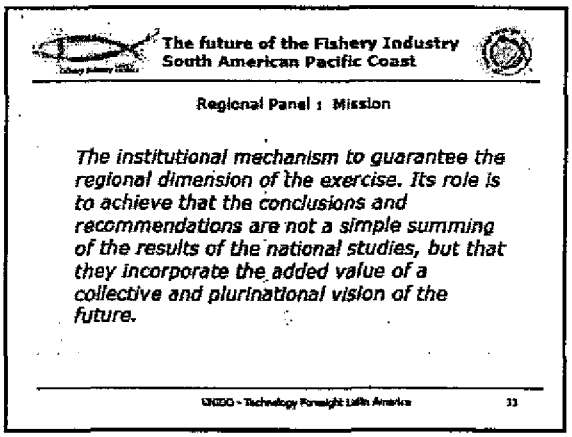
Appendix C (continued)

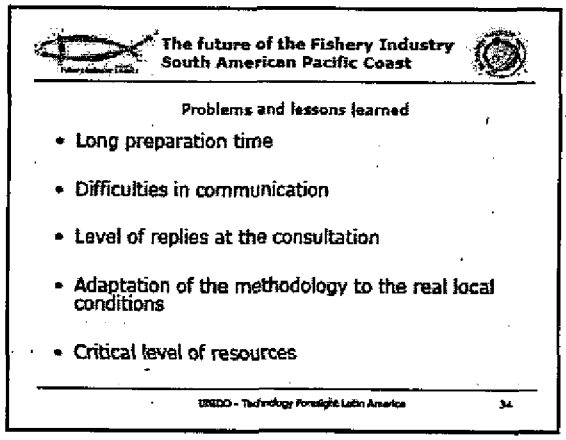
20 November 2006

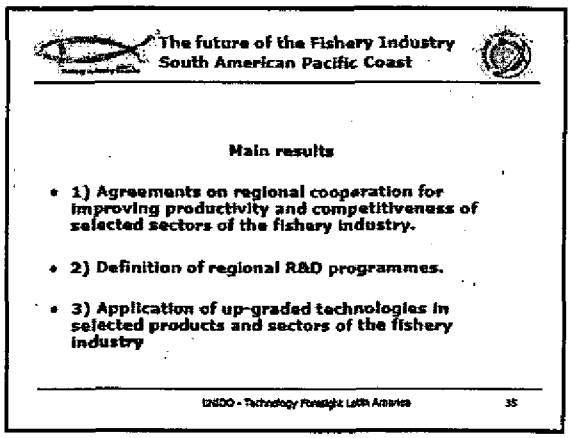
Presentations (5)

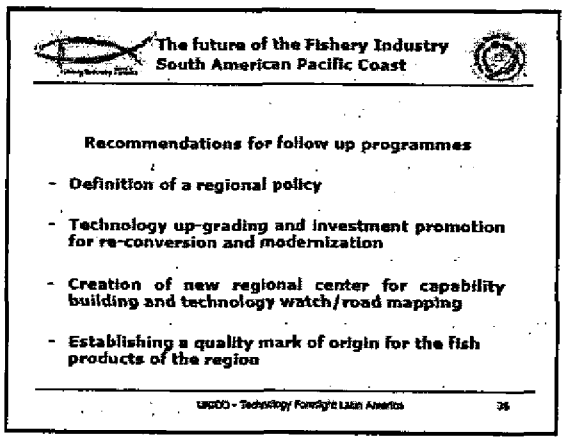








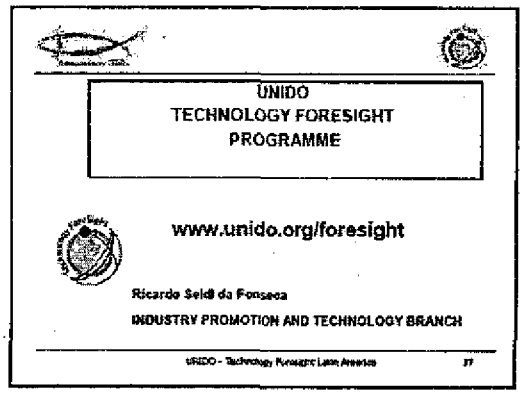




Appendix C (continued)

20 November 2006

Presentations (5)



Appendix C (continued)

21 November 2006

Presentations (6)

Scope and Focus of Foresight Programmes

Attila Havas
Institute of Economics,
Hungarian Academy of Sciences

Outline

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

1. Types of Foresight

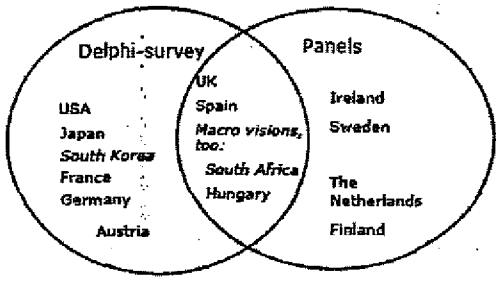
Methods, approaches

Geographical scope (level)

Product- vs. process orientation

Clients

Foresight Methods



Geographical scope (level)

Local

Regional

National

International
- cross-border regions
- group of countries

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)

Appendix C (continued)

21 November 2006

Presentations (6)

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)

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

Pure S&T

Techno-economic

Societal/ socio-economic

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

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?

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?

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??

Appendix C (continued)

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Presentations (6)

'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

3. Coherence of Foresight Programmes

Focus → structure, elements

Principal rational → 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

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 TF

Hungarian themes

- Human resources
- Health, life sciences
- Natural and built environment
- ICT, media
- Manufacturing and business processes
- Agribusiness, food
- Transport

Swedish

- Health, medicine and care
- Biological natural resource
- Society's infrastructures
- Production systems
- ICT systems
- Materials and material flows in the community
- Service industries

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

Appendix C (continued)

21 November 2006

Presentations (6)

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

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
Focus (main objectives)
} Time horizon

4. Conclusions, Dilemmas

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

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

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

Appendix C (continued)

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Presentations (6)

What can NOT be expected

Setting posteriorities (as opposed to priorities)

Strictly controlled processes

Quick, direct, easy results

Exact measures of economic impacts

What foresight can't do . . .

Replace decision making! Difficult decisions will still remain, but should be better informed

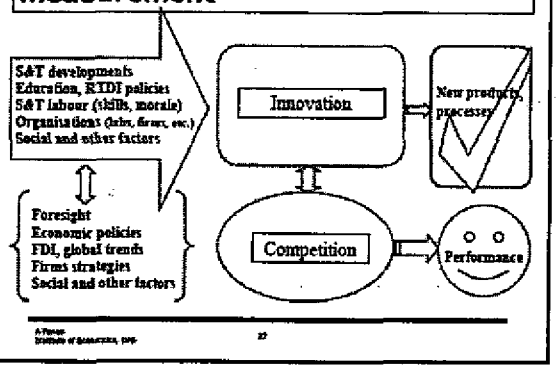
Overhaul a research or innovation system: It can contribute towards this, but is not enough on its own

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!

Complexities: Difficulties of measurement



Thanks!

Questions, comments?

havasatt@econ.core.hu

Appendix C (continued)

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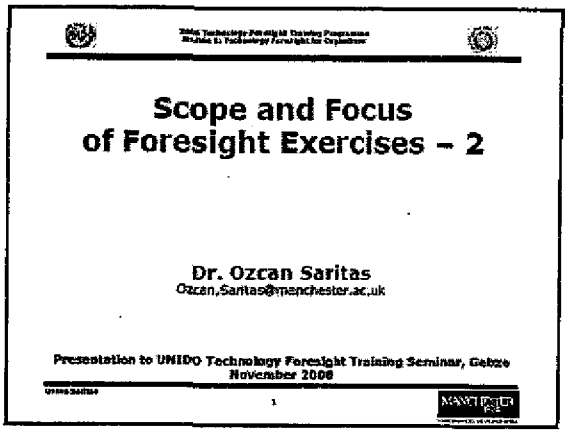
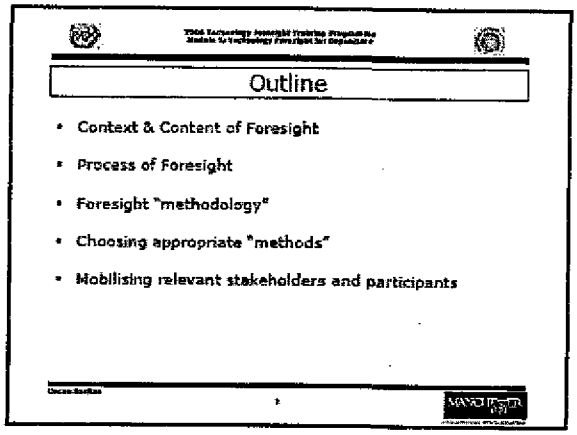
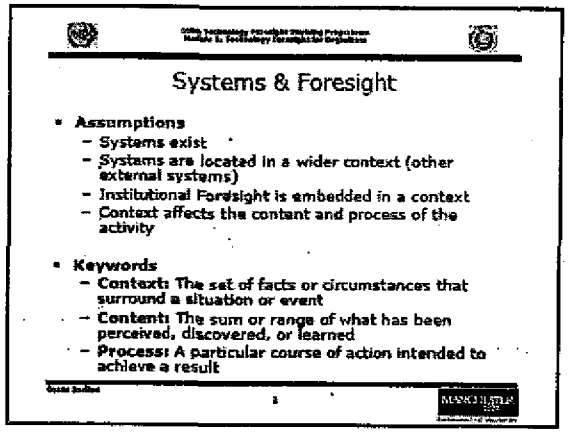
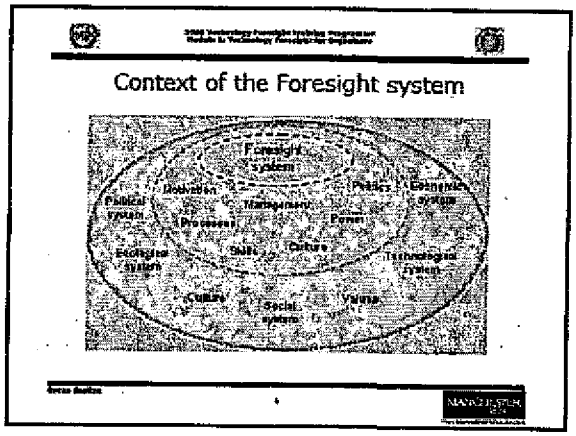
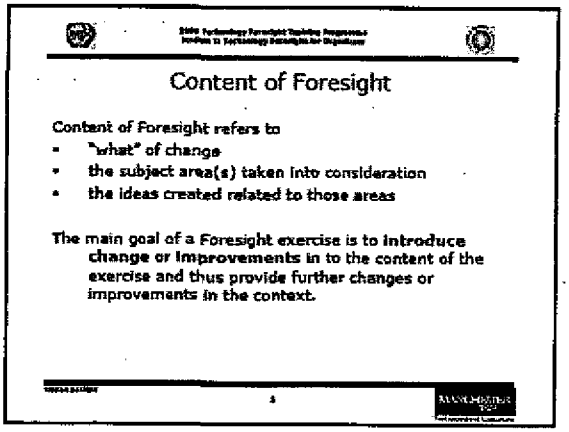
Presentations (7)

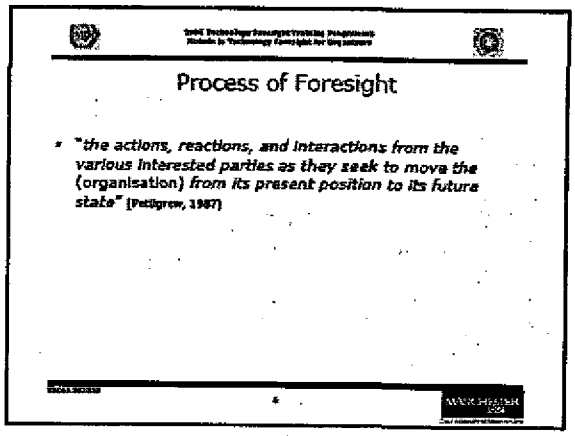












Appendix C (continued)

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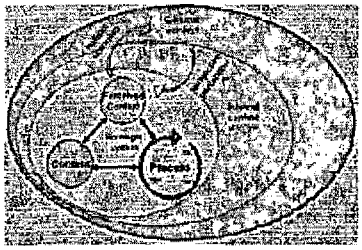
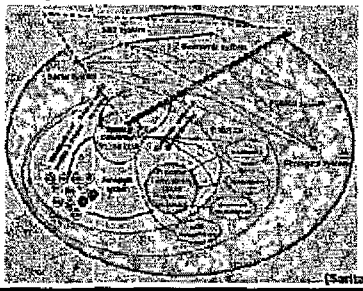
Presentations (7)

Context, Content & Process



Systemic Foresight Model (Sarlas, 2006)

Context, Content & Process of Vision2023



(Sarlas, 2006)

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

5 mental acts of Foresight

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

Systemic Foresight Model (Sarlas, 2006)

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

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

Appendix C (continued)

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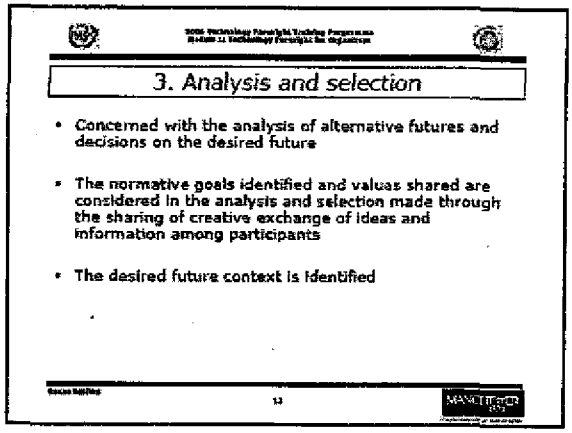
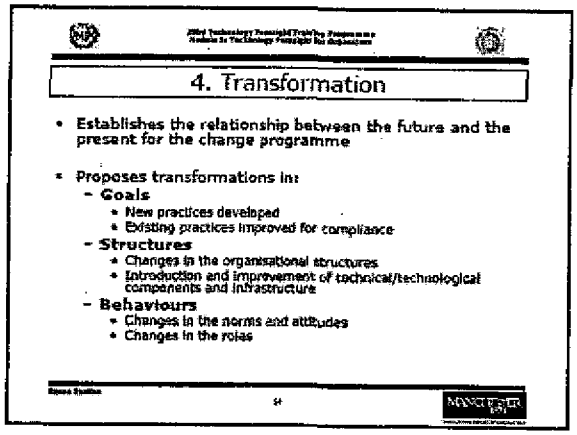
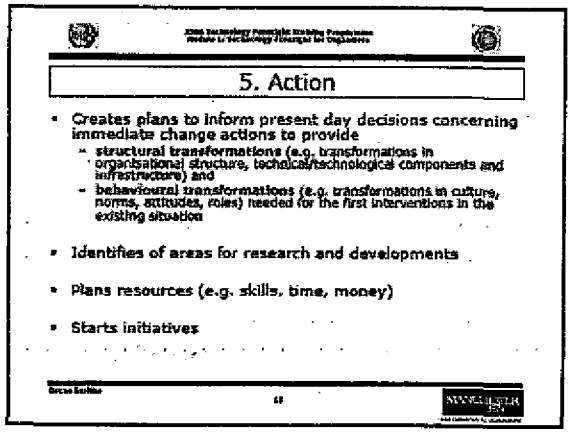
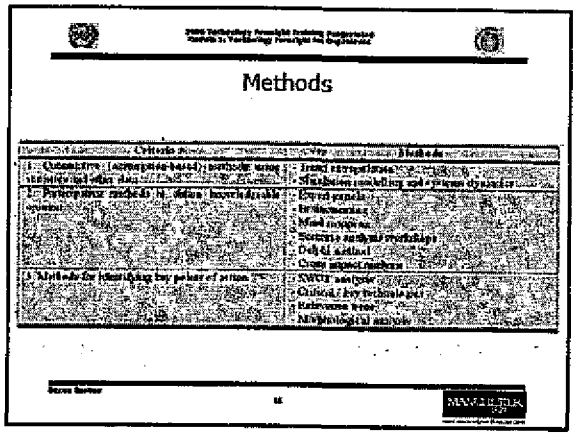
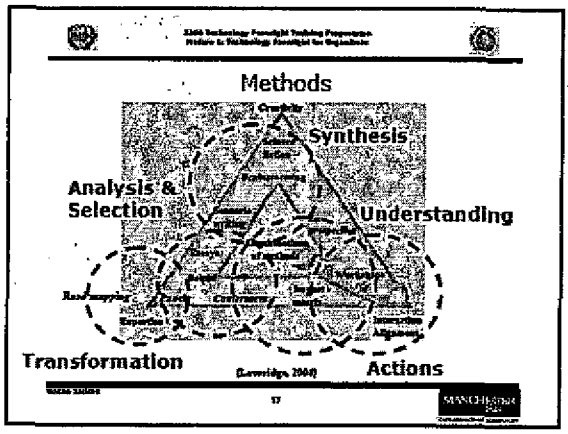
Presentations (7)

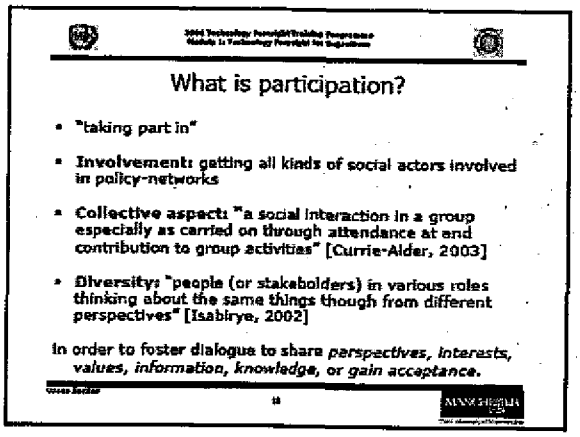












Appendix C (continued)

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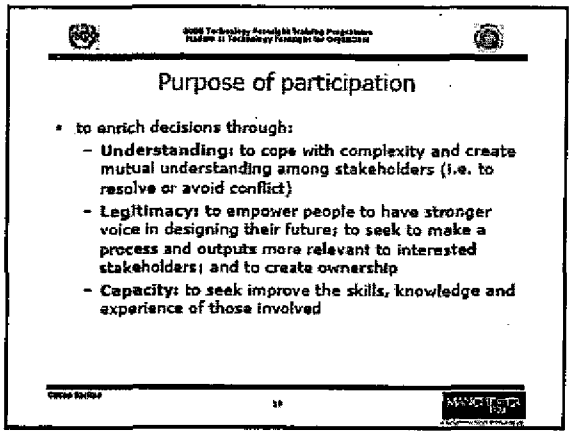
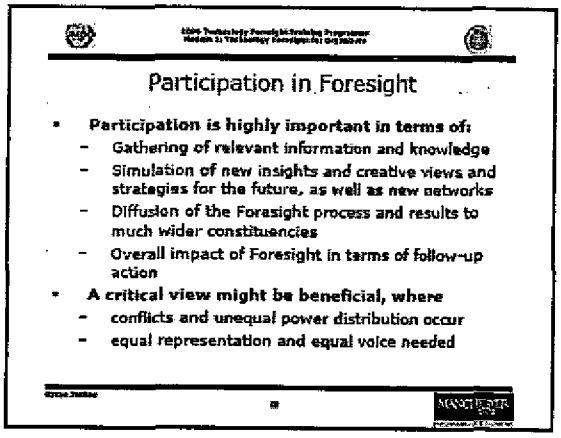
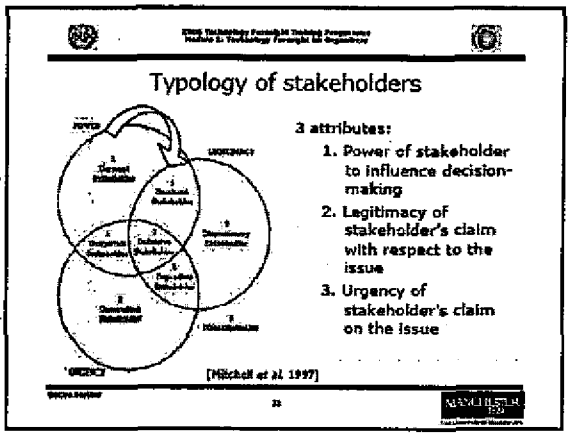
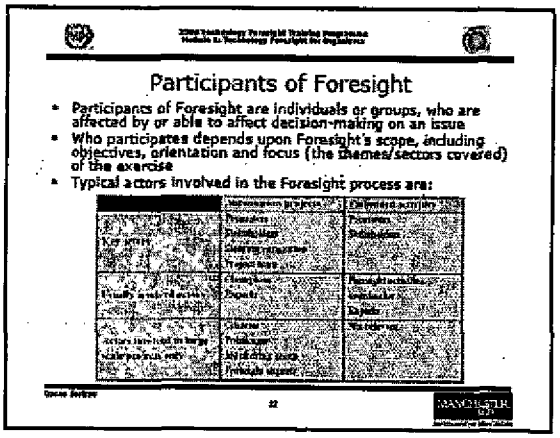
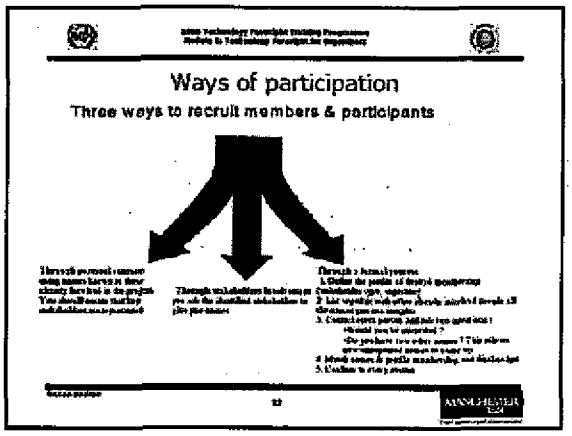
Presentations (7)

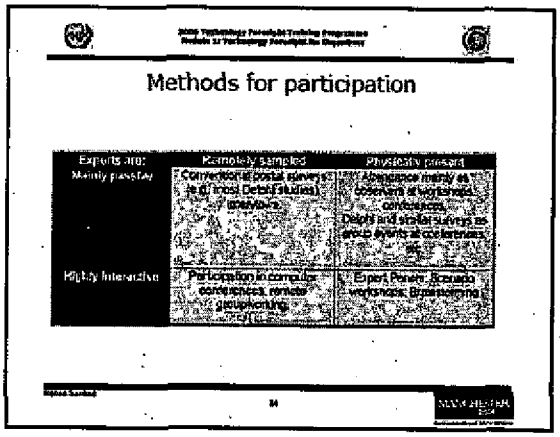












Appendix C (continued)

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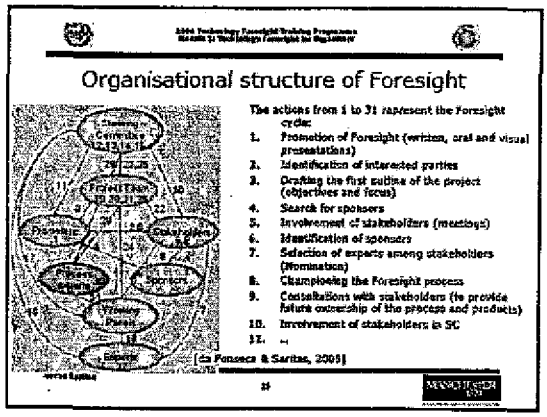
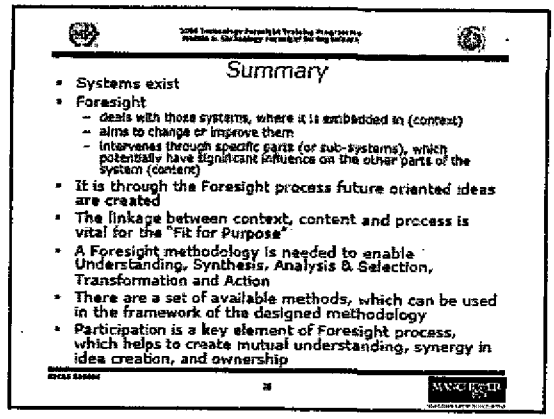
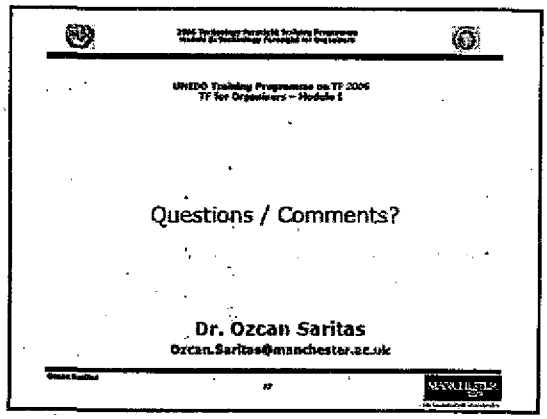
Presentations (7)







Appendix C (continued)

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Presentations (8)

Organising and Managing Foresight

Dr. Michael Keenan
PREST, University of Manchester, UK

Michael.Keenan@manchester.ac.uk

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

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

Critical elements to consider when scoping a Foresight exercise

a. Rationales and Expected Outcomes	**Determined through a continuous, iterative process during the lifetime of the exercise**
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	

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

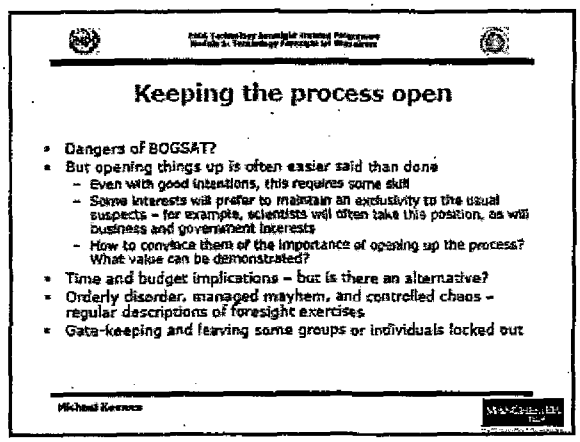
Time and budget

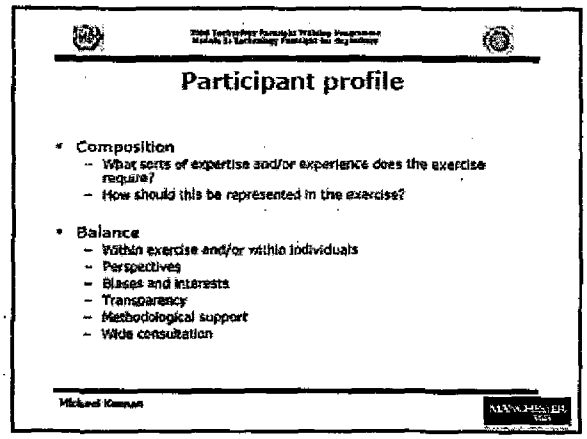
- Time and budgets largely dictate the approach to foresight
- Be clear on the time available for the exercise and plan your approach accordingly
  - Are there real deadlines that must be respected?
  - The scope and rationales for setting some artificial deadlines?
  - Wise to plan for a 50% overrun 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

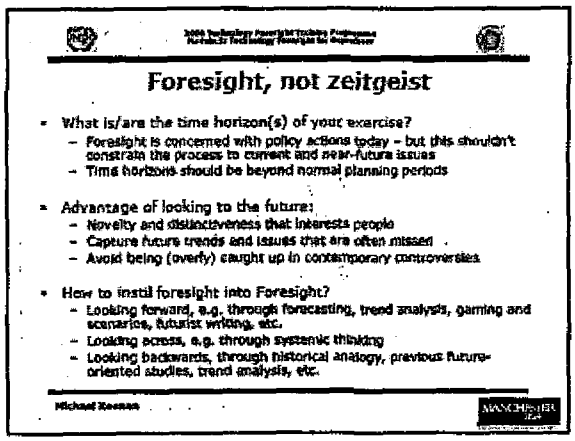
Appendix C (continued)

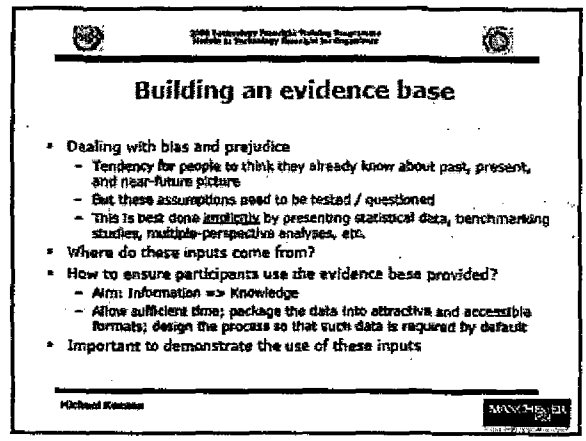
21 November 2006

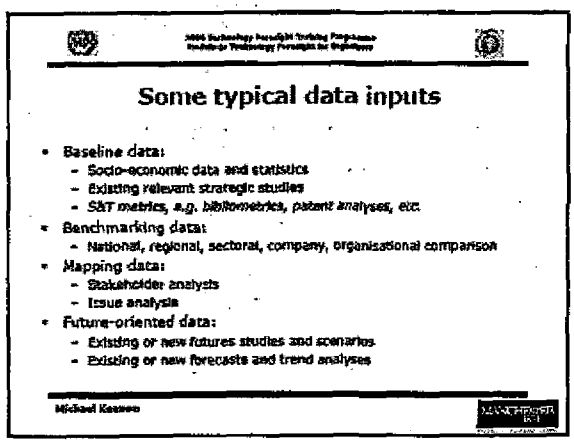
Presentations (8)

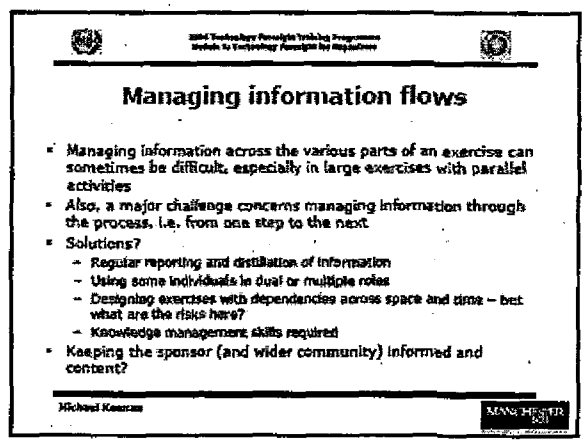












Appendix C (continued)

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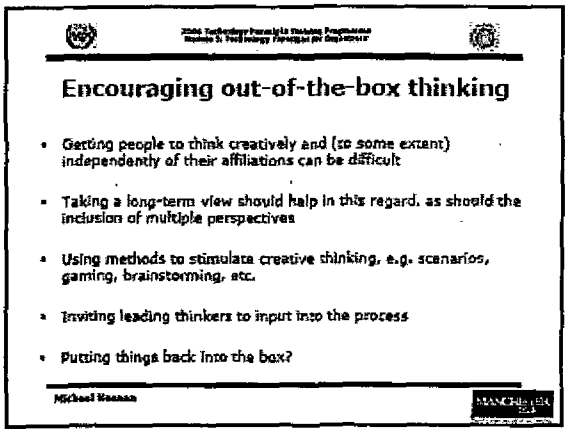
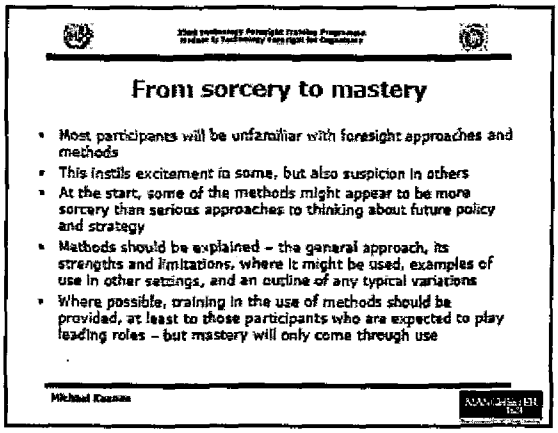
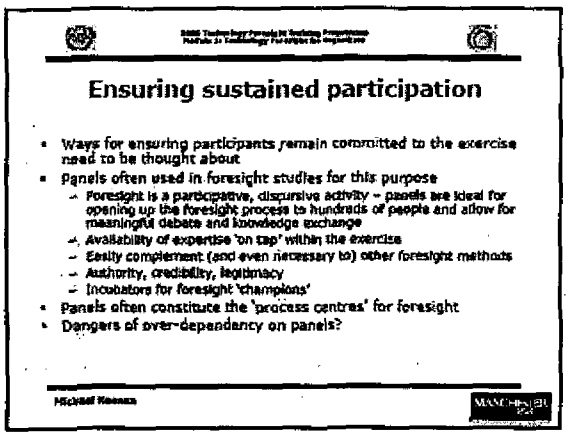
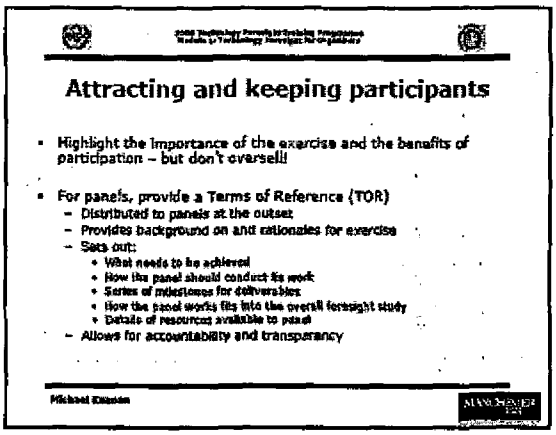
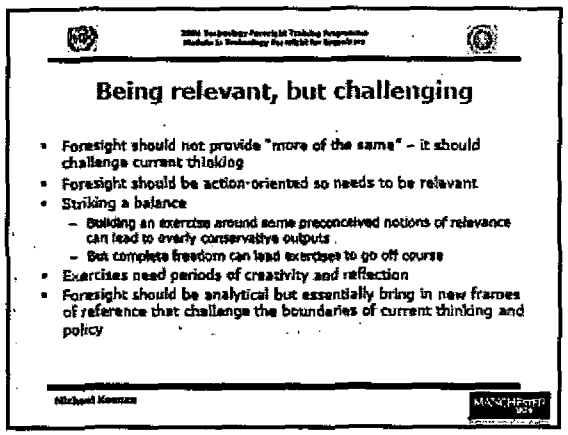
Presentations (8)

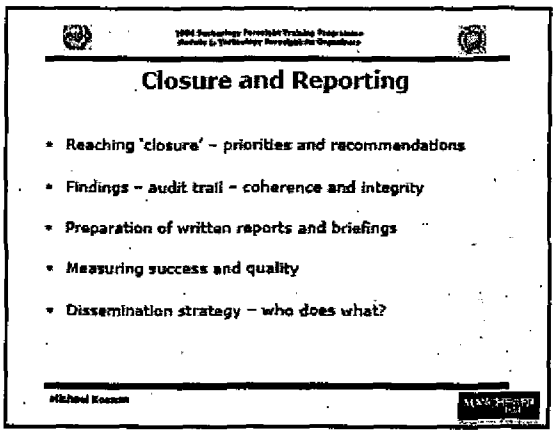












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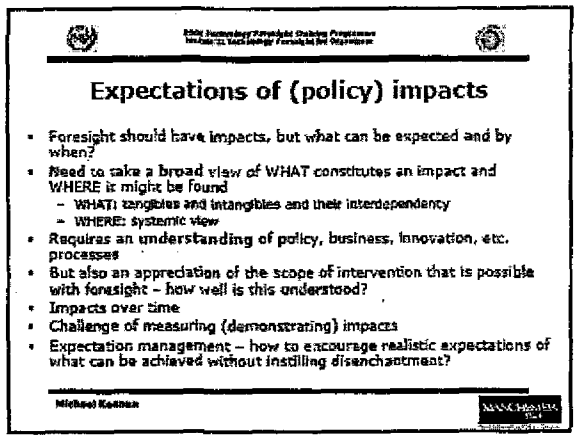

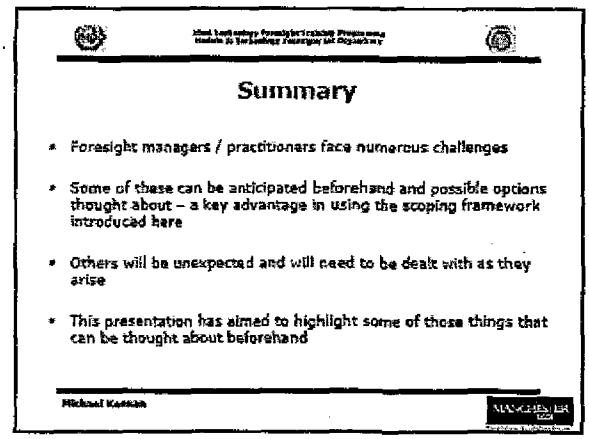

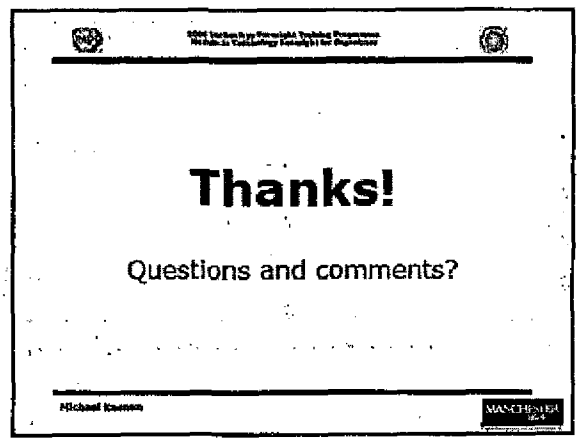

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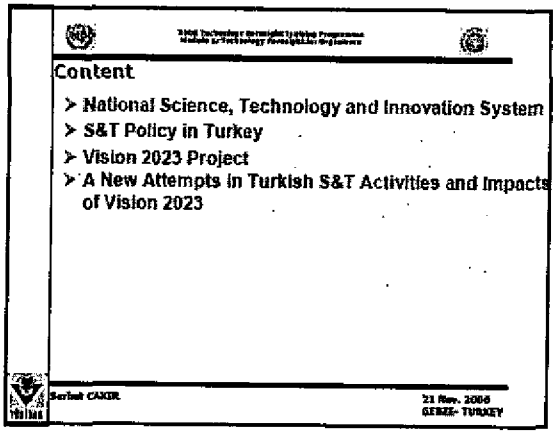

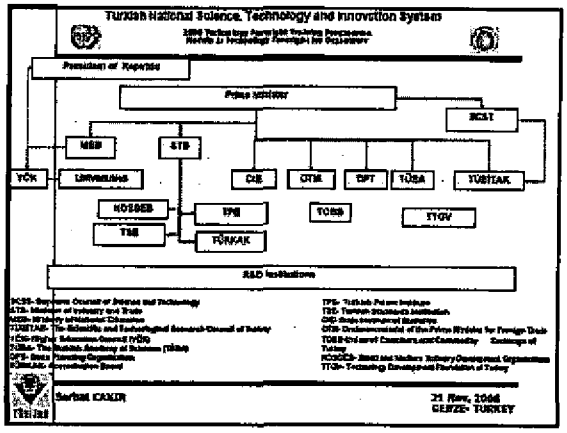

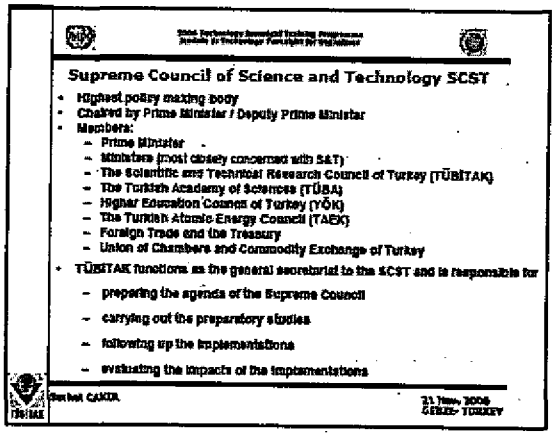

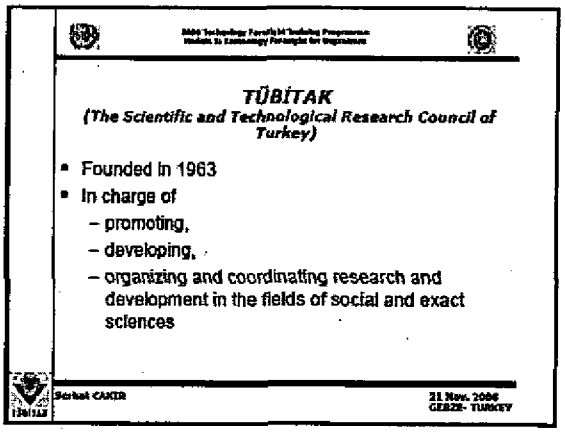

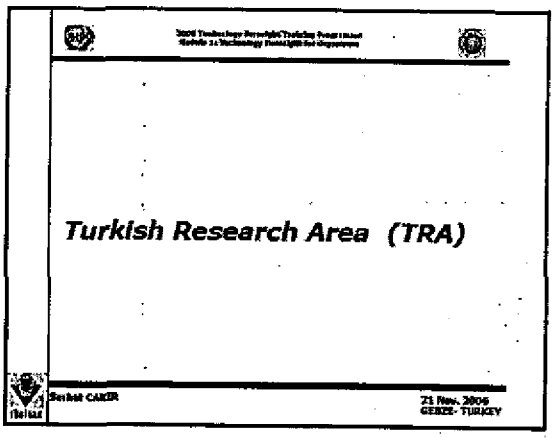

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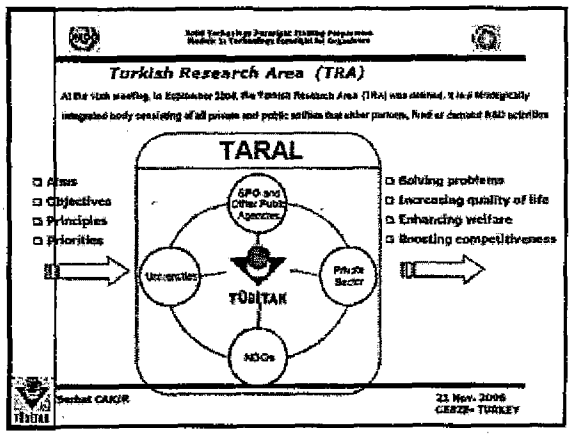

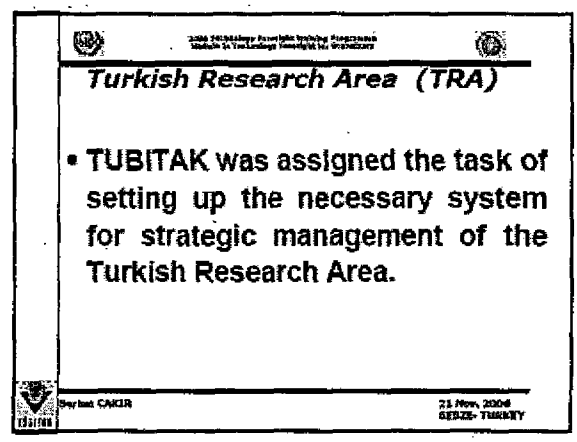

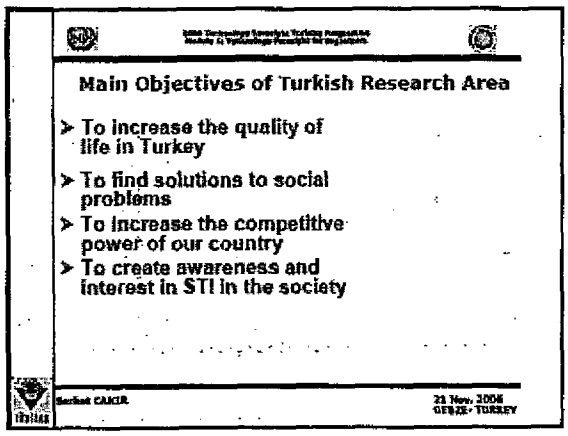

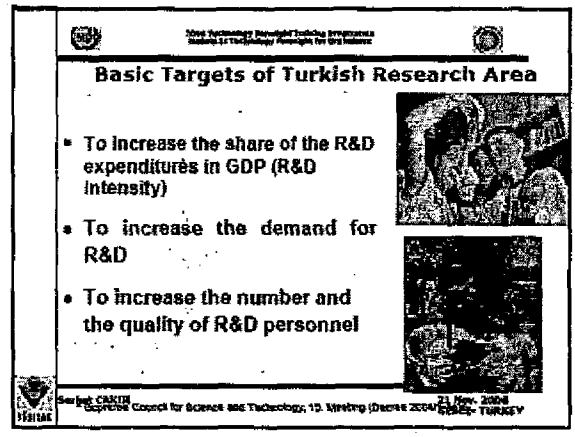

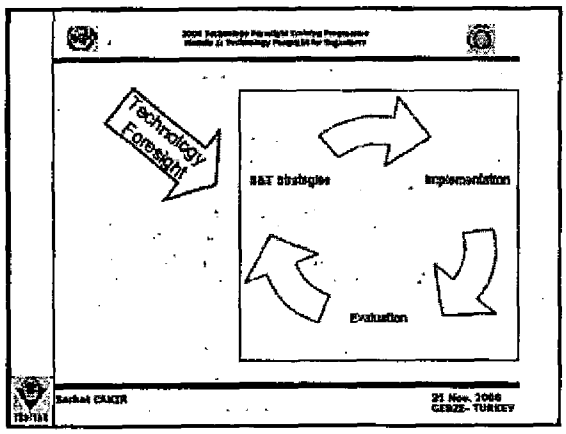

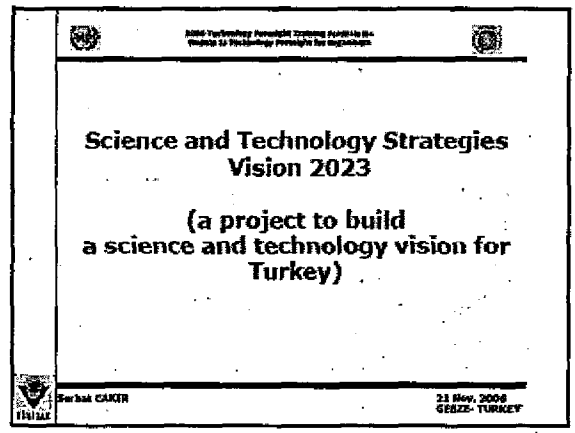

Appendix C (continued)

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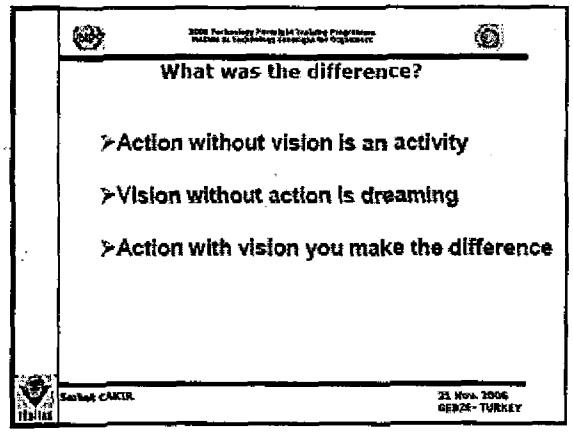

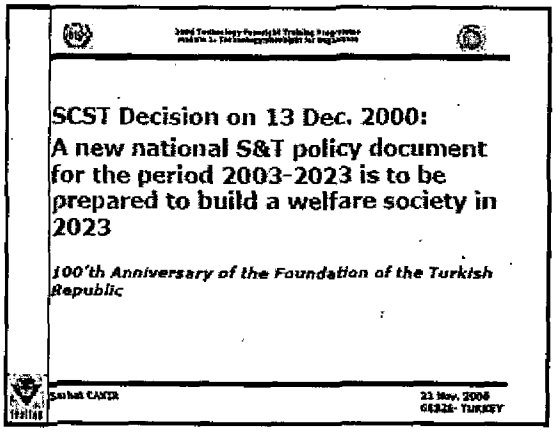

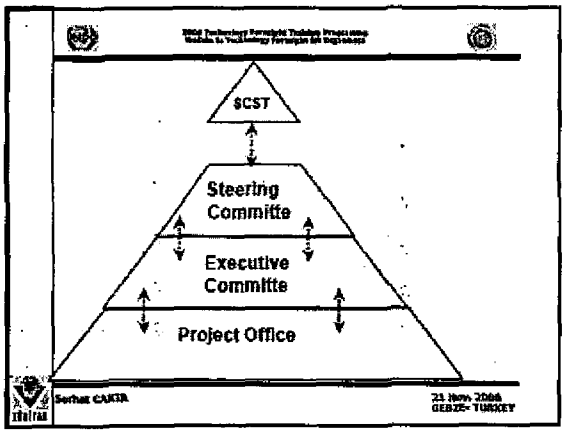

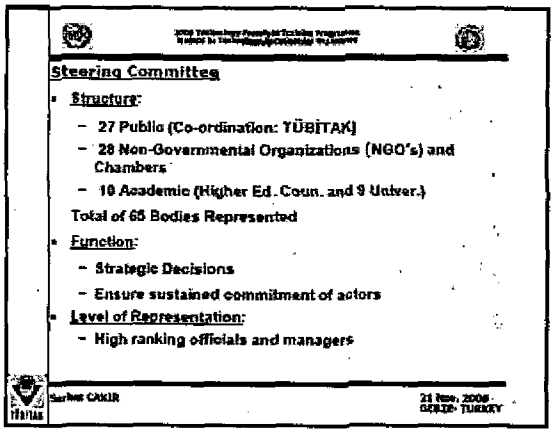

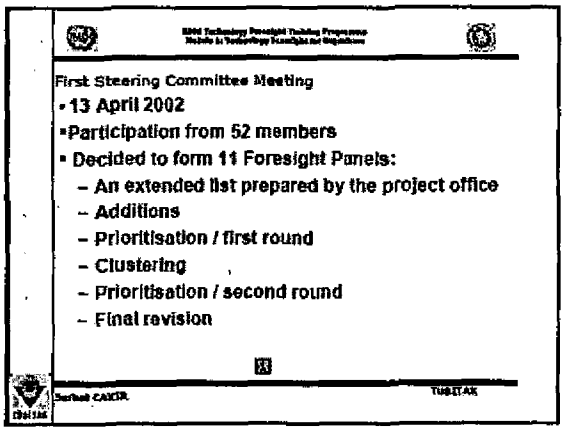

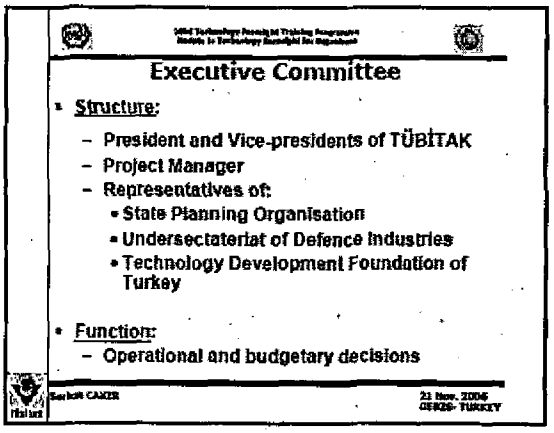

Appendix C (continued)

21 November 2006

Presentations (9)

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

Serkat CAKIR TUBITAK

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
  - Manageble

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Action Plan

- Nominations for panel membersip (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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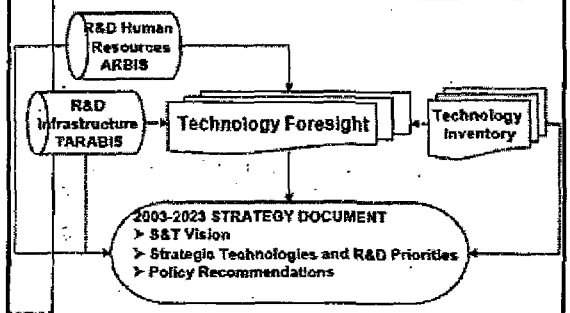
SCST Decision on 24 Dec. 2001



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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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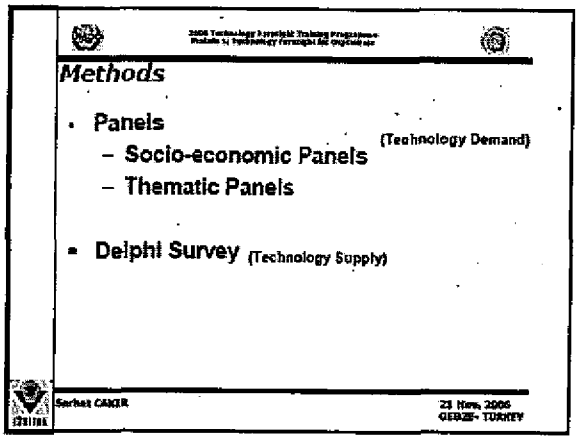
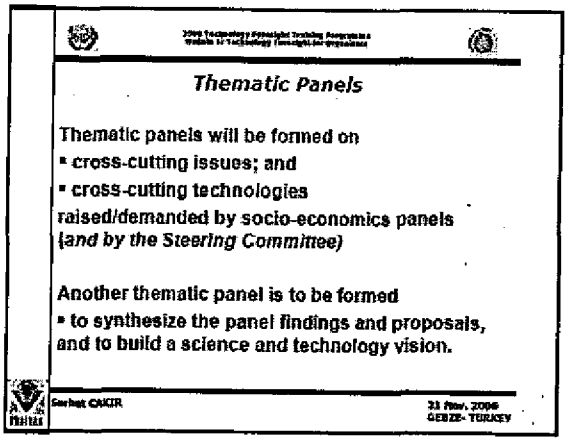
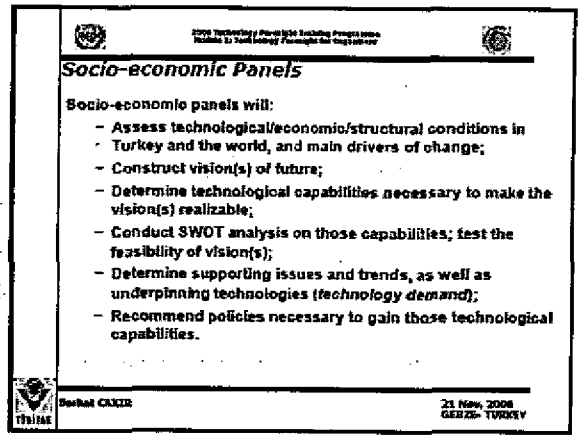
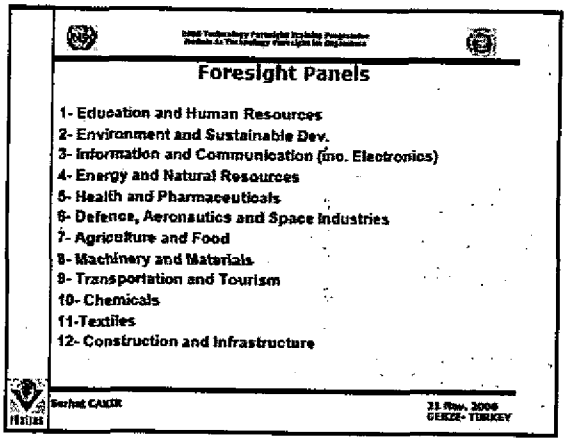
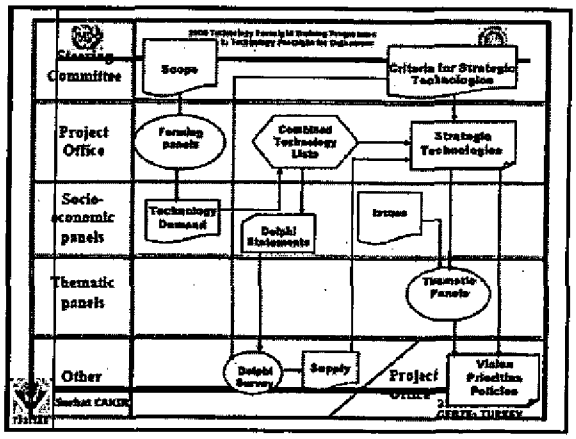
Presentations (9)

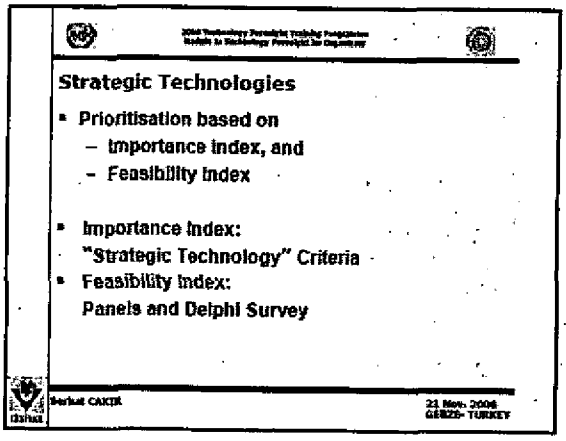












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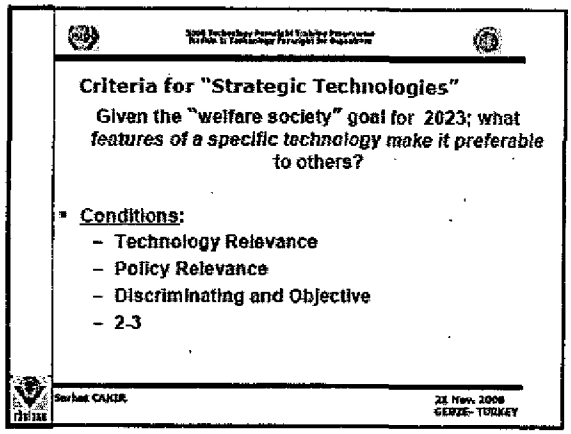

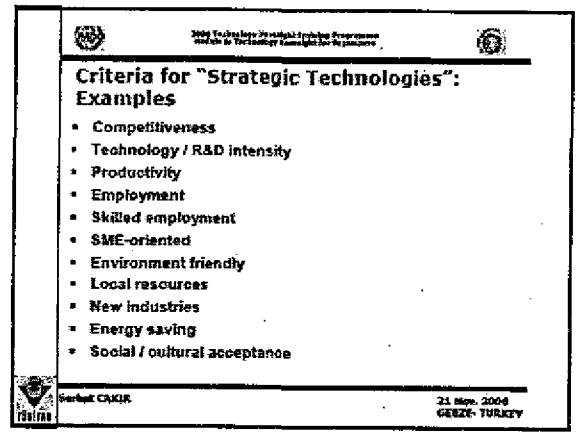

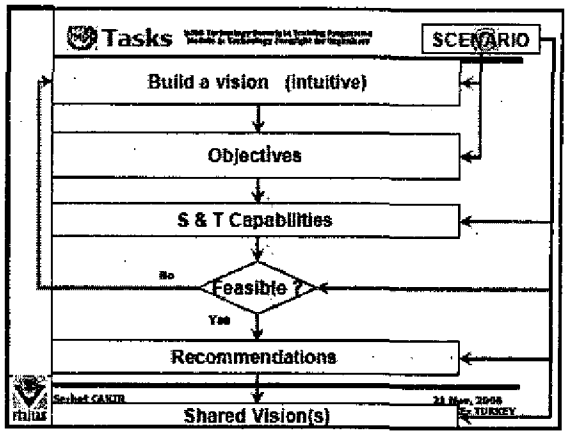

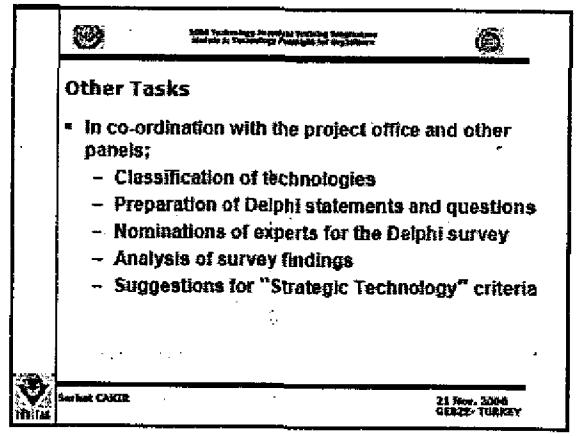

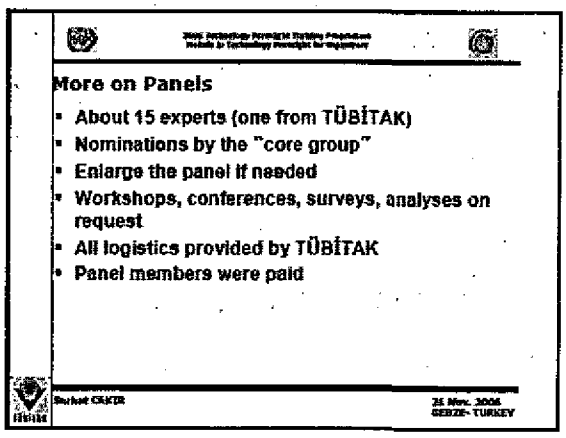

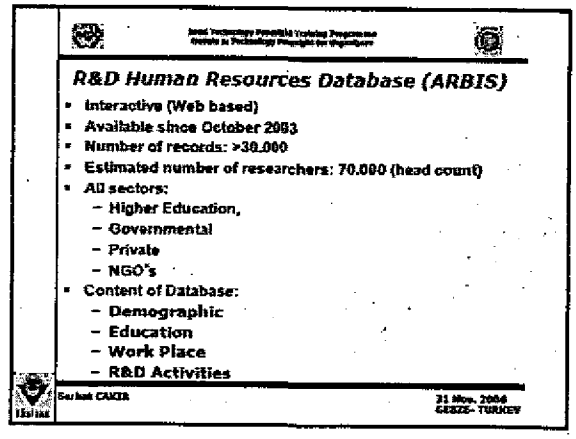

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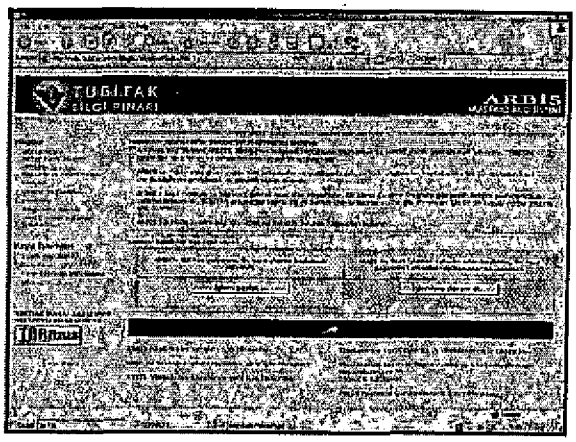

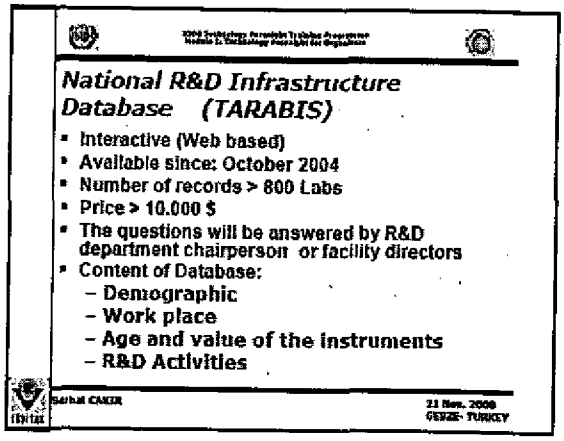

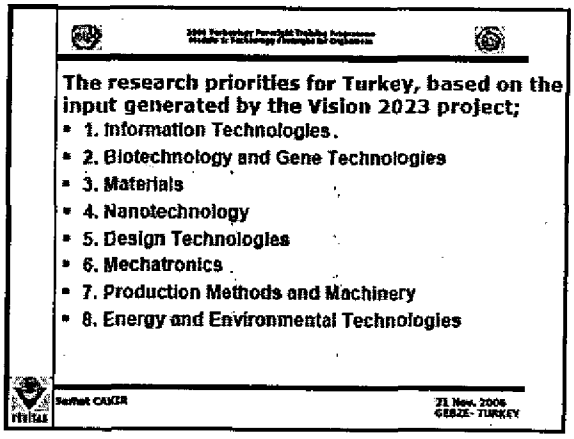

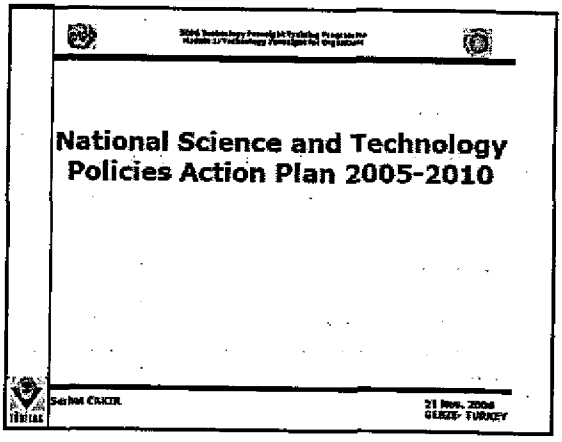

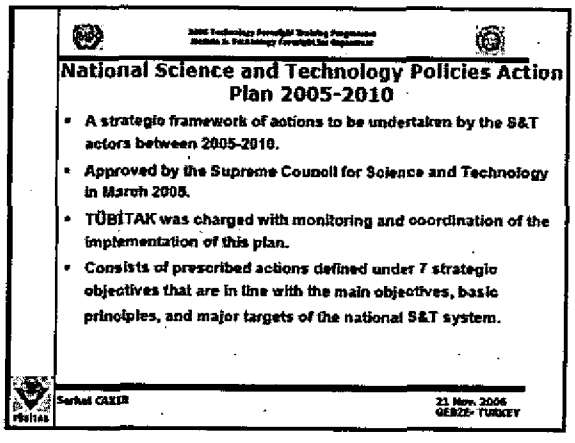

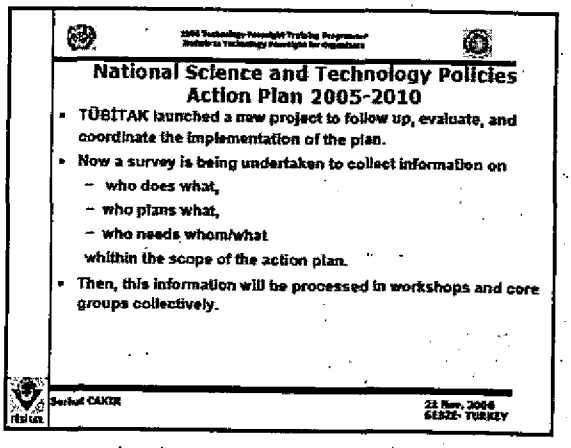

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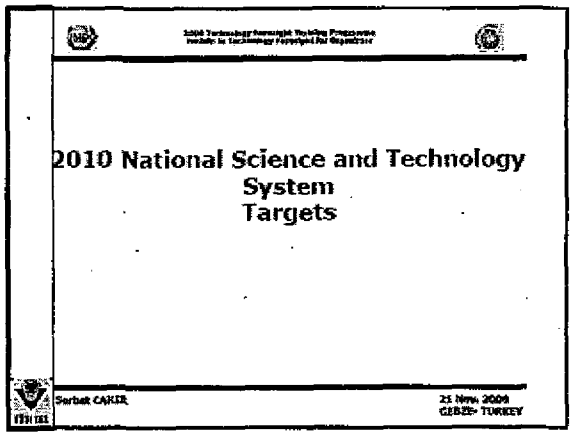
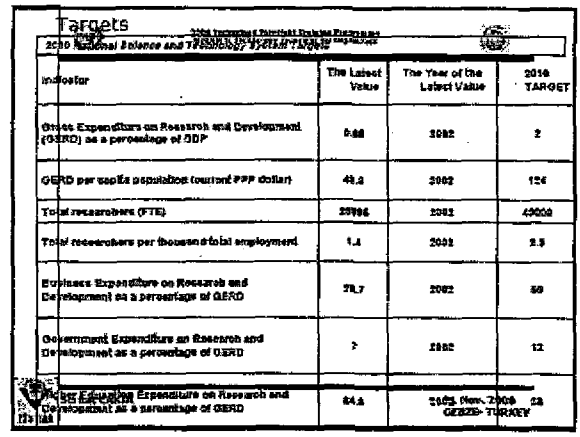
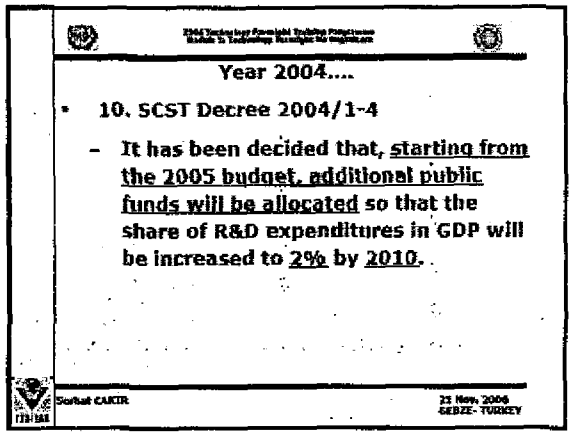
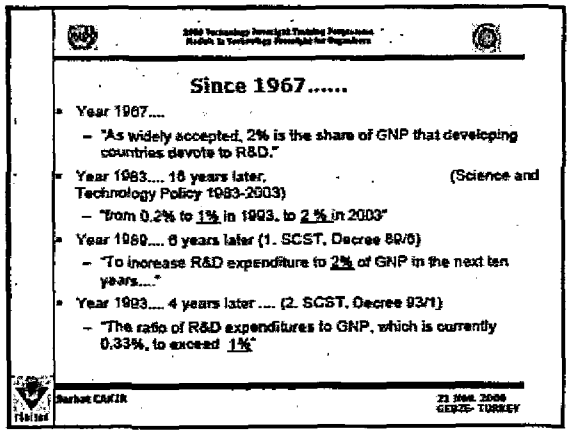
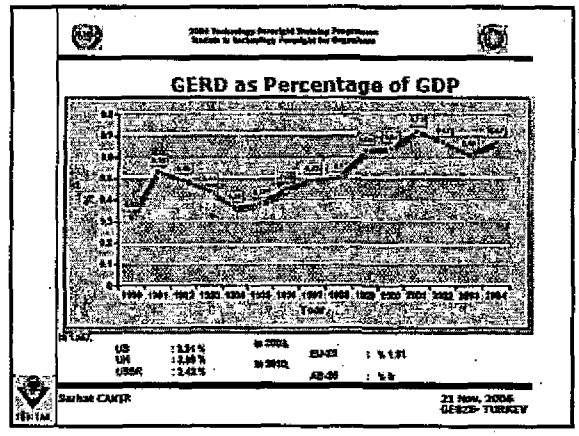
Presentations (9)











Appendix C (continued)

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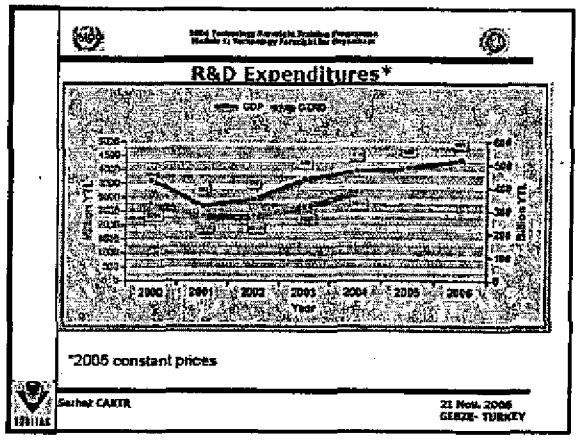
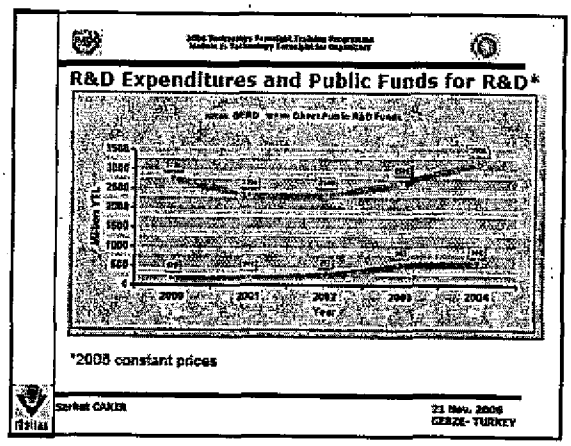
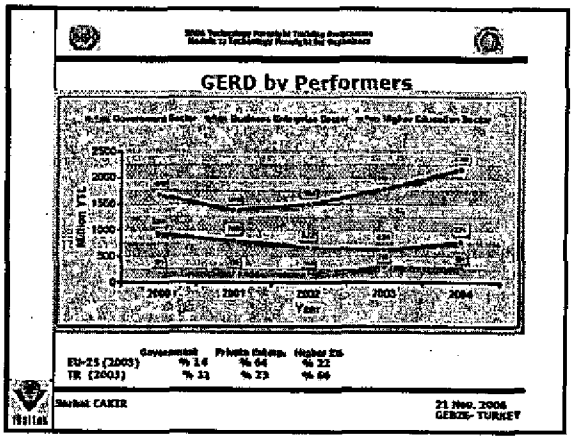
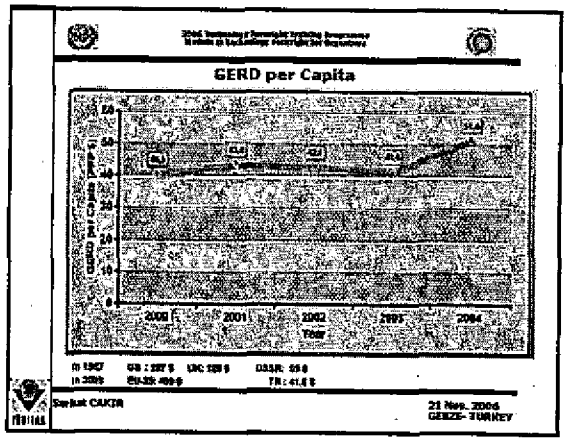
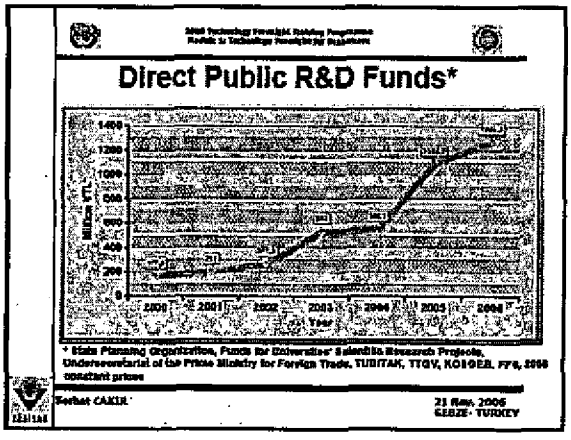
Presentations (9)

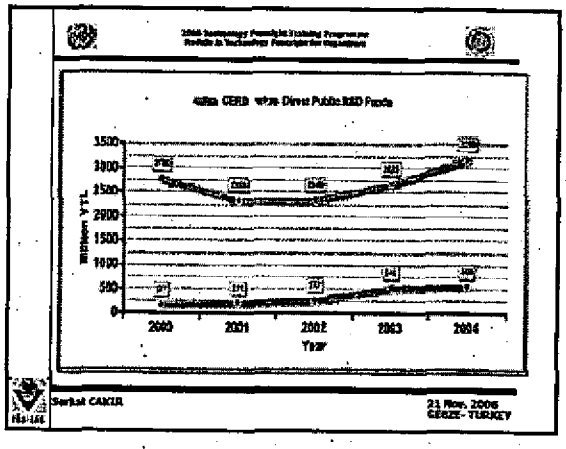












Appendix C (continued)

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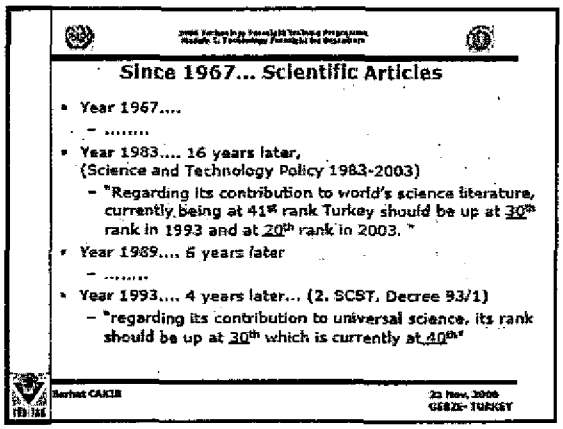
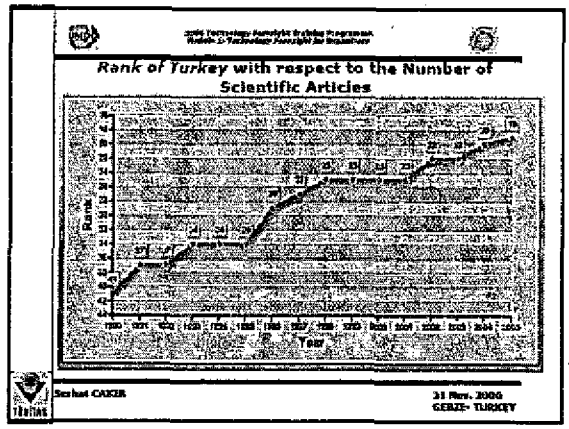
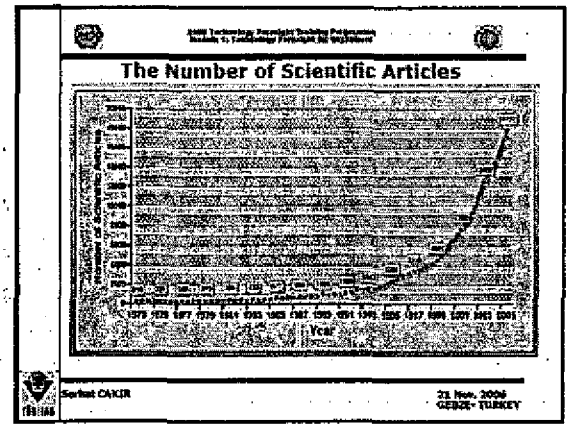
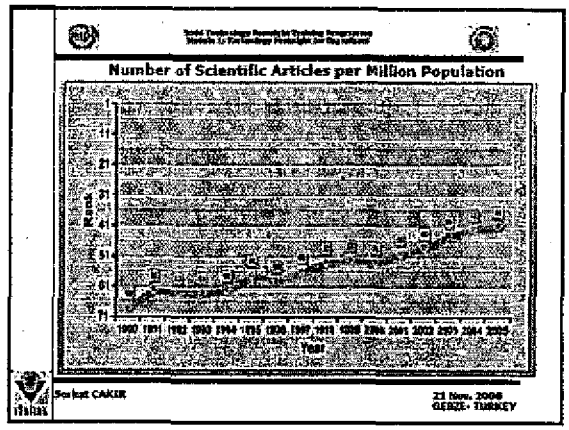
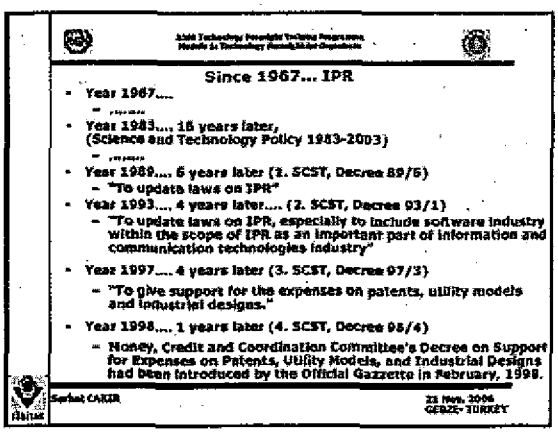
Presentations (9)

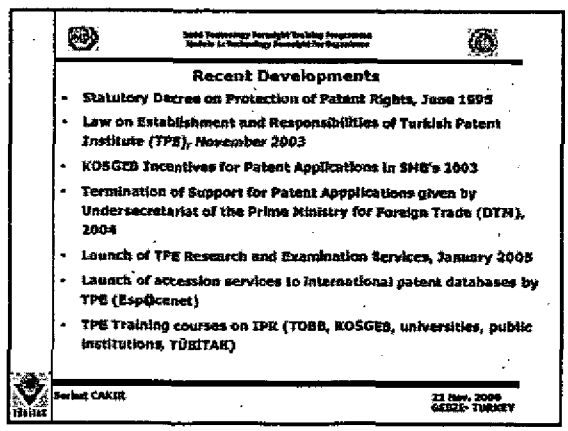












Appendix C (continued)

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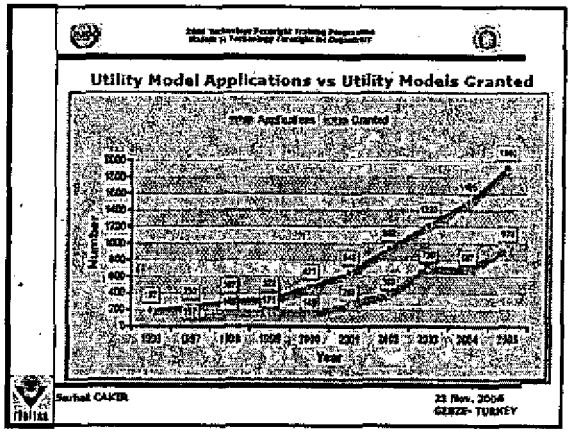
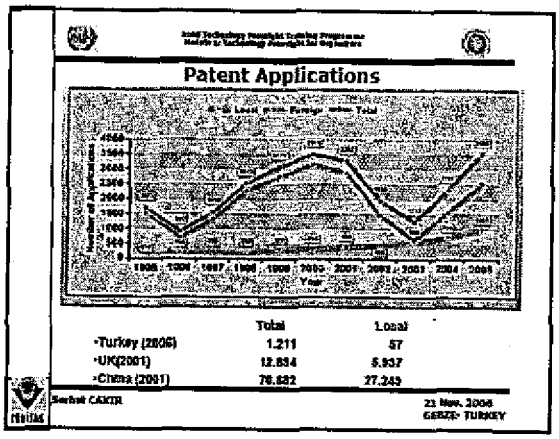
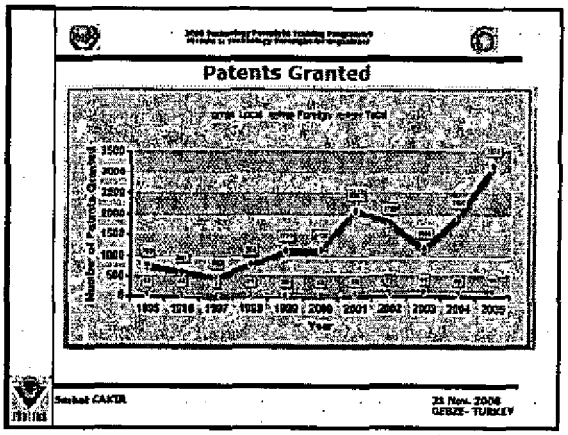
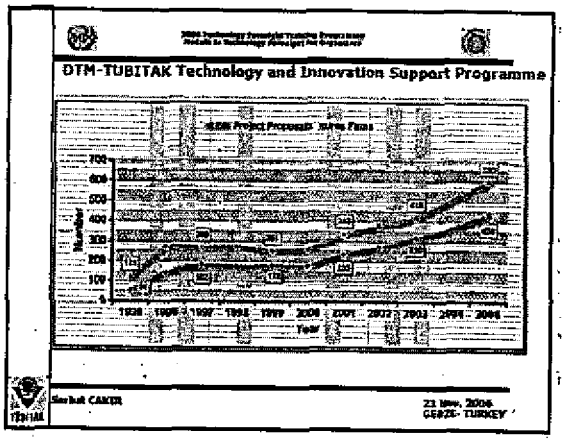
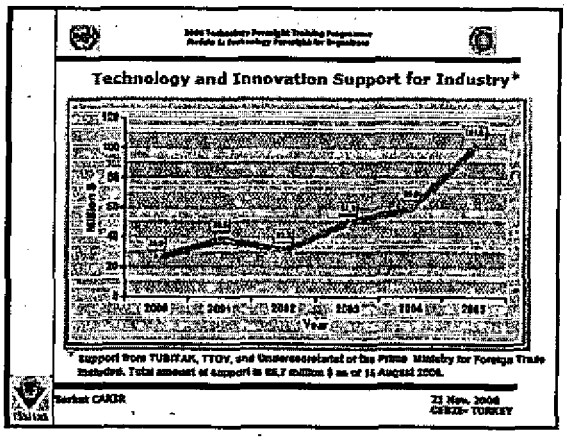
Presentations (9)

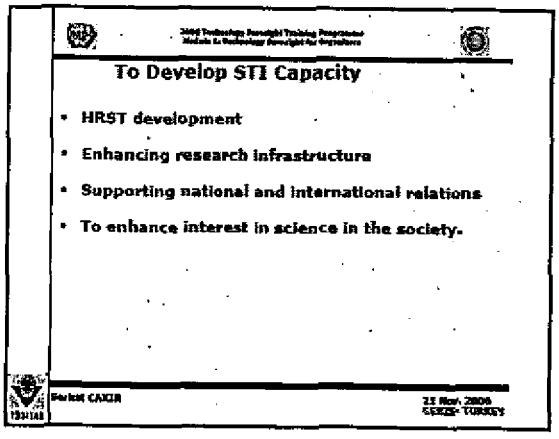












Appendix C (continued)

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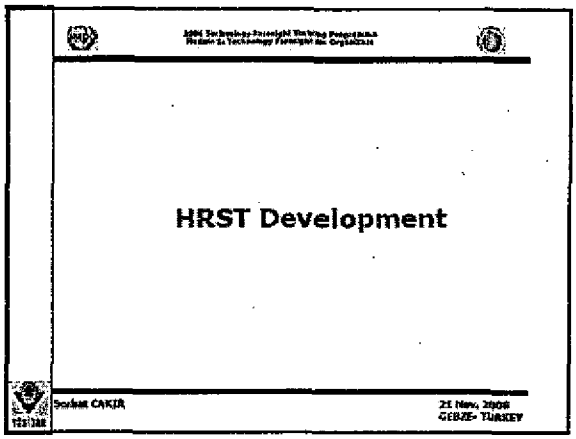
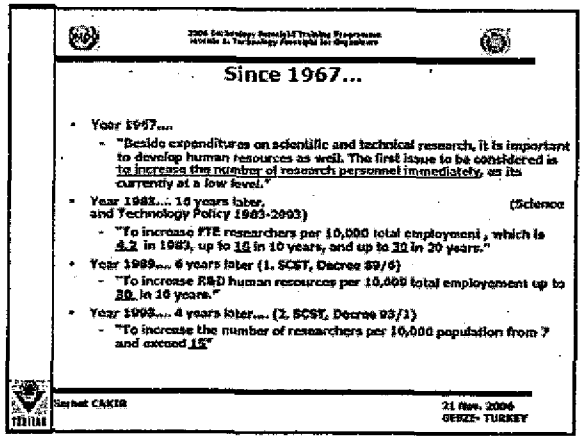
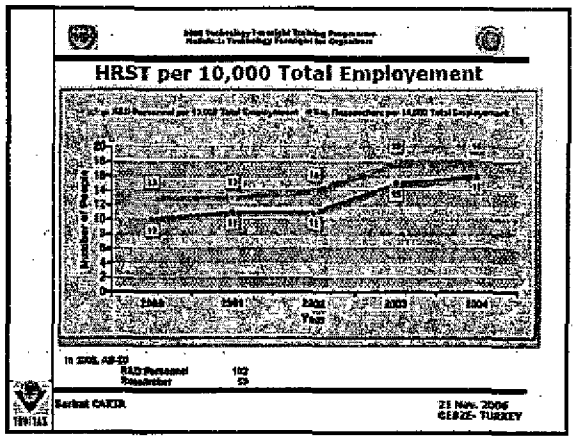
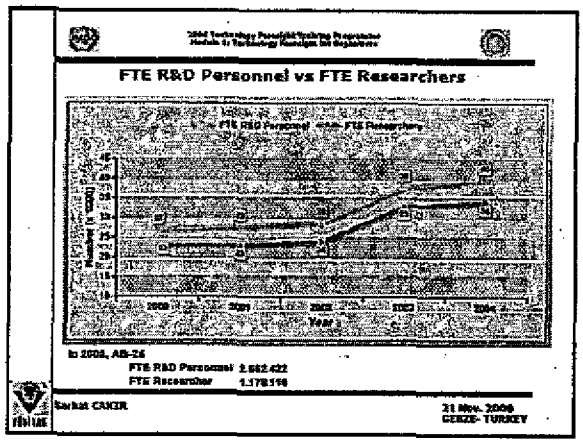
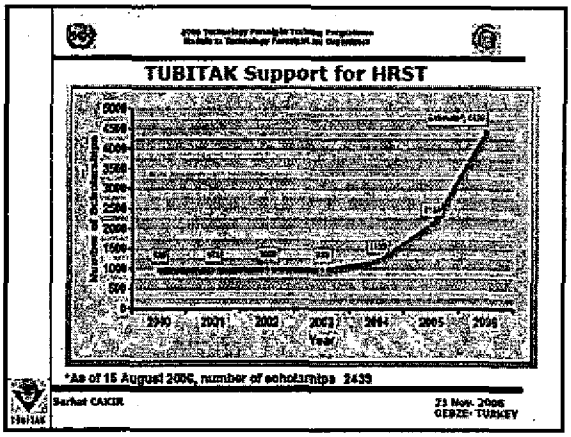
Presentations (9)

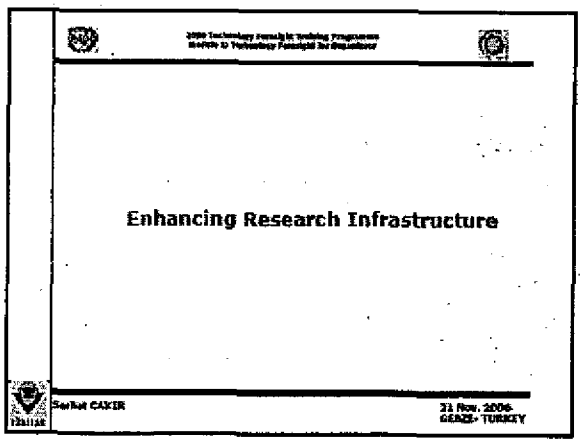












Appendix C (continued)

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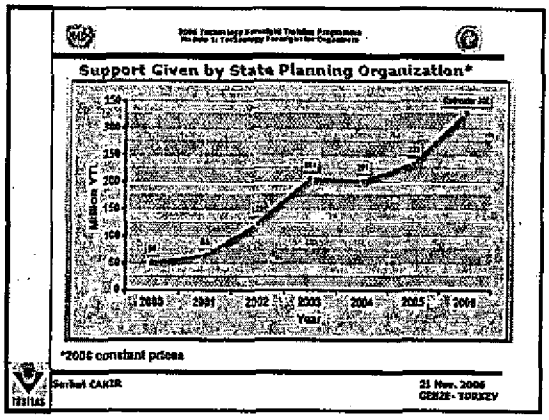
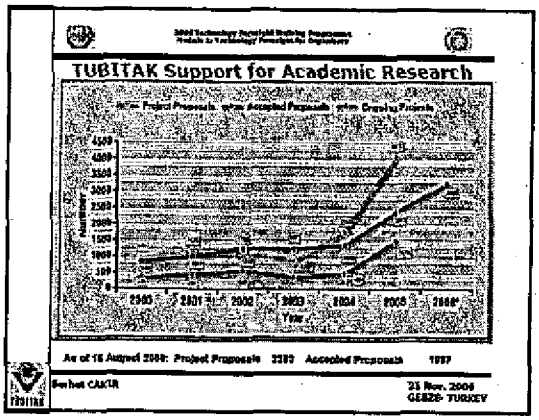
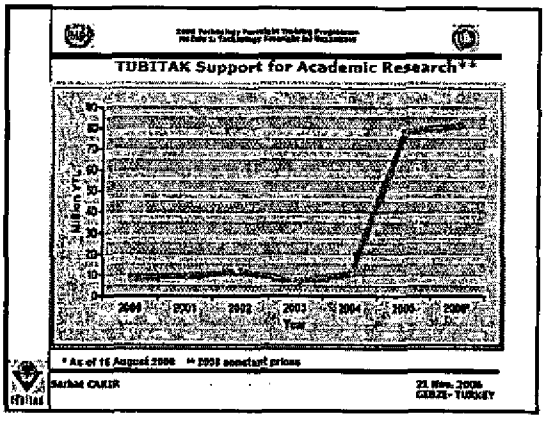
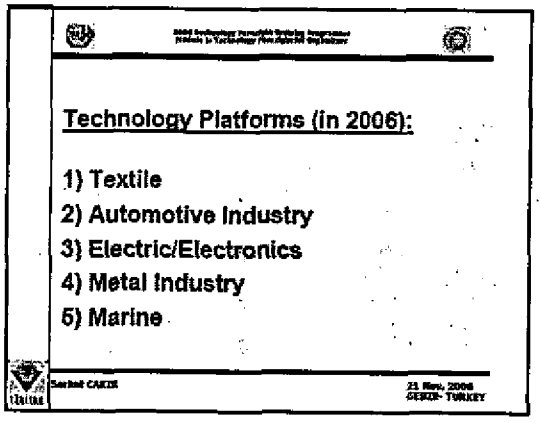
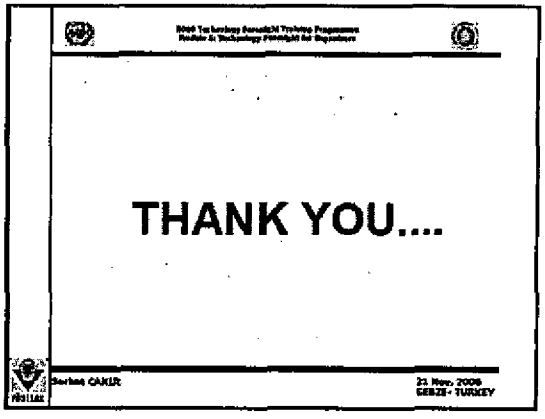
Presentations (9)











Appendix C (continued)

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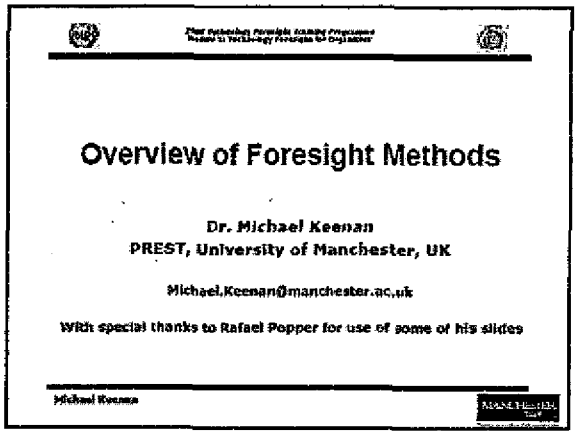
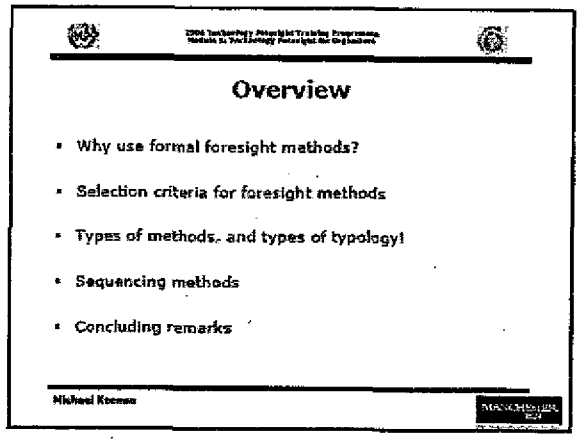
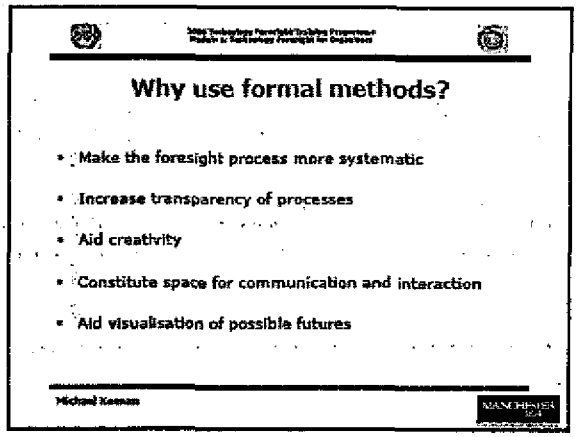
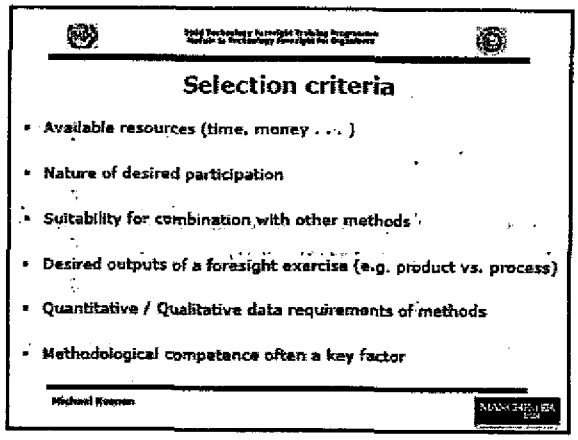
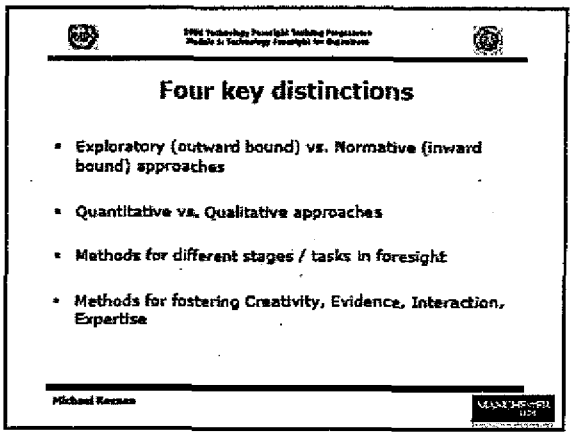
Presentations (10)

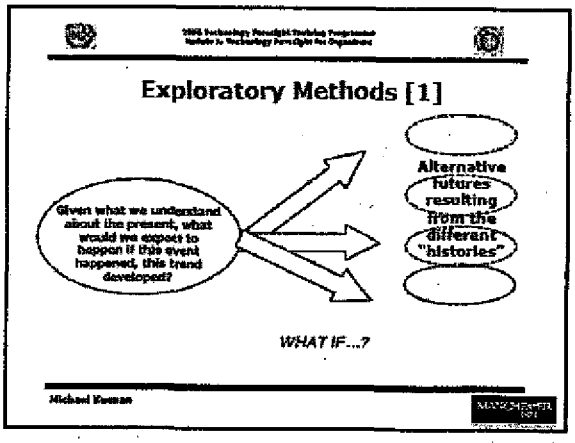












Appendix C (continued)

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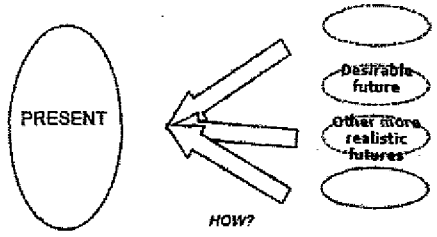
Presentations (10)

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

Normative methods



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 analyses
- 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.

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 Delphis, the data we work with derive from the numbers of people agreeing with particular statements or forecasts

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

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

Appendix C (continued)

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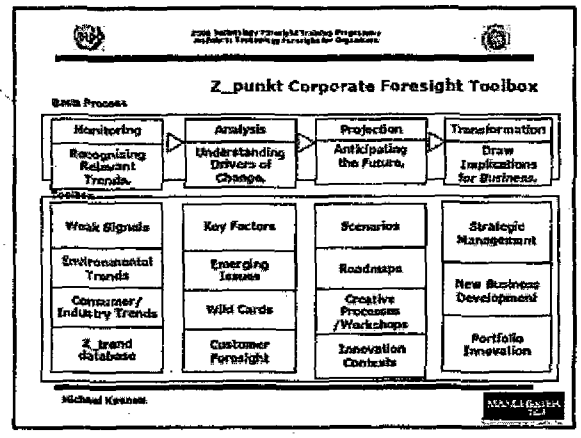
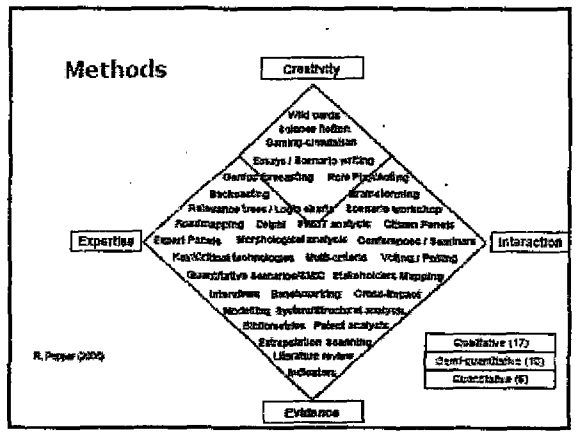
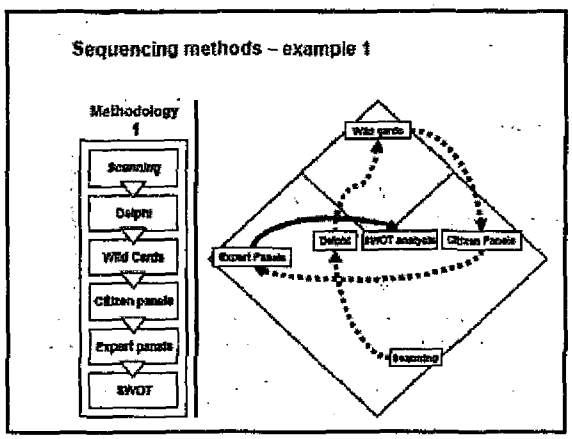
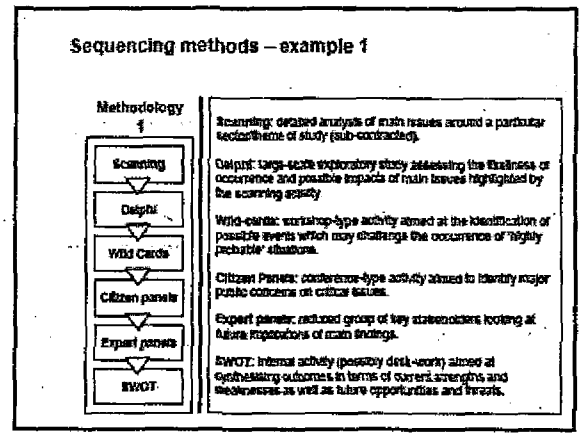
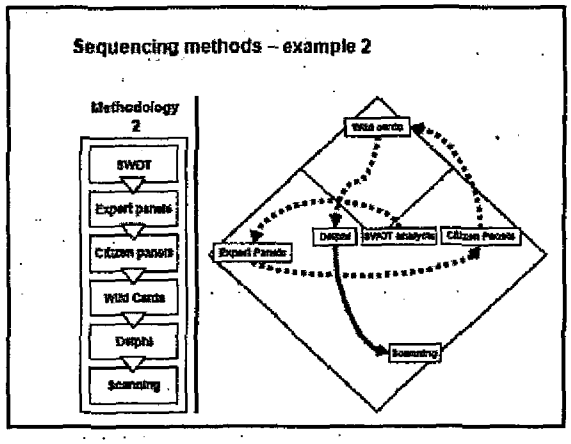
Presentations (10)

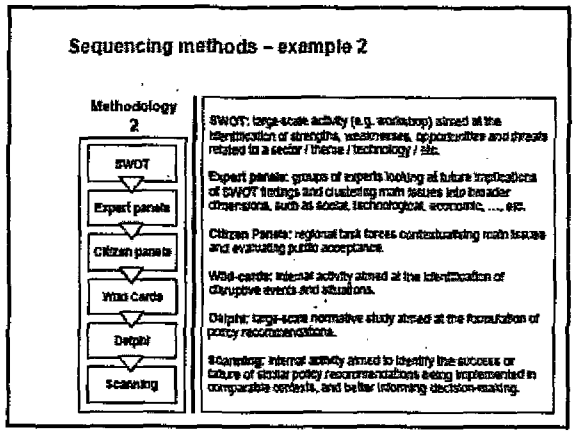












Appendix C (continued)

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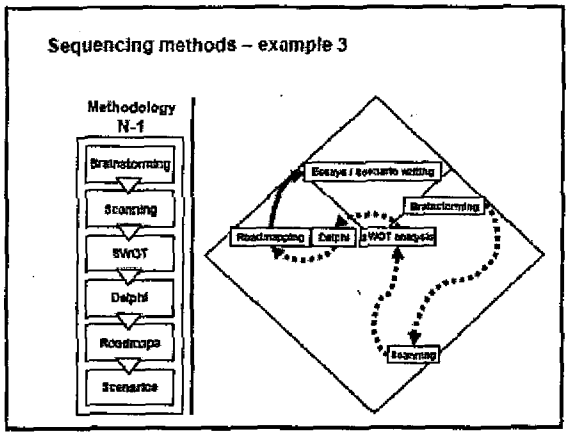
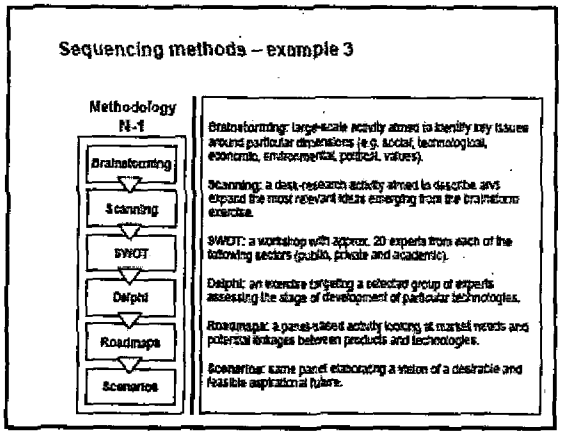
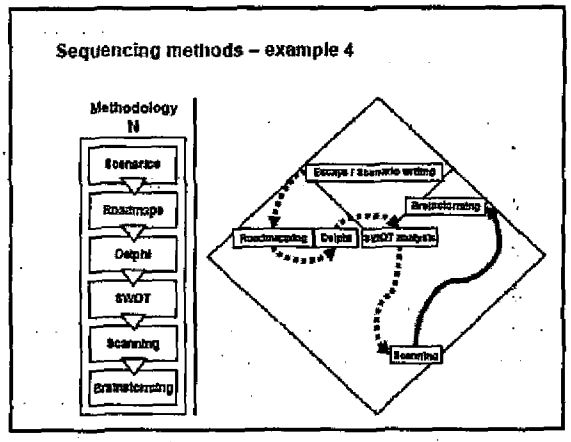
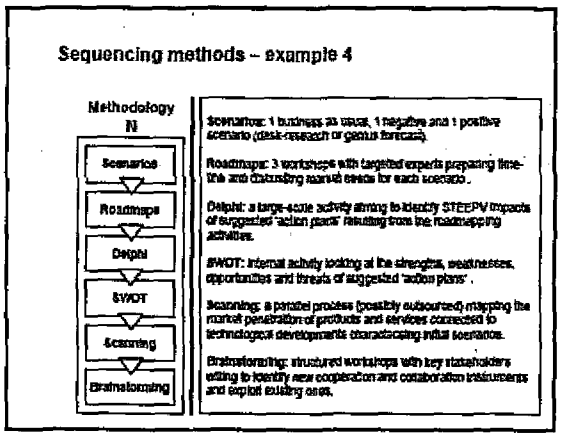
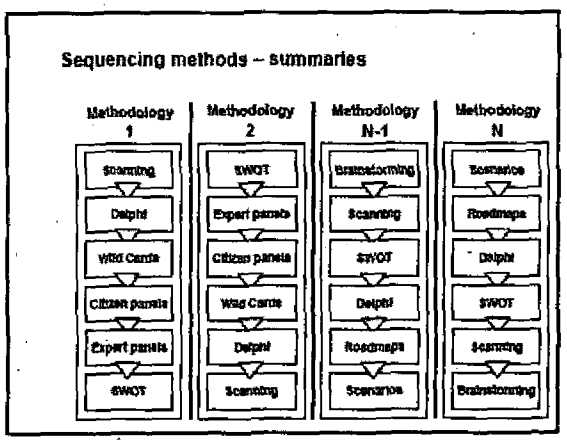
Presentations (10)

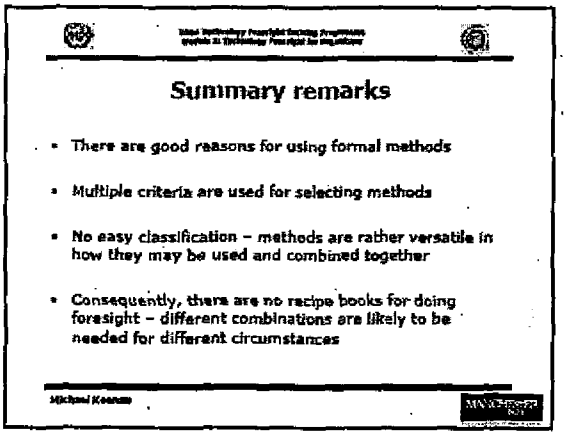












Appendix C (continued)

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Presentations (11)

Tools for Generating Ideas and Options

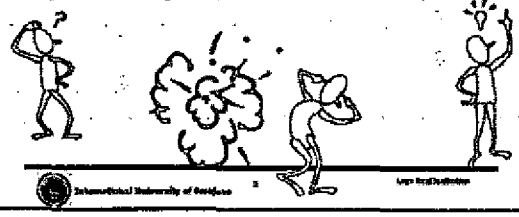
Prof. Dr. T. Erkan TÜRE
International University of Sarajevo
22 November 2006

Tools for Generating Ideas and Options

1. Brainstorming
2. Mindmapping

1. Brainstorming

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



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.

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.

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.

Appendix C (continued)

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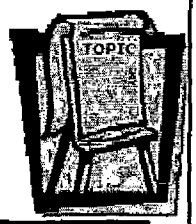
Presentations (11)

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.



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.

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.)

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.

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.

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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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

Brainstorming Techniques

Technique	Circular	Random	Silent
Description	• Members give ideas in order • They may pass after 1st round • Structured	• Members give ideas at random as they wish • Unstructured	• Members write ideas on slips of paper • Slips are collected and written on chart • Structured
Properties (Advantages and dis-advantages)	• Good for beginning • No one dominates • Full participation • Hitch-hiking • May forget ideas • Shy people feel under pressure	• More creative ideas • Quietshy people feel more comfortable • Some people may dominate • Confusion and difficulty in writing	• Good for sensitive issues or hierarchical groups • No one dominates • Ideas can be kept anonymous • No hitch-hiking • May block creativity

2. Mind Mapping

Mind mapping increases creativity and energy by attracting and involving individuals.

It stimulates visual thinking by providing a quick and enjoyable method of generating and assimilating ideas.

Mind mapping can increase the enthusiasm of the team members who are involved.

What Is It?

Mind Mapping is a method to generate and collate ideas and information that is:

- quick to do and use
- non-linear
- pictorial as well as verbal
- more interesting and colorful than text alone
- focused on relationships between ideas

How It Helps?

Mind Mapping is a fun way of involving people in generating ideas, capturing thoughts, and *demonstrating the relationships* and connections between them.

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.

Appendix C (continued)

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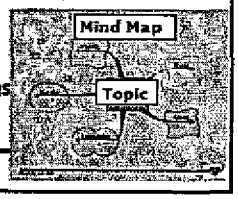
How To Use It

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.

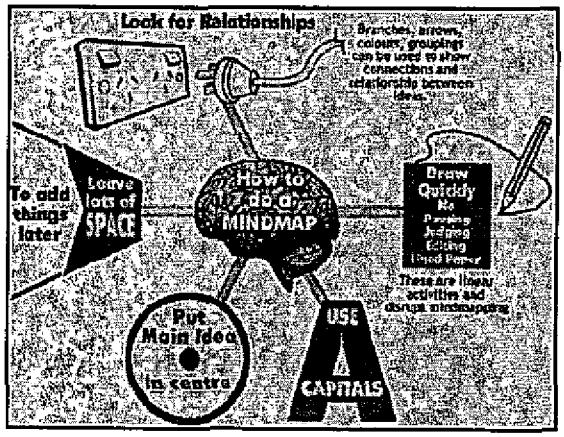
How To Use It

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 apropriate, draw links between branches and twigs

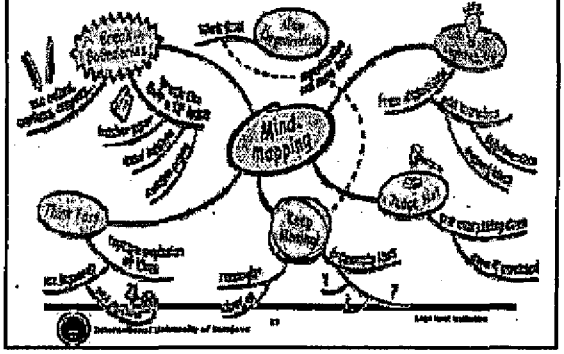


How To Use It

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.



Groundrules for Mind Mapping



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.

Appendix C (continued)

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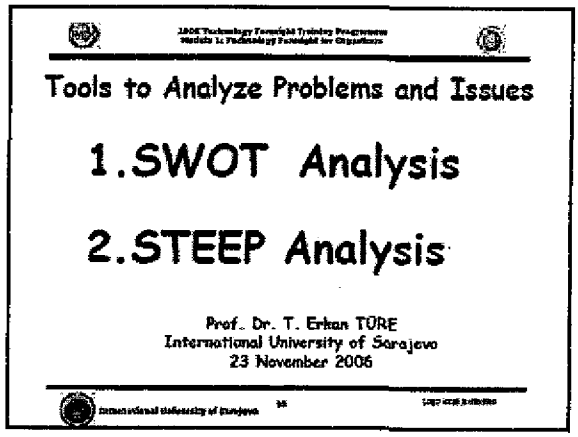

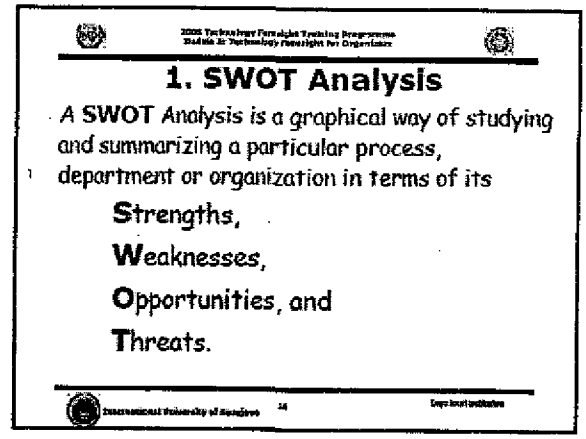

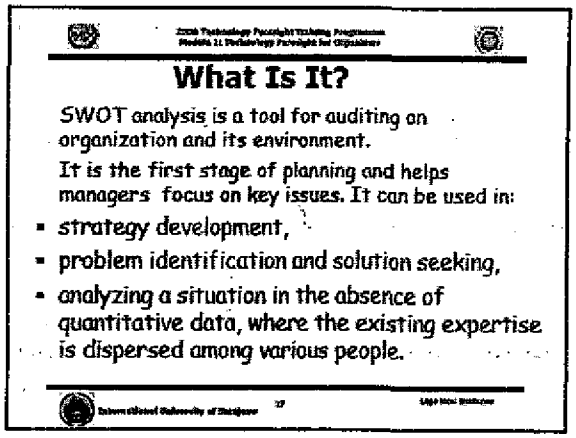

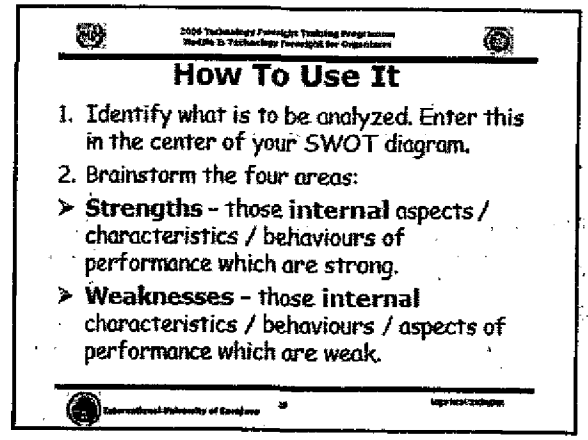

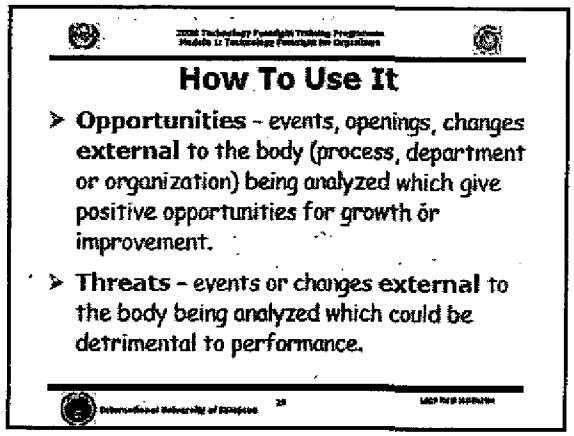

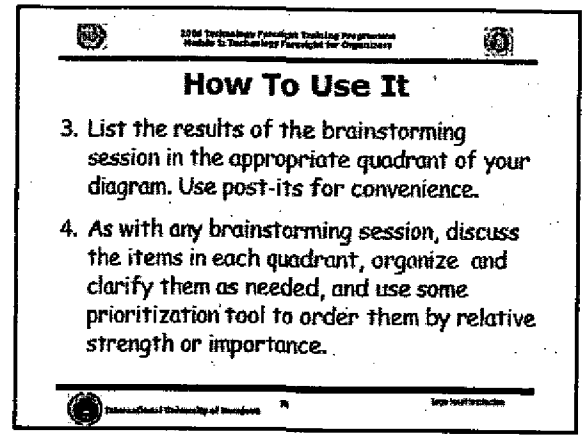

Appendix C (continued)

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Presentations (11)

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.

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.

SWOT Analysis Diagram

Strengths	Weaknesses
• history of creative and succesful product development • able to start new projects quickly • accepted use of cross functional teams	• limited knowledge and experience of latest engineering techniques • budget restrictions • limited investment in new technology in recent years
Opportunities	**Threats**
• head of department retires soon • parent company pushing for new product range	• competitor Y has re-equipped its labs at great expense • competitor Z is advertising for researchers • EC likely to impose restrictions on plant testing

Product Development Process

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.

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.

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.

Appendix C (continued)

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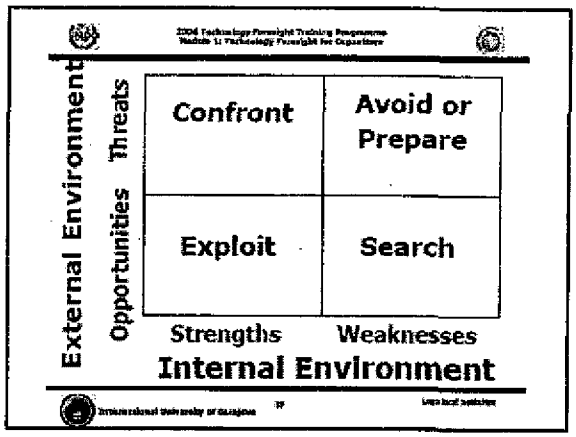
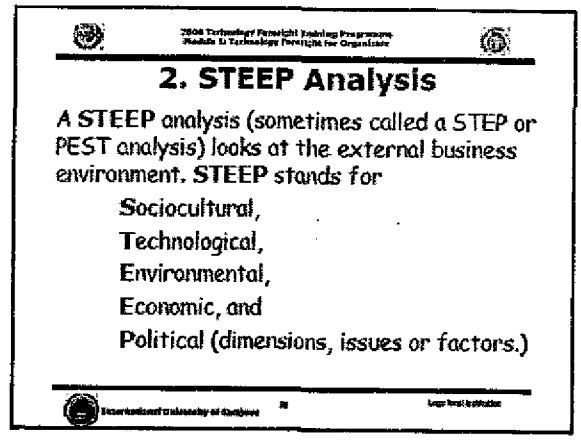
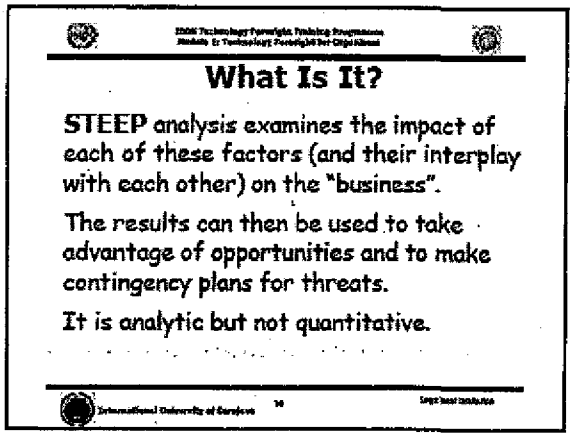
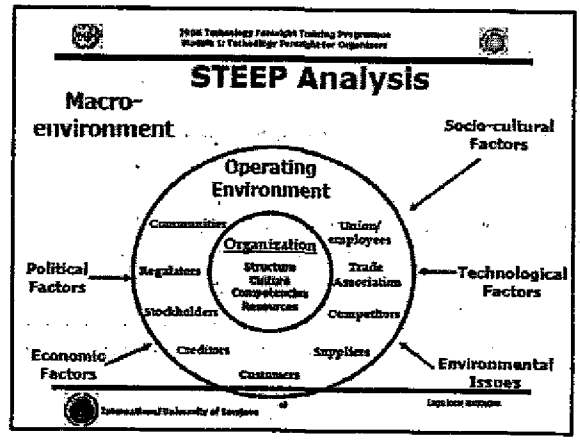
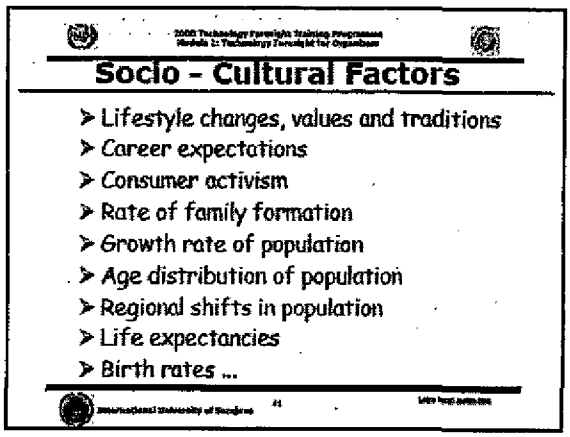
Presentations (11)

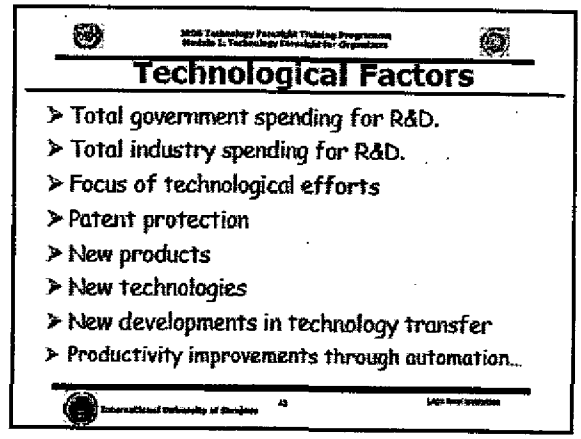












Appendix C (continued)

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Presentations (11)

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)...

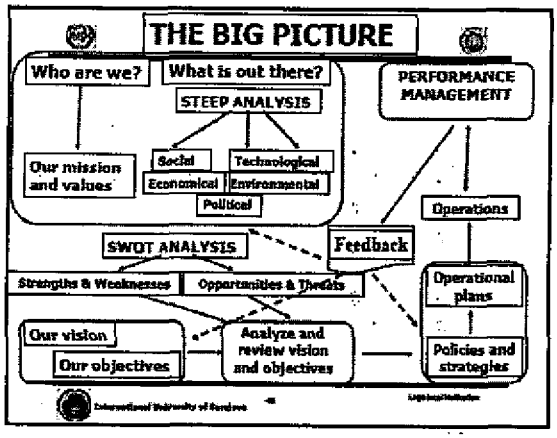
Economical Factors

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

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...

THE BIG PICTURE



Appendix C (continued)

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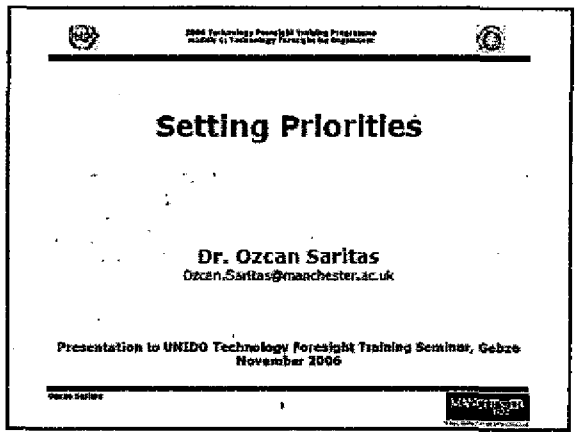
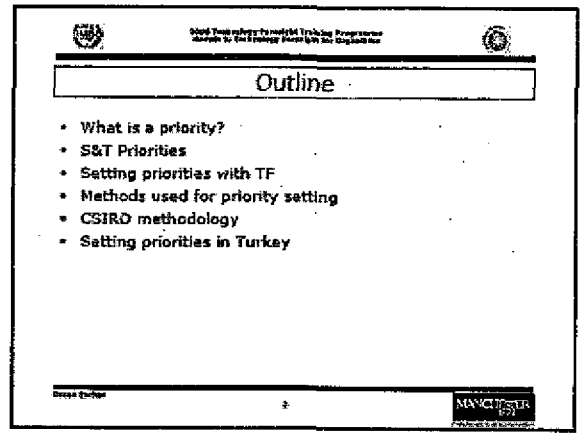
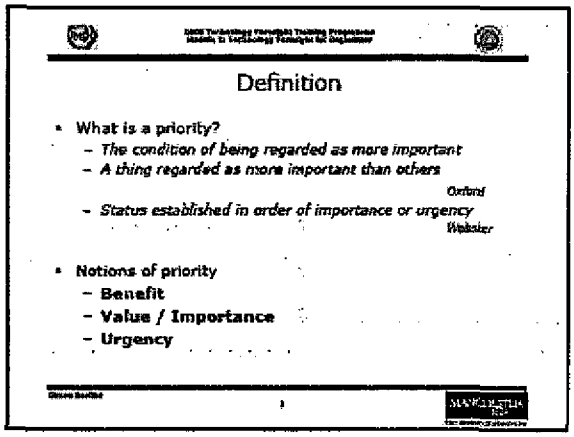
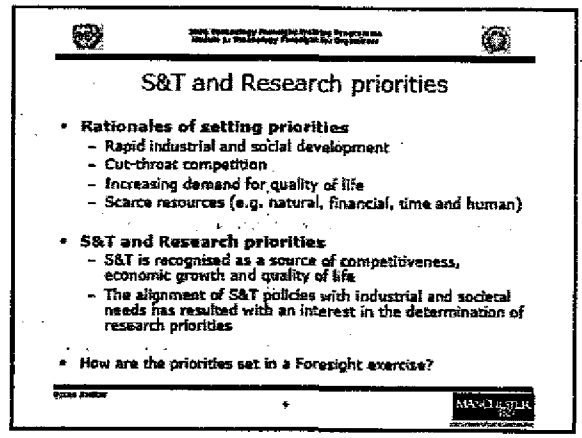
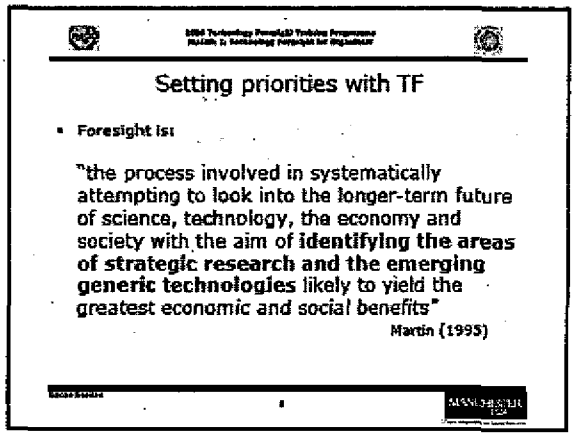
Presentations (12)

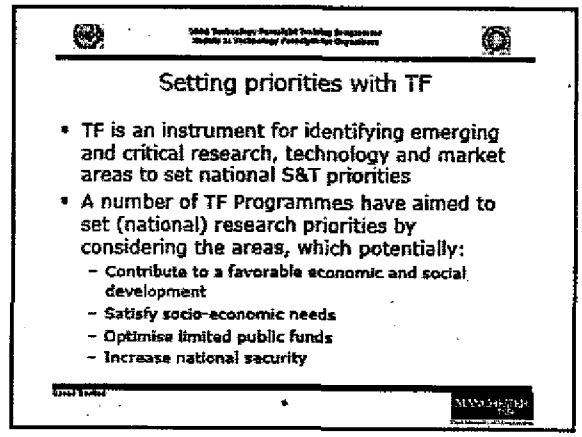












Appendix C (continued)

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Presentations (12)

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?

A generic process of prioritisation

Identification and selection of experts

↓

Initial list of technologies

↓

Prioritization

↓

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"

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

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)

Methods used for setting priorities

- Methods based on data
- Methods based on opinion
- Mixture of data and opinion

- <u>Typical methods</u>
  - 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

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

Appendix C (continued)

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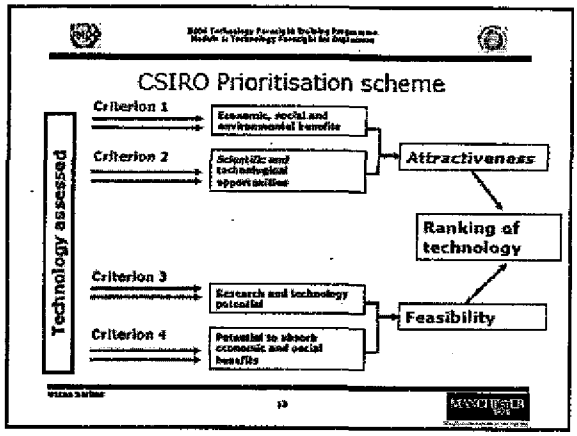
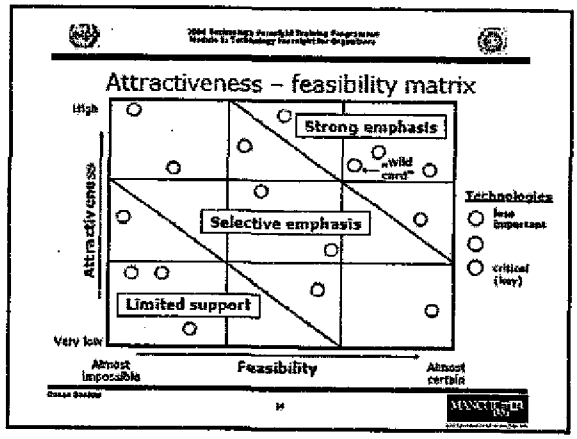
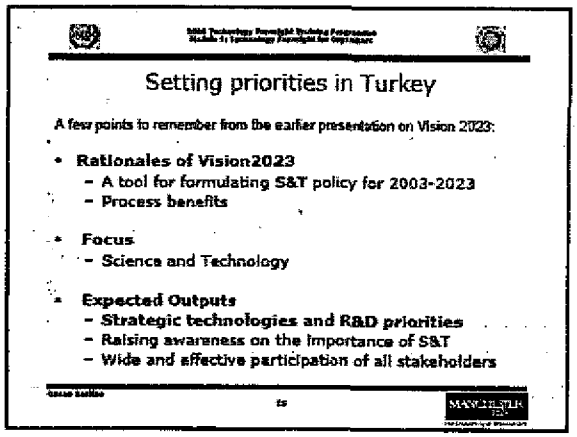
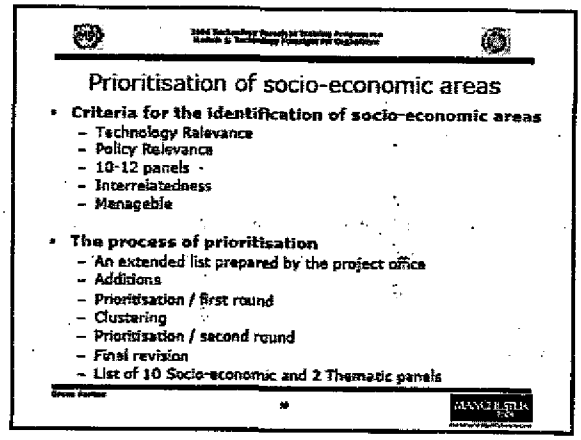
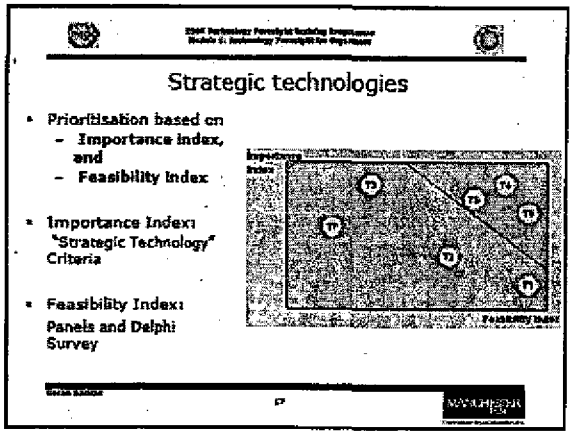
Presentations (12)

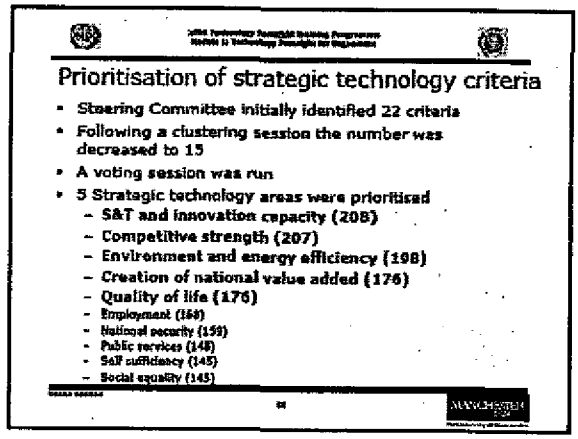












Appendix C (continued)

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Presentations (12)

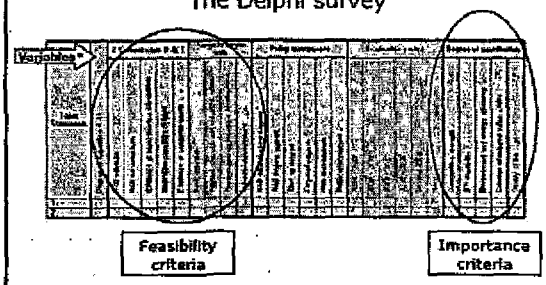
Importance index

- 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

Feasibility index

	Weights				
	Researcher potential	R&D infrastructure	Existence of basic science capabilities	Innovation capability of firms	Existence of competitive firms
Basic research	% 25	% 23	% 25	% 15	% 10
Applied research and industrial research	% 25	% 20	% 20	% 20	% 15
Pre-competitive industrial development	% 20	% 20	% 15	% 20	% 20
Industrial development	% 20	% 15	% 15	% 20	% 25

The Delphi survey



*Identified with the participation of panels, project office and consultants

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

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

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

Appendix C (continued)

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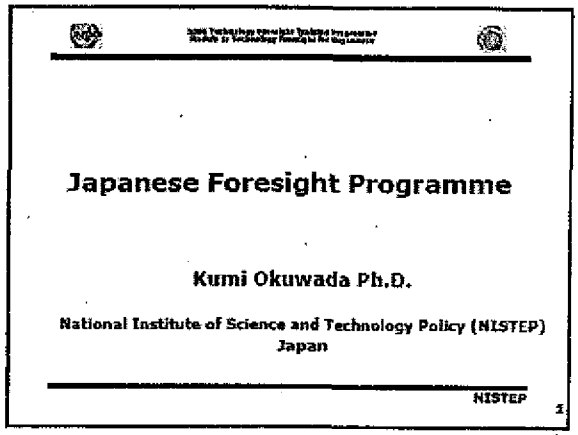
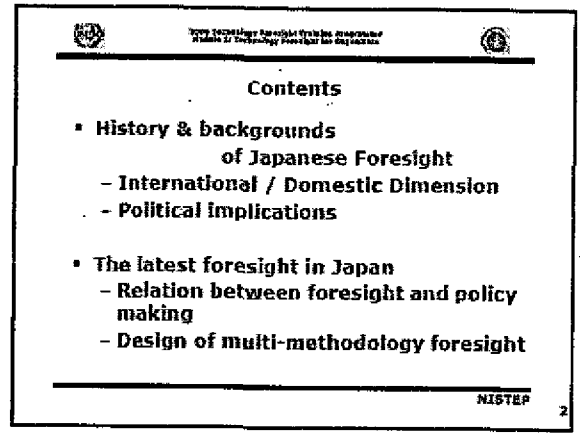
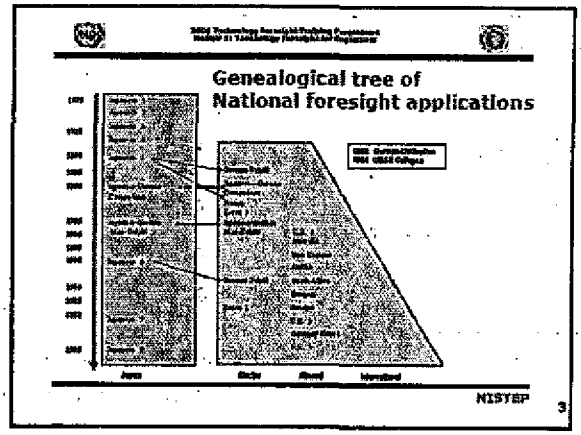
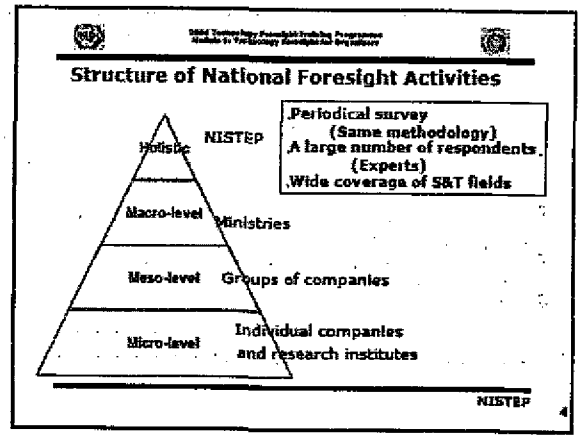
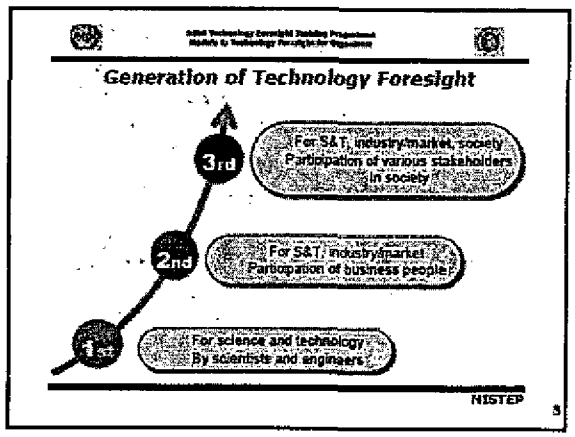
Presentations (13)

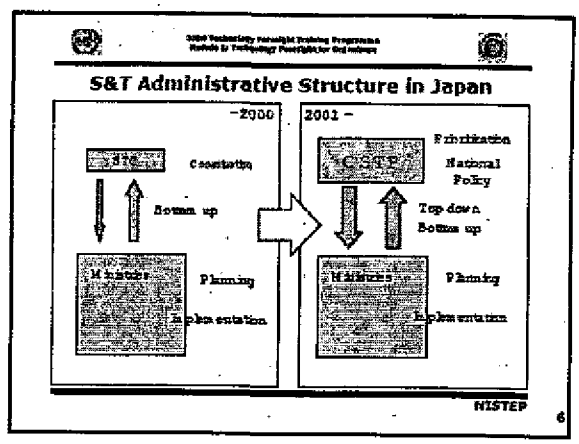












Appendix C (continued)

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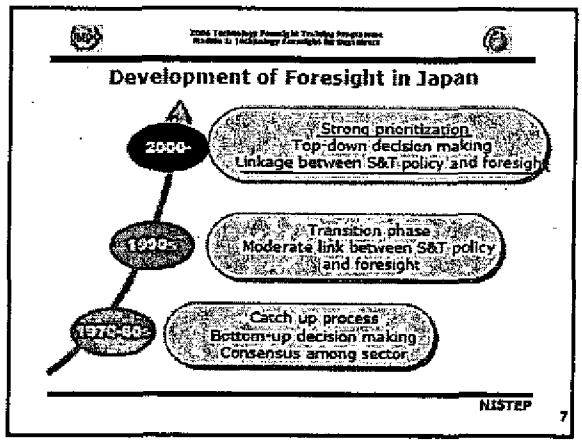
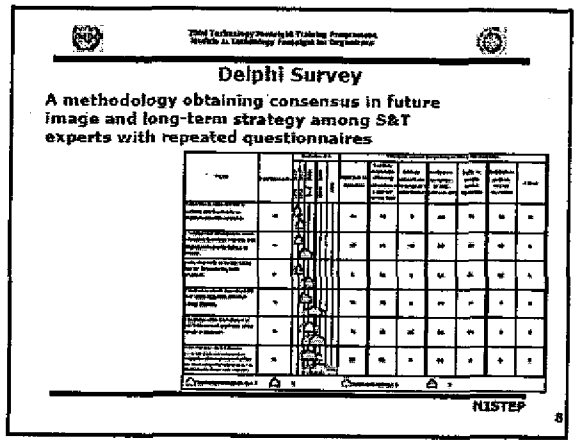
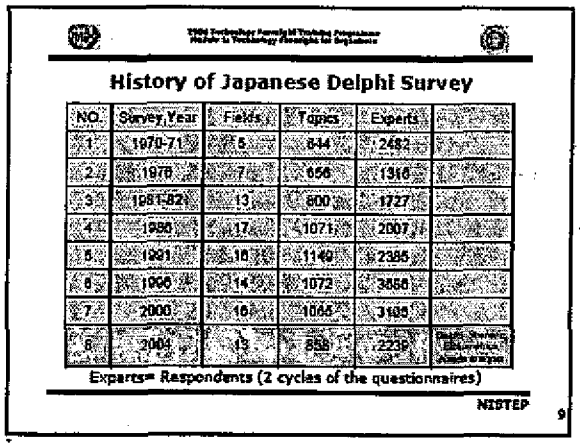
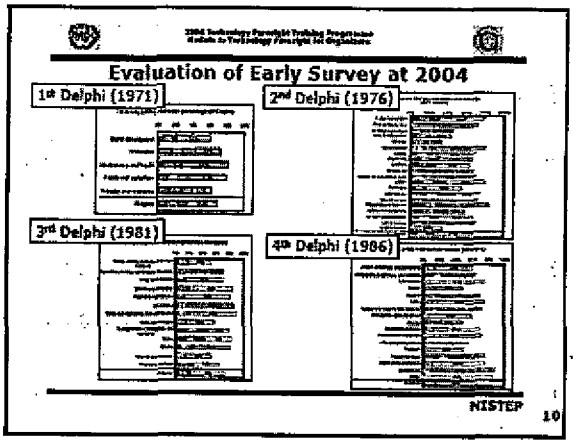
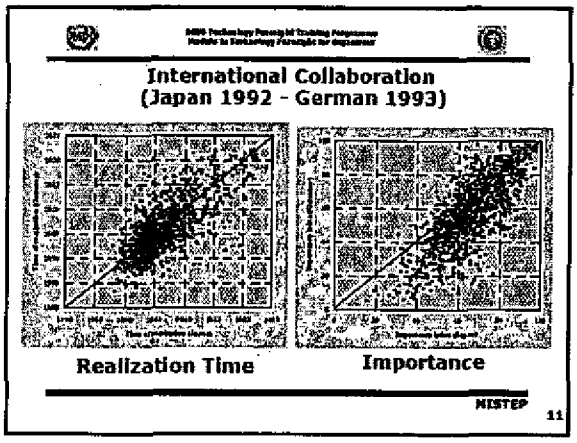
Presentations (13)

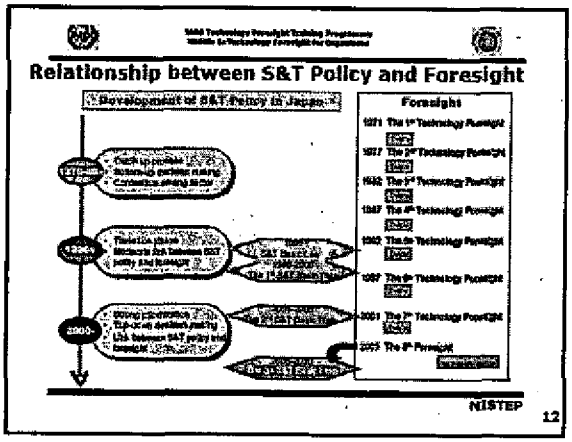












Appendix C (continued)

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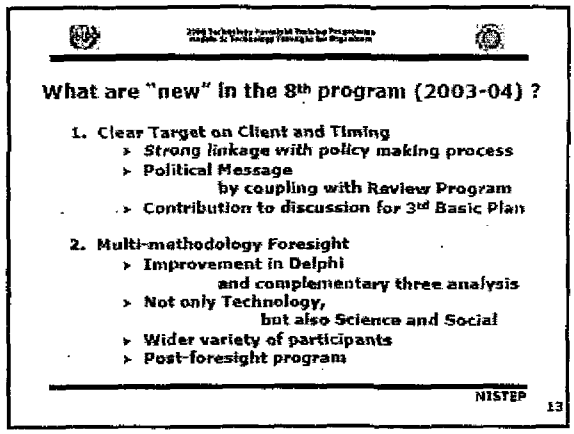
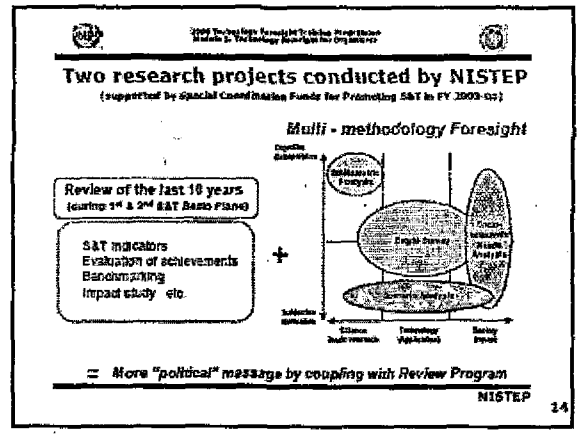
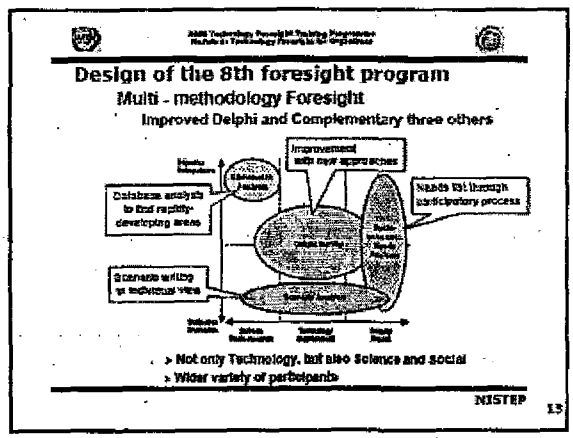
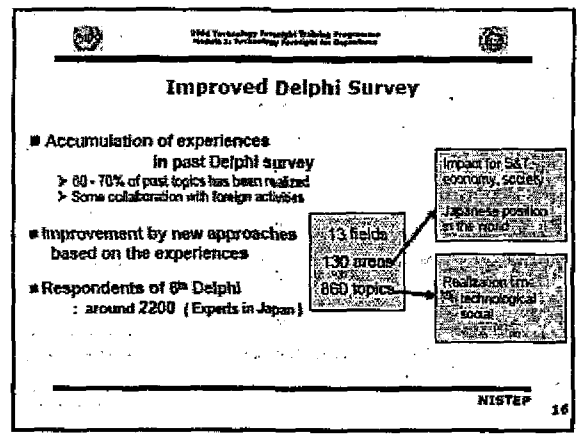
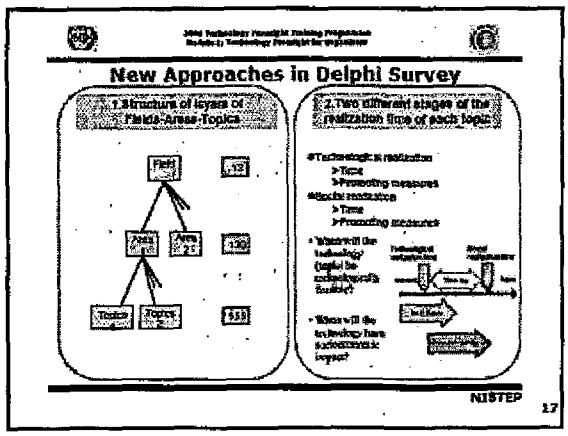
Presentations (13)

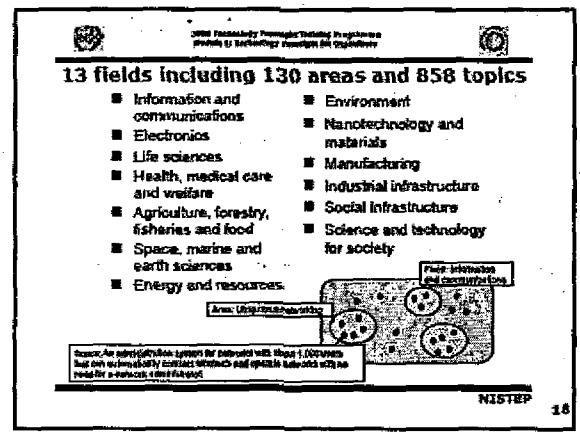












Appendix C (continued)

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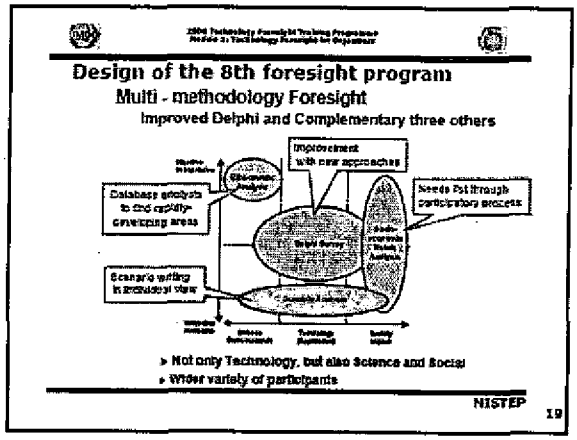
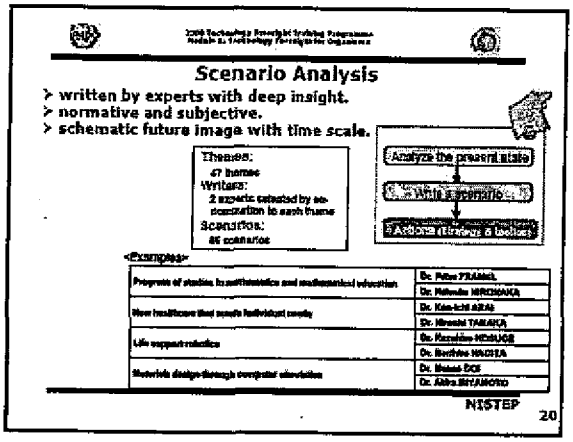
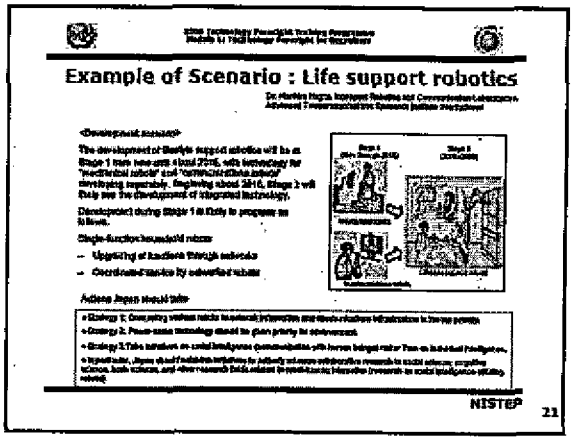
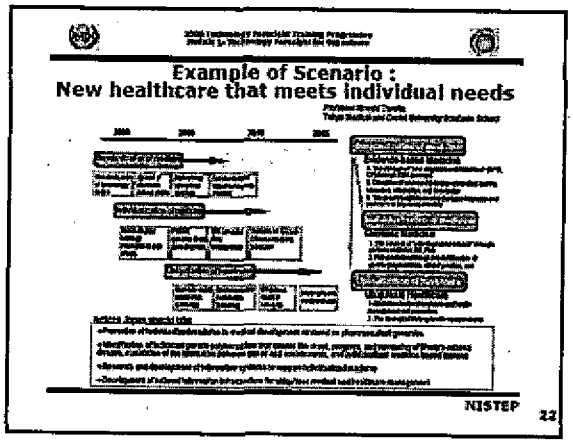
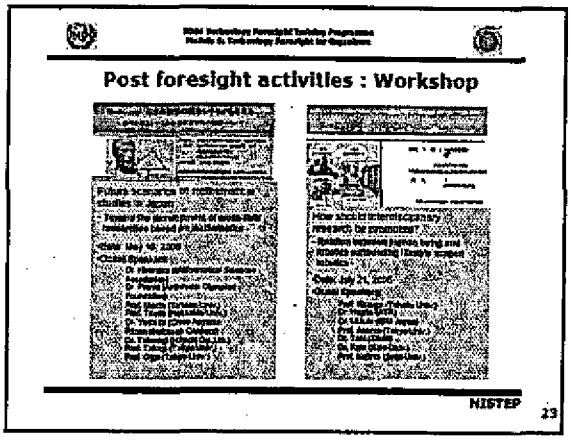
Presentations (13)

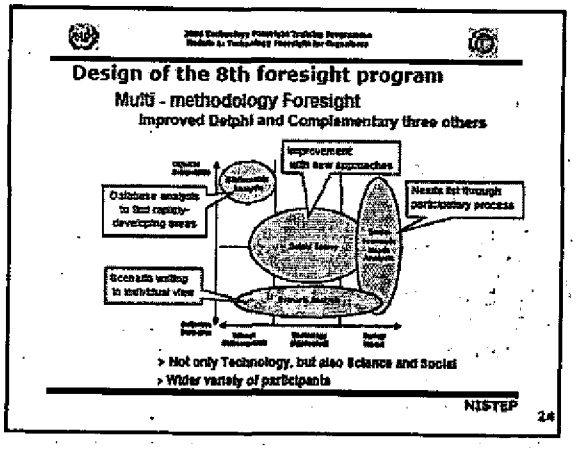












Appendix C (continued)

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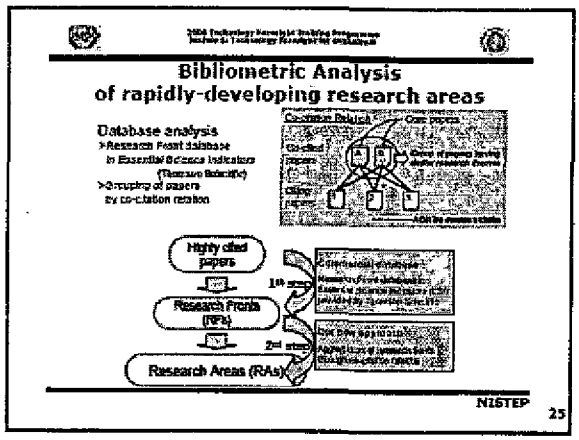
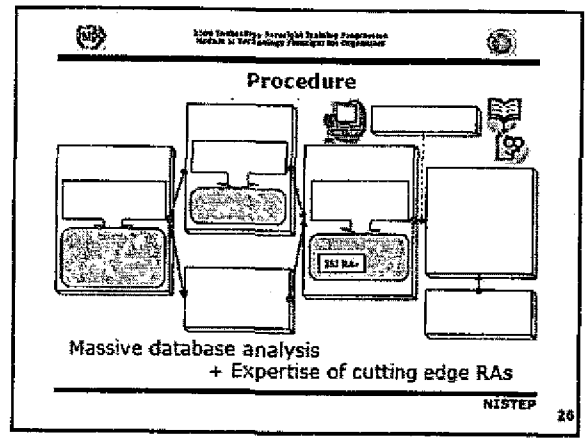
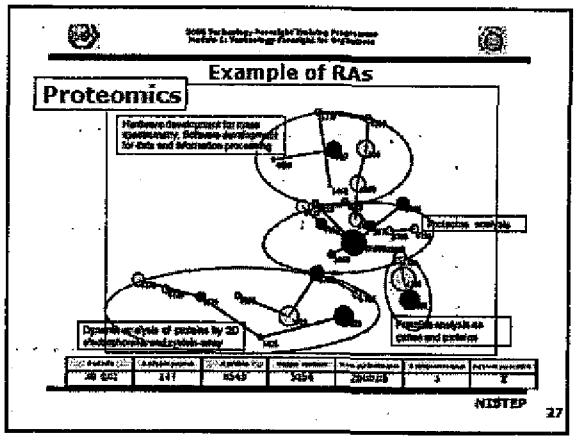
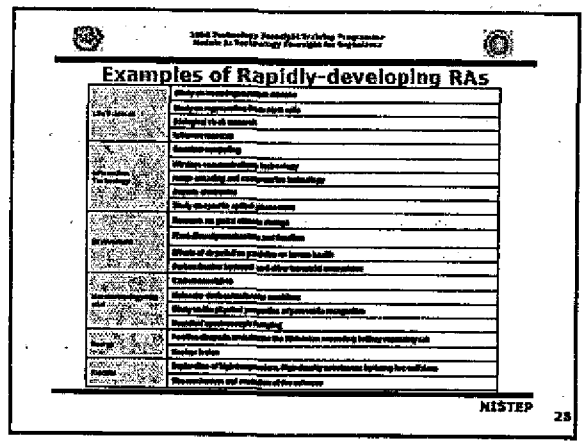
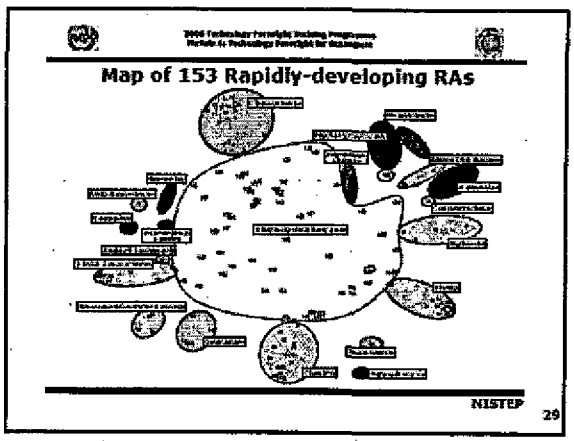
Presentations (13)

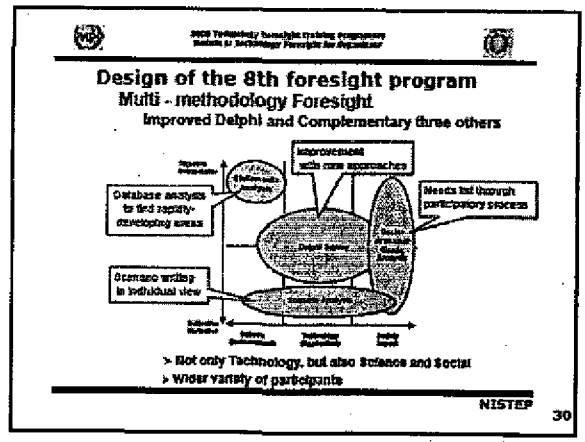












Appendix C (continued)

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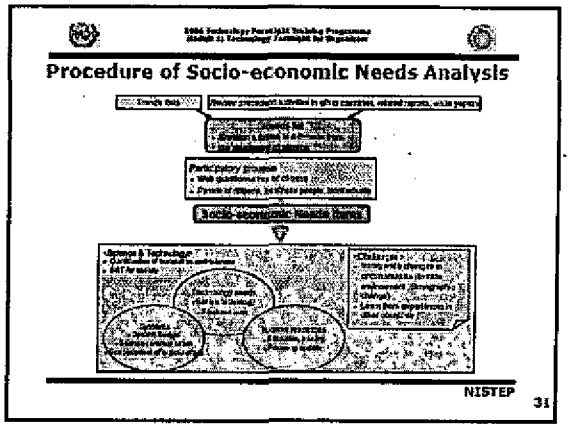
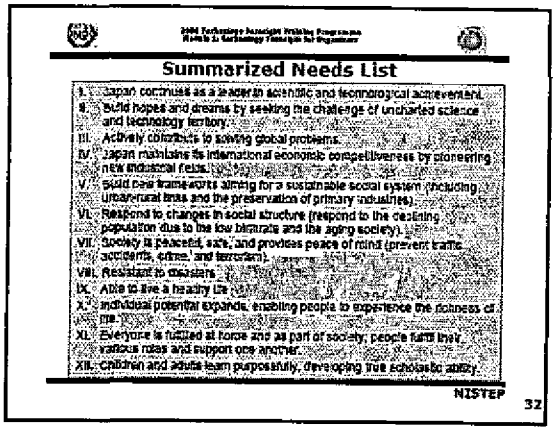
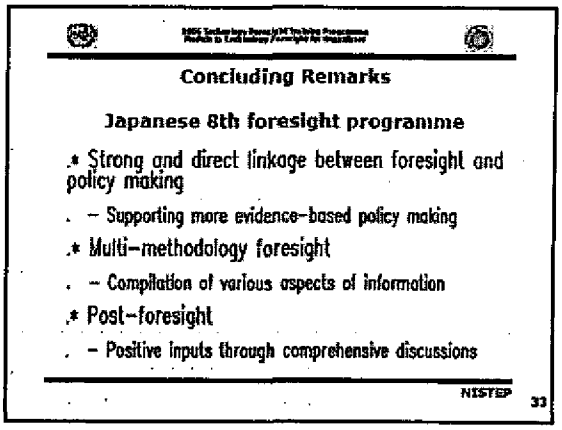
Presentations (13)







Appendix C (continued)

23 November 2006

Presentations (14)

The Latest Japanese Delphi

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

NISTEP 1

Contents

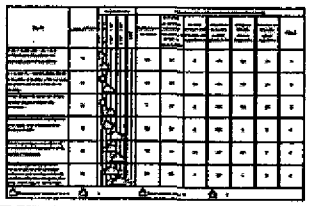
- Delphi Survey
  - Methodology
  - Effectiveness and Limits
- In the latest foresight program in Japan (2003-04)
- Improvements in the New Delphi
- Obtained Results

DELPHI

NISTEP 2

Delphi Survey

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



NISTEP 3

History of Japanese Delphi Survey

NO.	Survey Year	Fields	Topics	Experts	
1	1970-71	5	644	2482	
2	1976	7	658	1310	
3	1981-82	13	900	1727	
4	1986	17	1071	2907	
5	1991	16	1149	2385	
6	1996	14	1072	3586	
7	2000	10	1086	3108	
8	2004	13	858	2239	

Experts= Respondents (2 cycles of the questionnaires)

NISTEP 4

Delphi Survey: Effectiveness and Limits

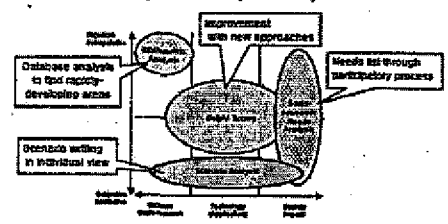
- Helpful to form consensus
  - High correlation between experts view and investments as a result
- Acceptable credibility
  - Feasibility of technology : universal
  - Priority of technology : regional
- Difficulty to extract outstanding but minor insights
  - High temperature superconductive material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

NISTEP 5

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

NISTEP 6

Appendix C (continued)

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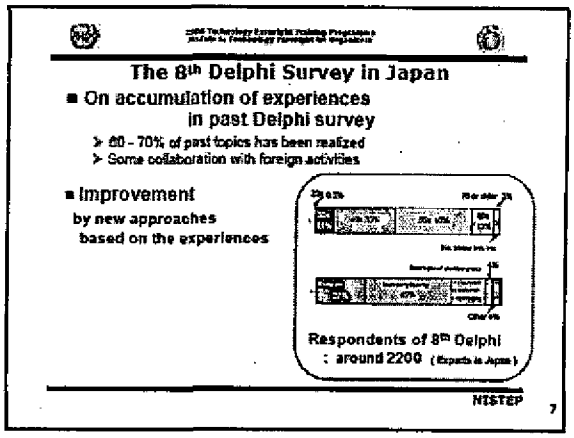
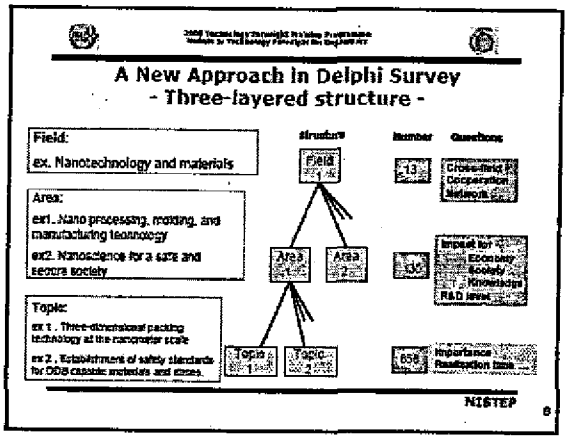
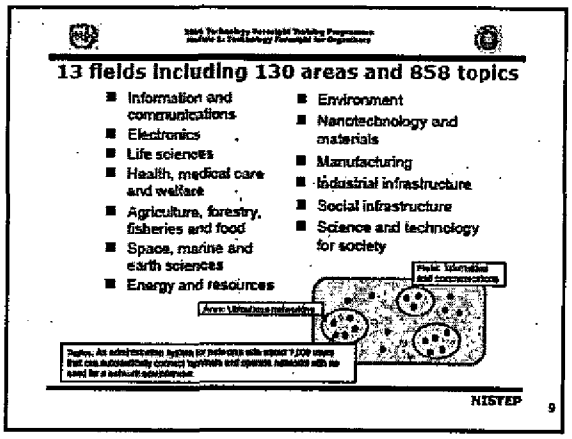
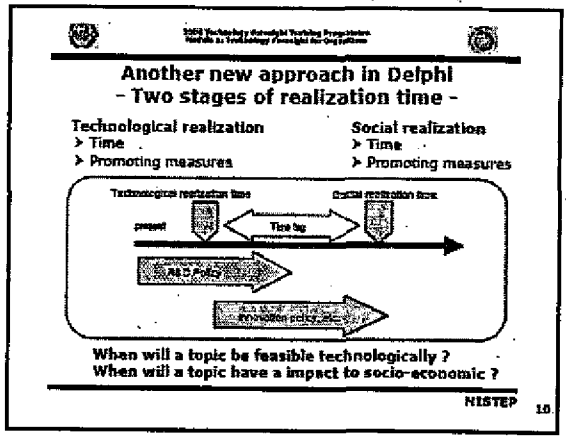
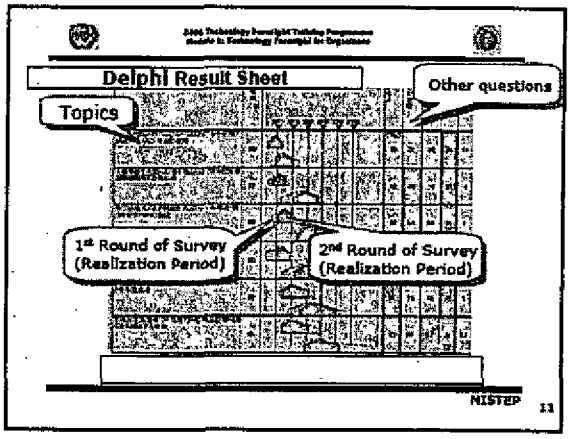
Presentations (14)

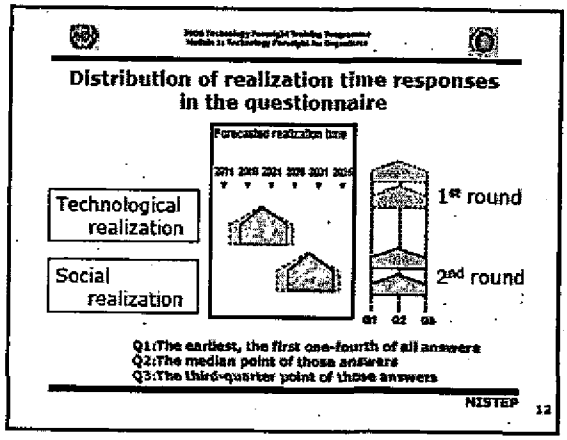












Appendix C (continued)

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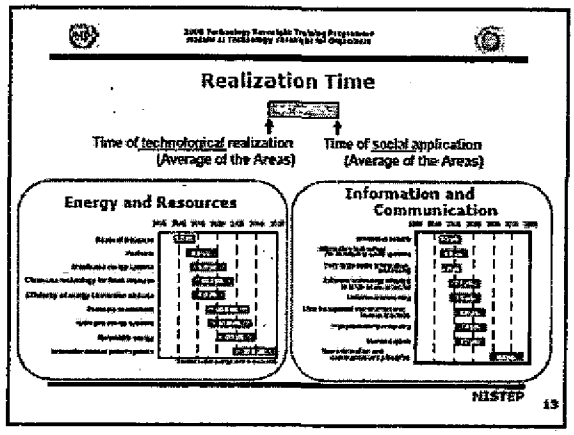
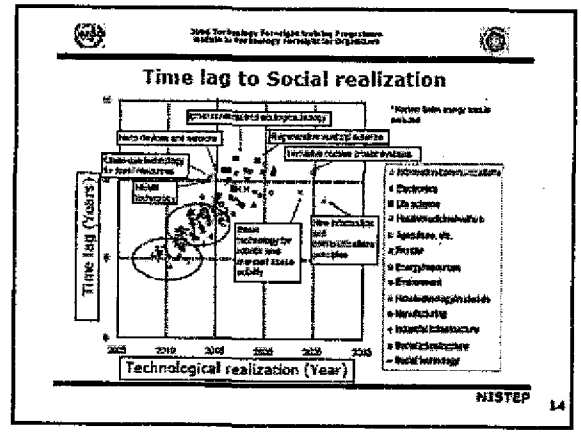
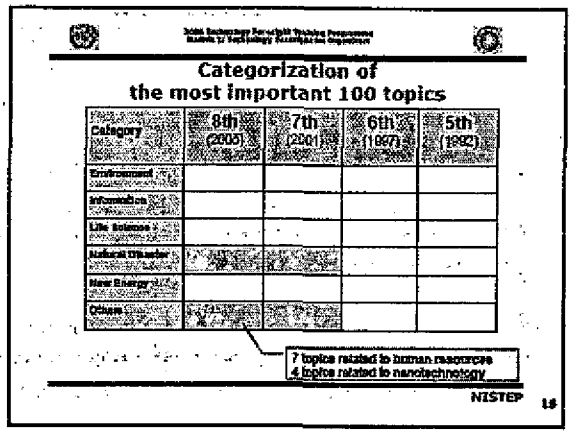
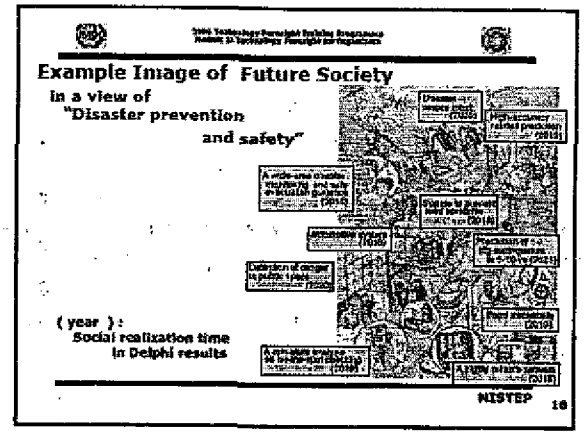
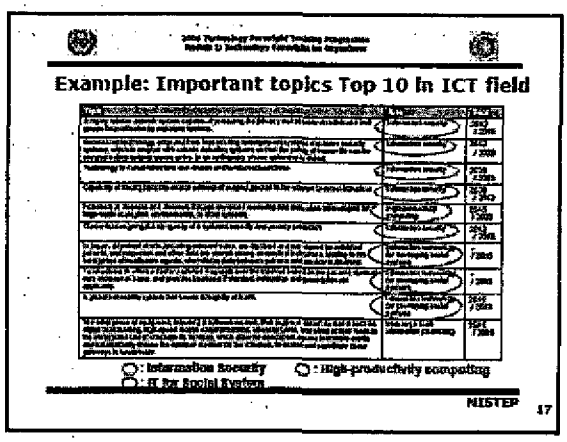
Presentations (14)

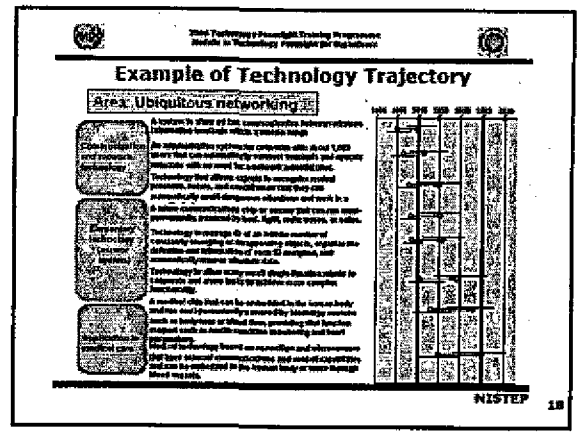












Appendix C (continued)

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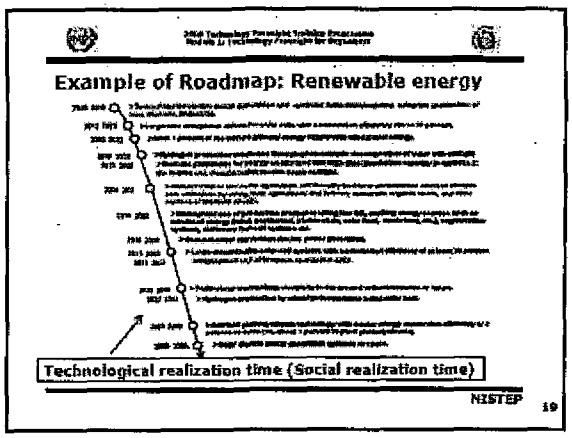
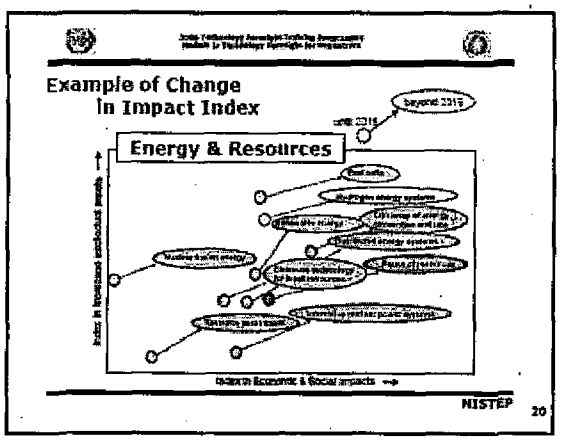
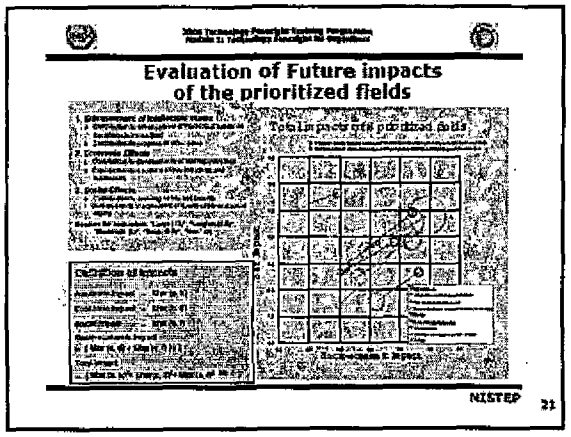
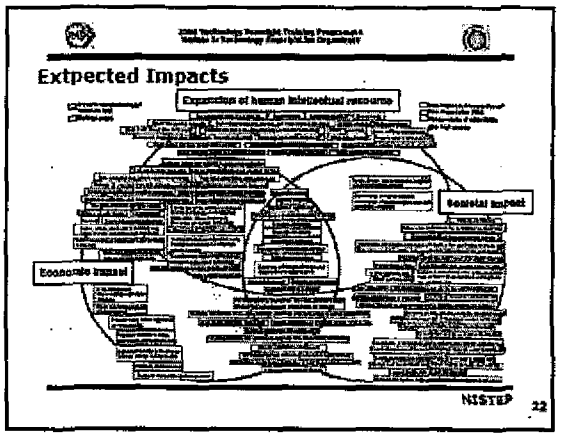
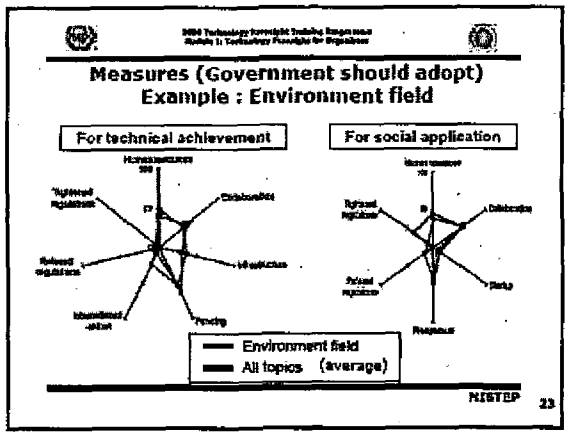
Presentations (14)

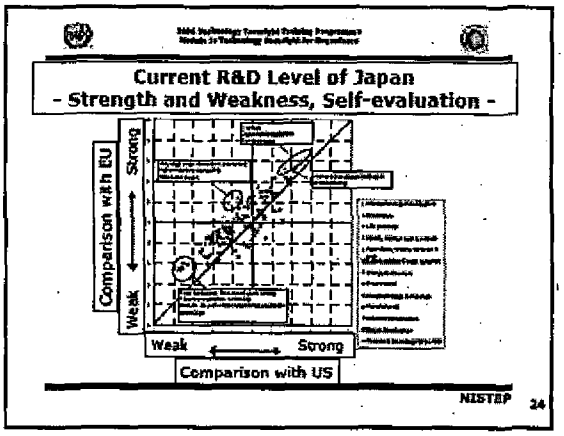












Appendix C (continued)

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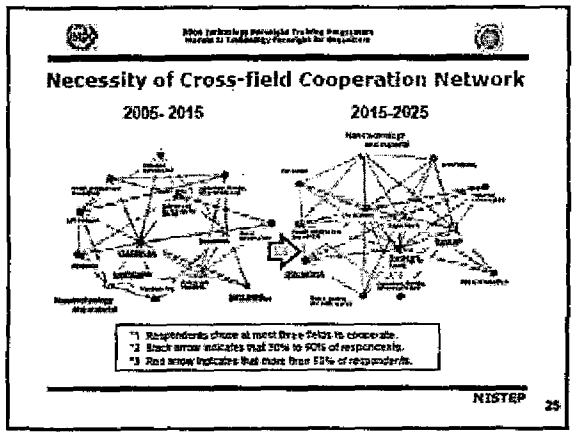
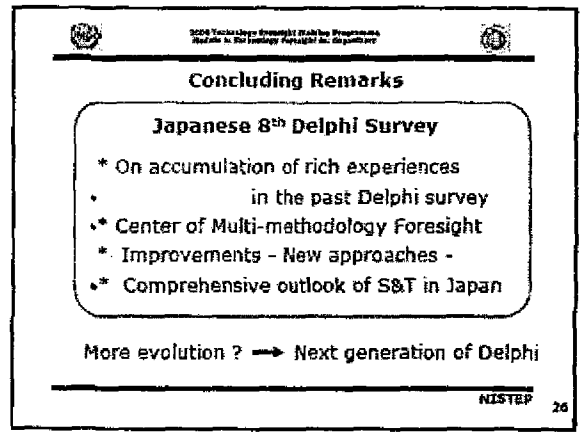
Presentations (14)





Appendix C (continued)

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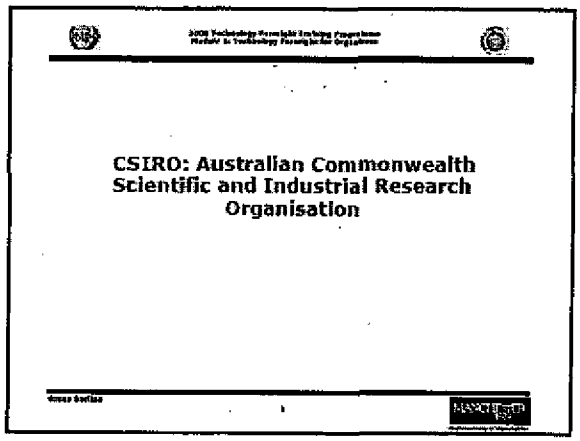
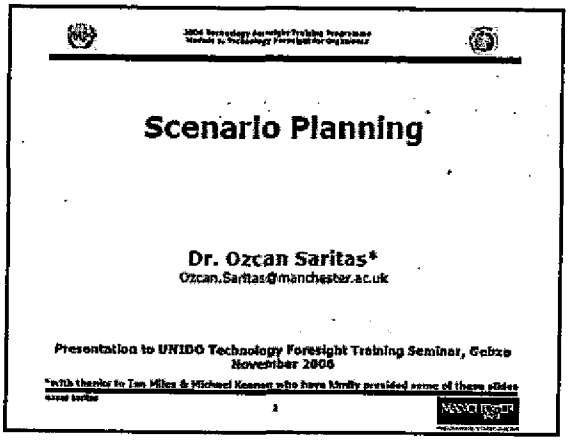
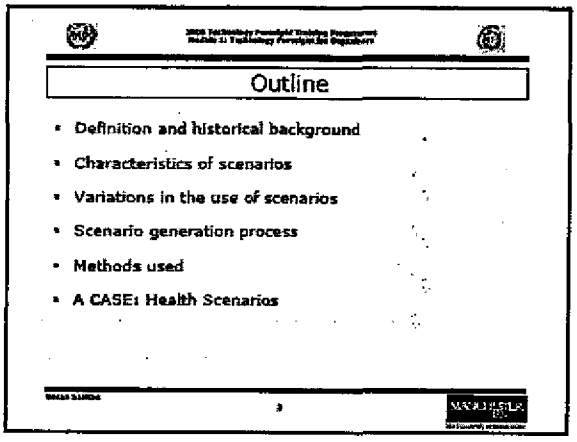
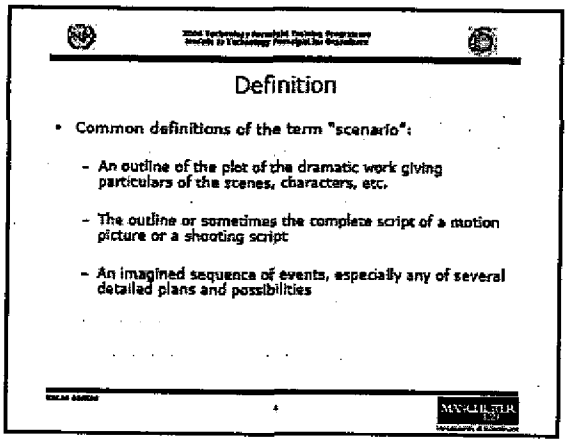
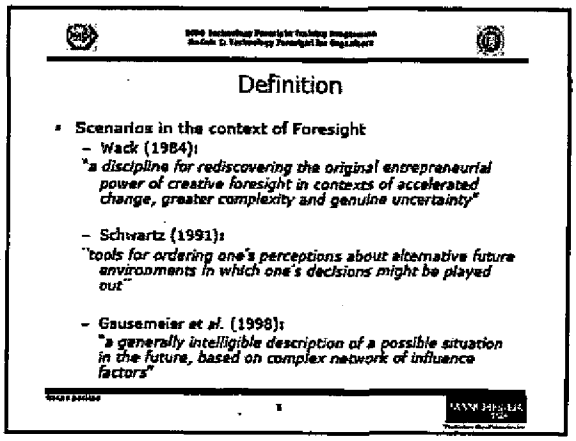
Presentations (15)

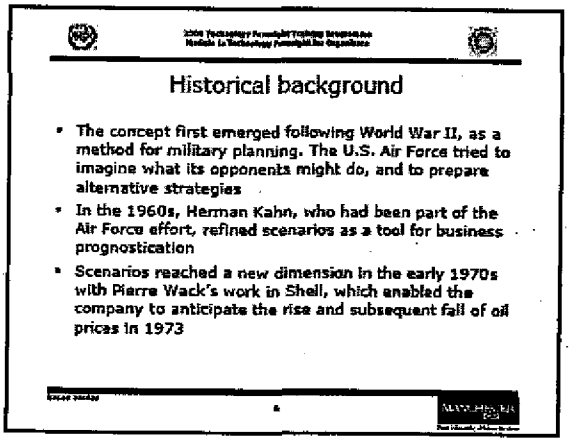












Appendix C (continued)

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Presentations (15)

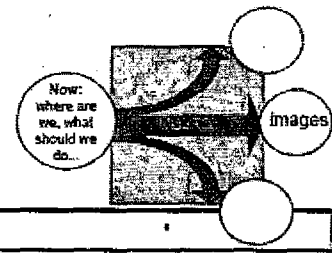
Key assumptions in using scenarios

- 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 Hertin, 2002)

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



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 Heijden, 1997)

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

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)

Single vs. Multiple

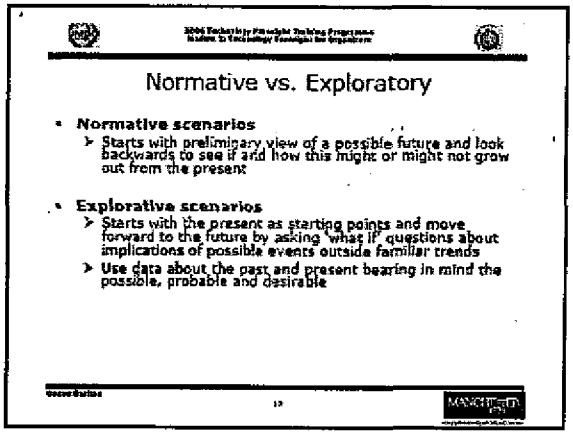
- **Multiple Scenarios**
  - *To illustrate* alternatives, *indicate* a range of plausible developments (not one inevitable future path); to assess robustness of strategies; to stimulate reflection on underlying assumptions
  - To give *insight* into contexts and outcomes (intended or otherwise) of actions,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

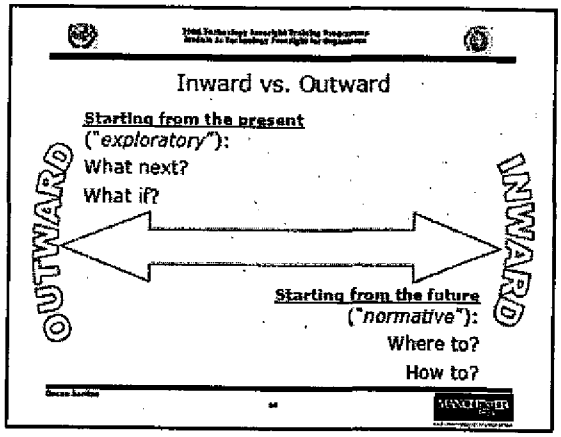
Common to use 3 or more scenarios

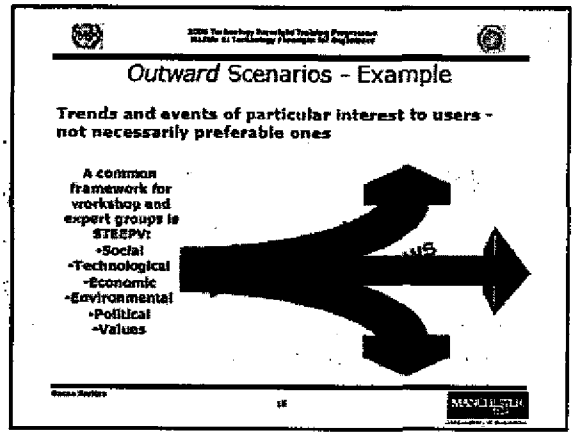
Appendix C (continued)

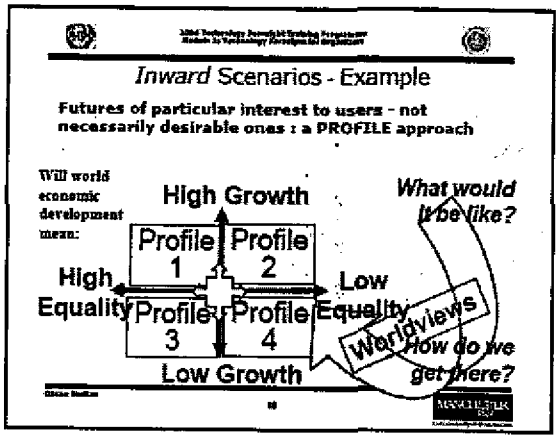
24 November 2006

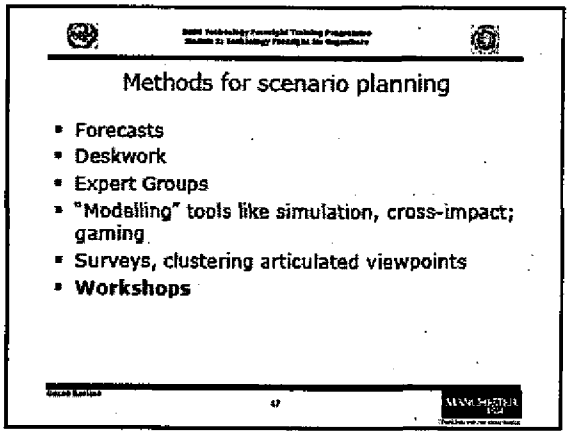
Presentations (15)

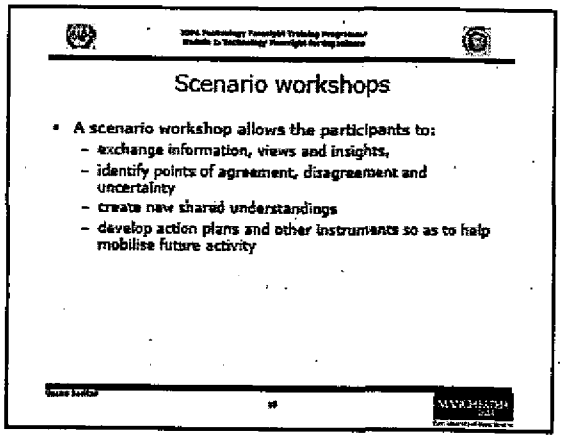








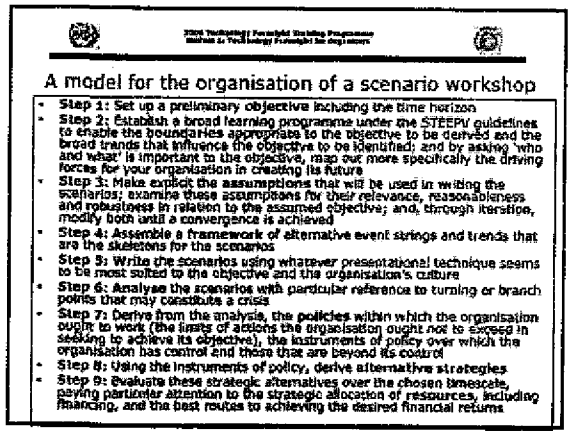


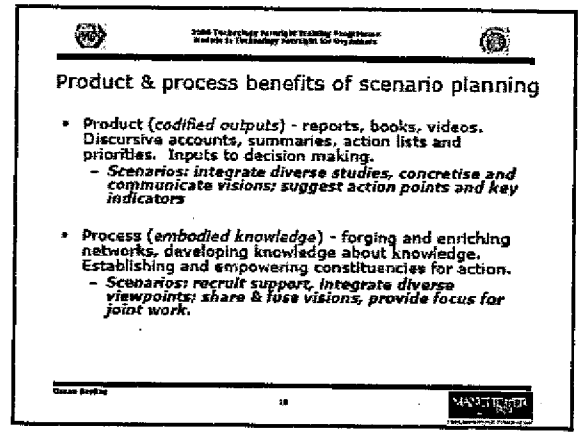


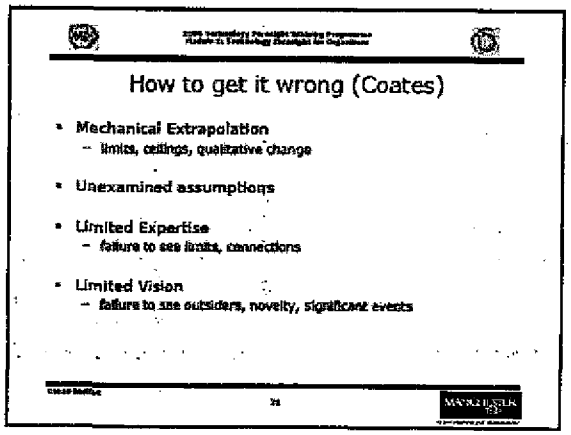
Appendix C (continued)

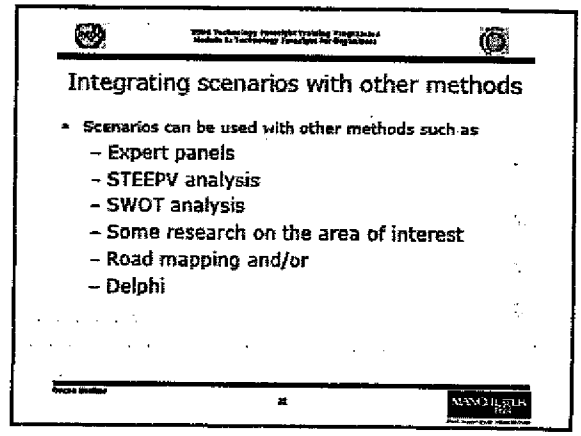
24 November 2006

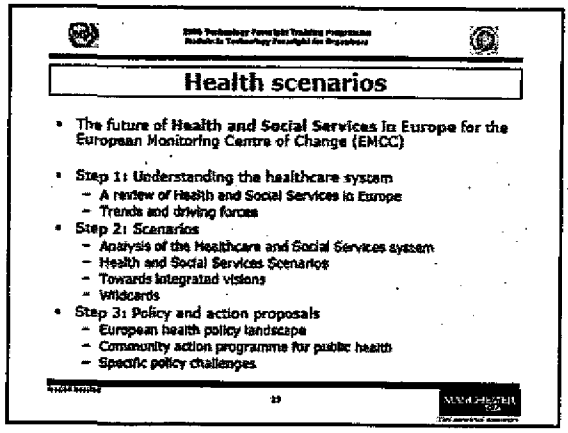
Presentations (15)

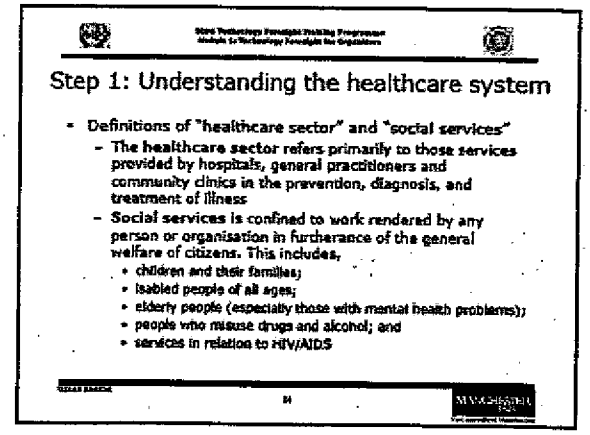








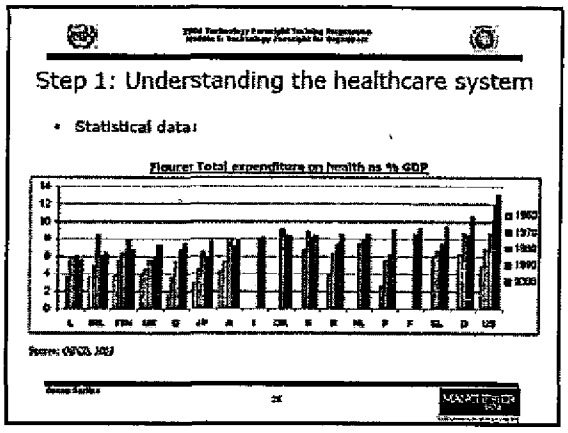


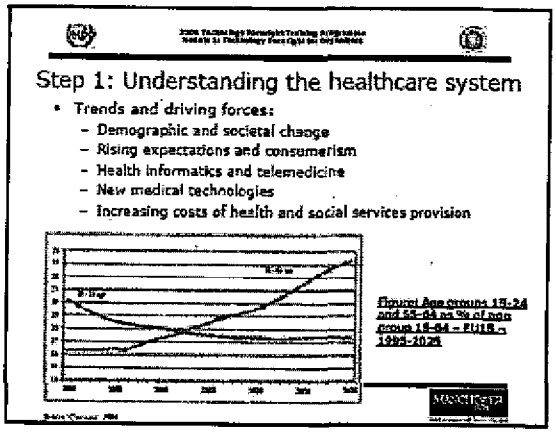


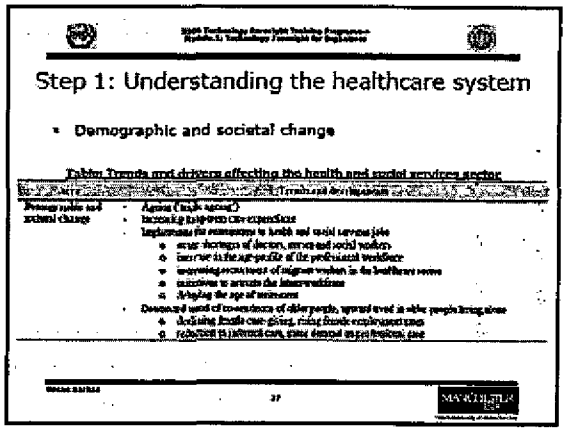
Appendix C (continued)

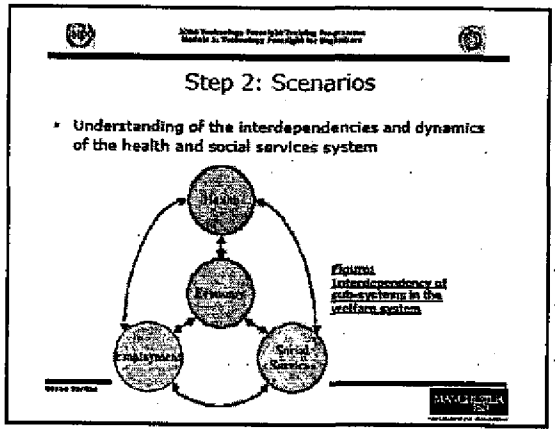
24 November 2006

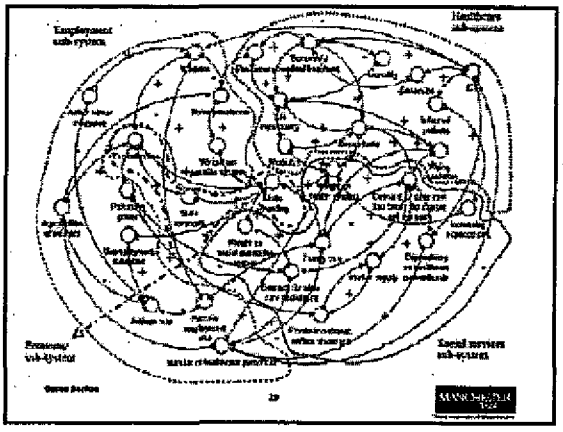
Presentations (15)

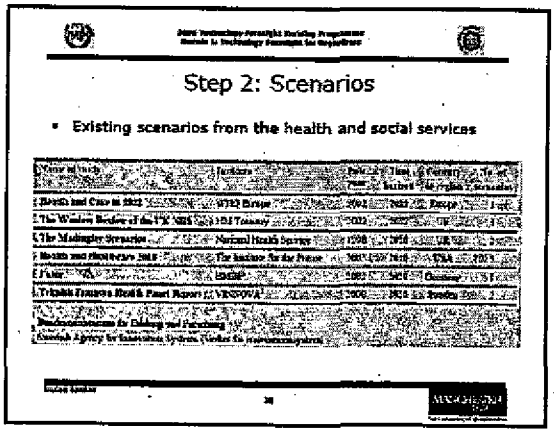








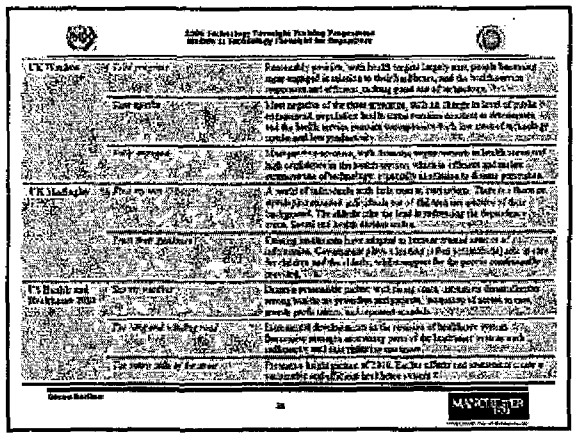


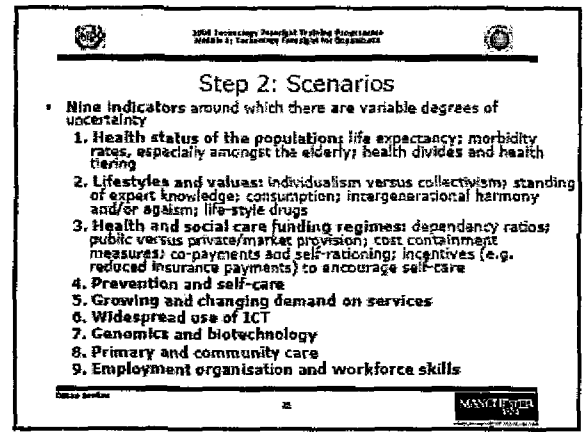


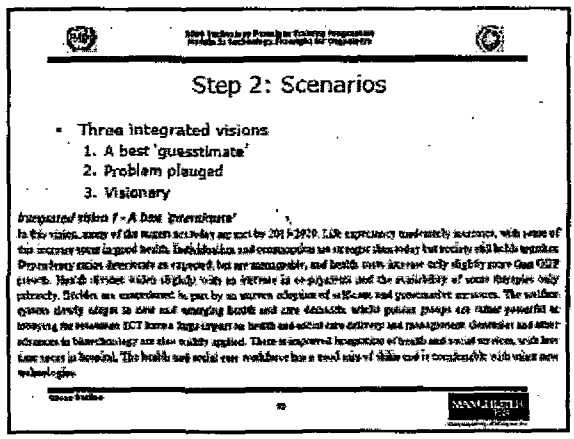
Appendix C (continued)

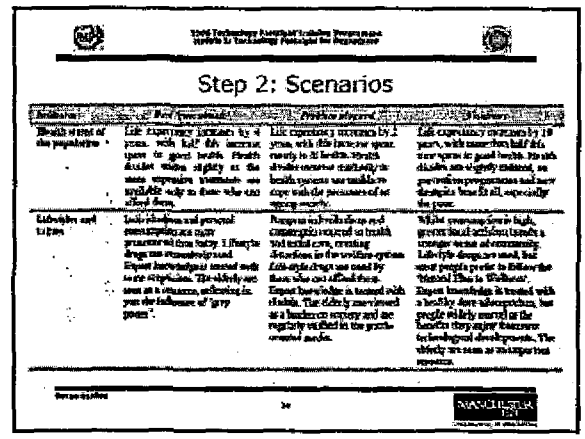
24 November 2006

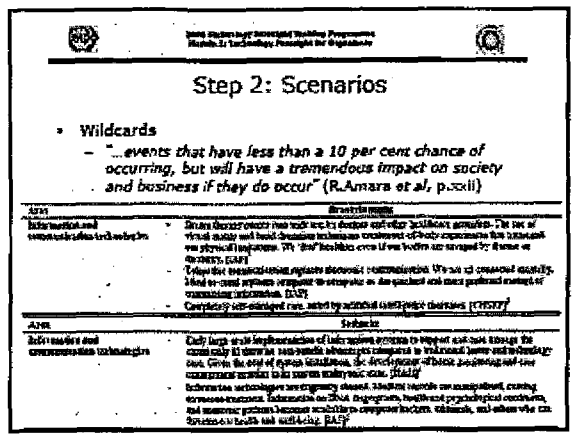
Presentations (15)











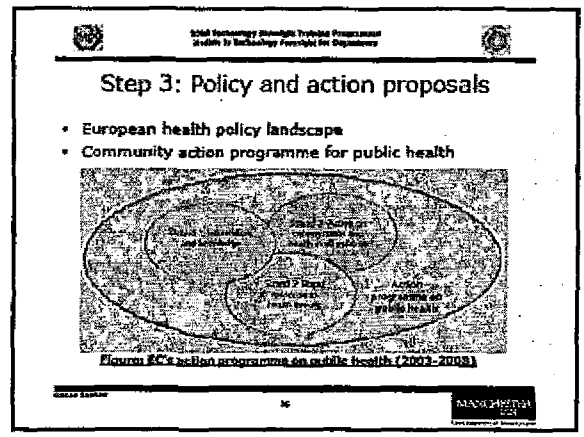
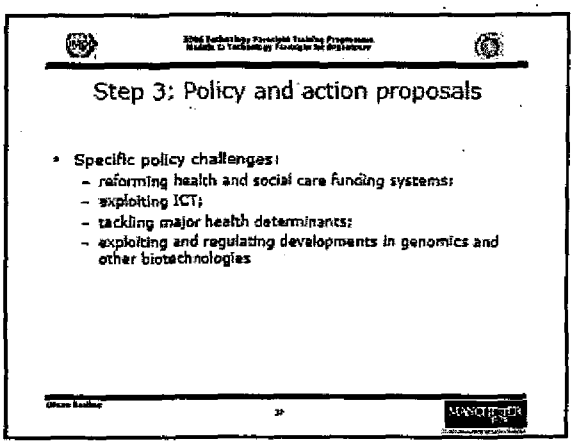


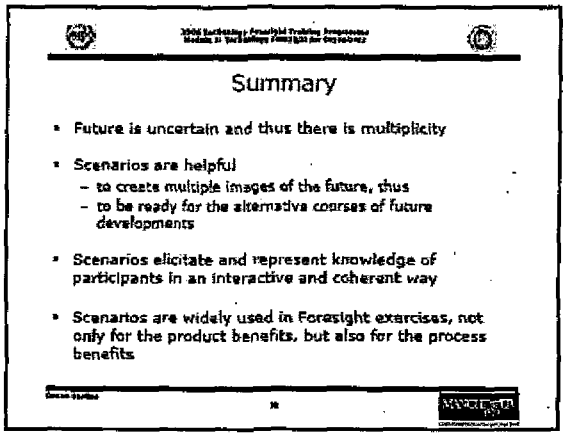
Figure: EC's action programme on public health (2003-2008)

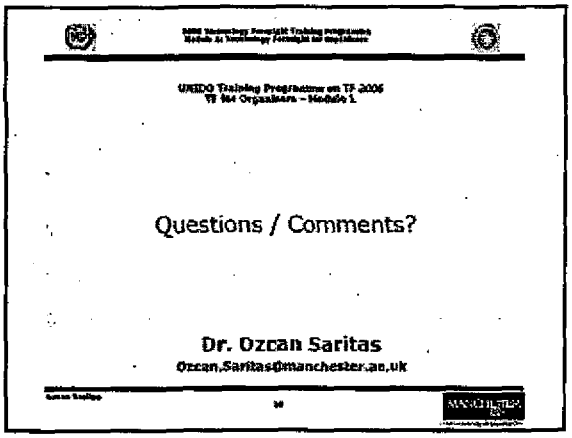
Appendix C (continued)

24 November 2006

Presentations (15)







Appendix C (continued)

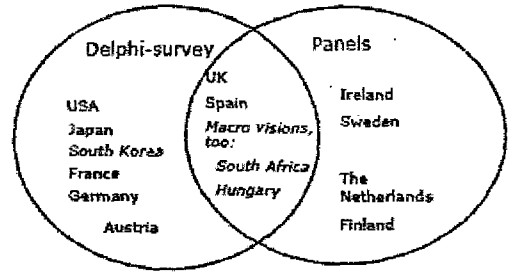
24 November 2006

Presentations (16)

Understanding different Foresight techniques

Attila Havas
Institute of Economics,
Hungarian Academy of Sciences

Foresight Methods



The design and use of foresight techniques in emerging economies

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

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.

Choice of methods

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

Taxonomy of scenarios (I. Miles)

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

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

Appendix C (continued)

24 November 2006

Presentations (16)

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)

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)

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?)

Methodological difficulties

Panel & macro visions
timing, harmonisation, structure, variables

Visions (futures) — Delphi

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

Conclusions

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

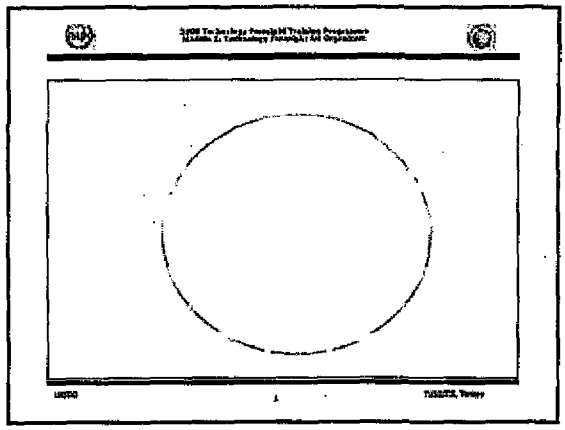
No 'hierarchy' ('absolute advantages') of particular methods/ techniques

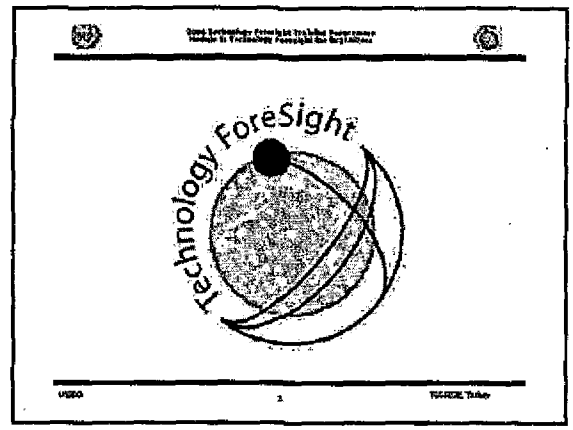
Costs and benefits of certain methods (their 'fit' to the context) vs. their actual conduct (efficiency, transparency, 'fairness', representation, etc.)

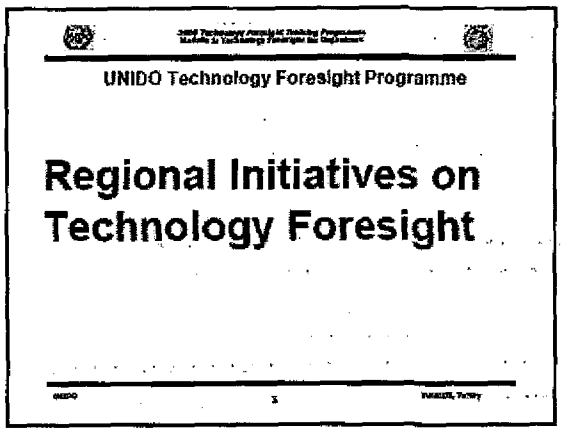
Appendix C (continued)

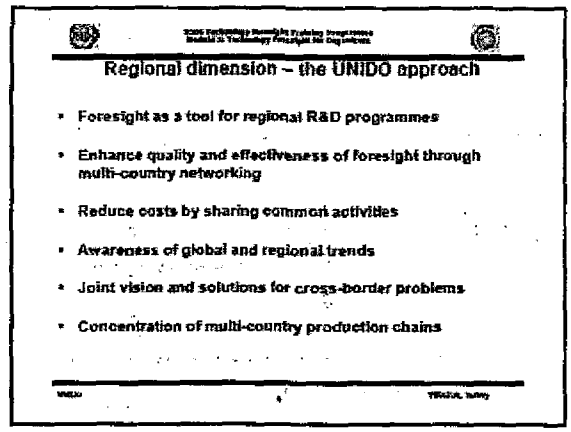
24 November 2006

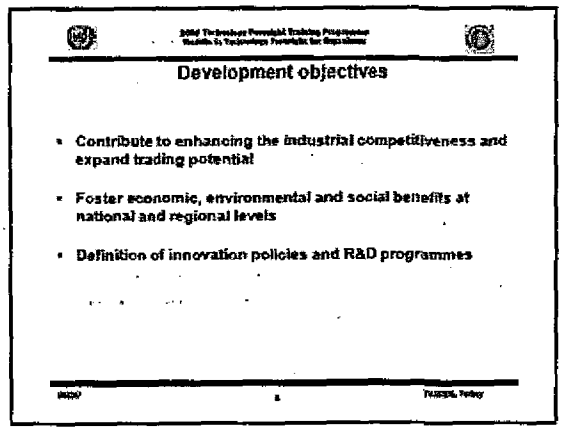
Presentations (16)

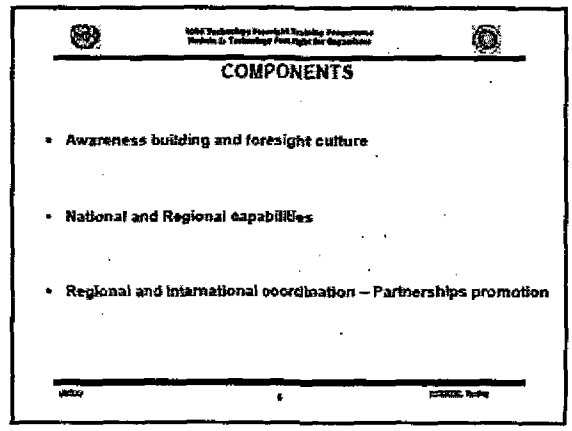












Appendix C (continued)

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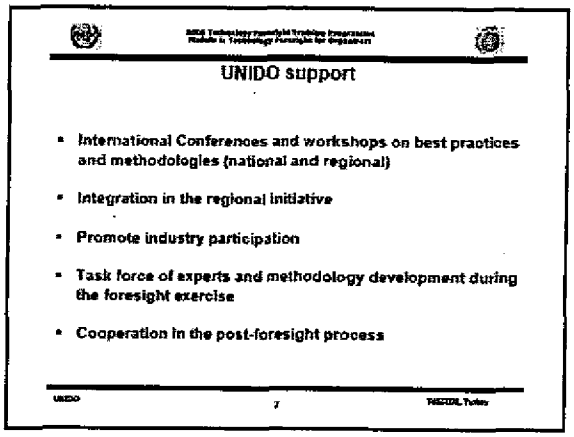
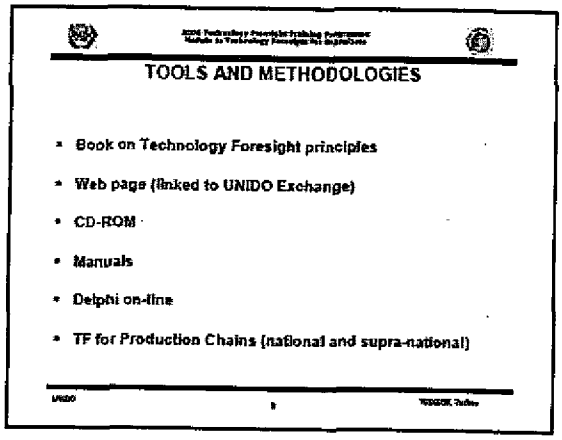
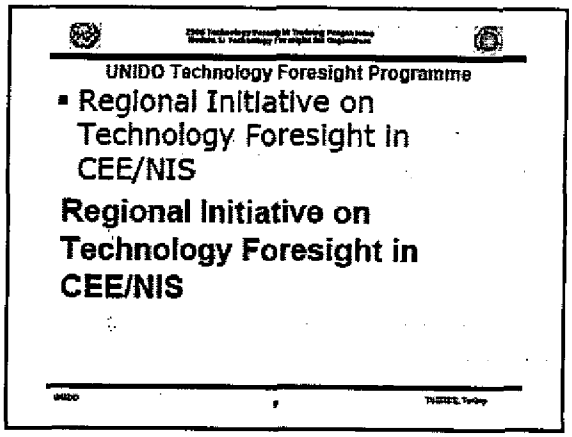
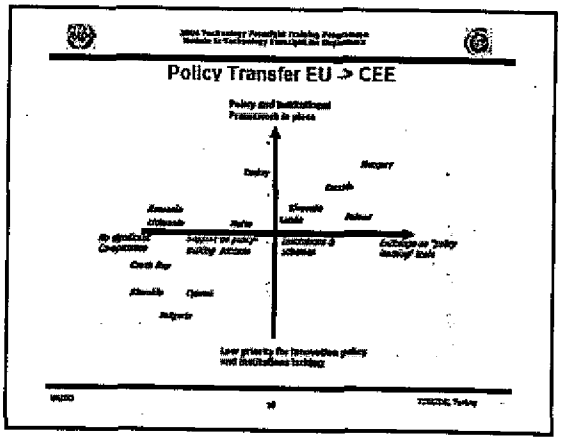
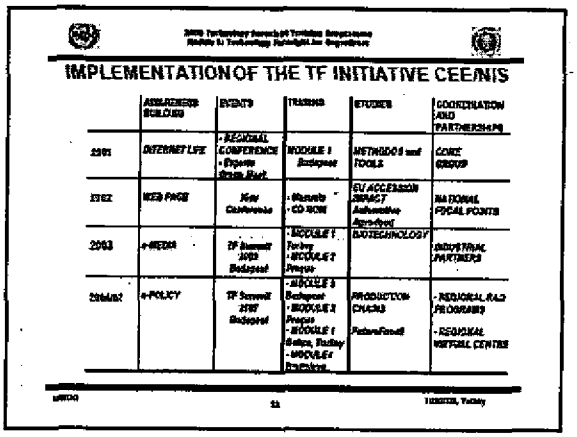
Presentations (16)

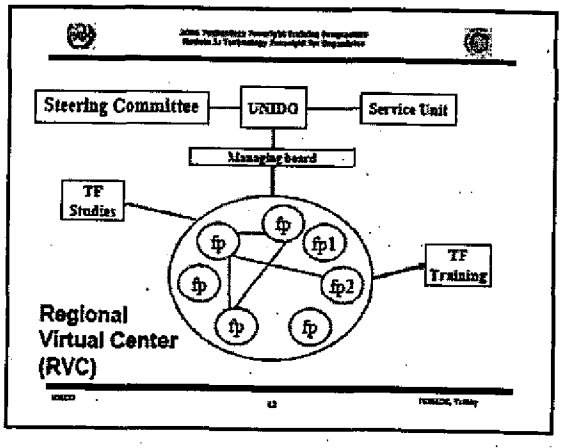












Appendix C (continued)

24 November 2006

Presentations (16)

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

FORTHCOMMINGEVENTS

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

UNIDO Technology Foresight Initiative

- Regional Initiative on Technology Foresight in Latin America

Regional Initiative on Technology Foresight in Latin America

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

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 cost (2005)
  - Bolivia, Ecuador, Peru – Future of the Andean Products (2006)

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.

Appendix C (continued)

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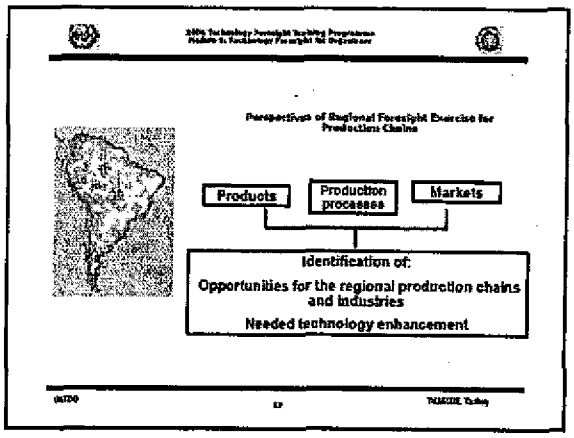
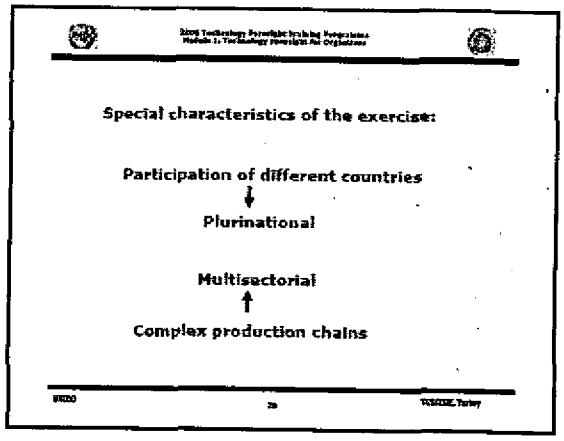
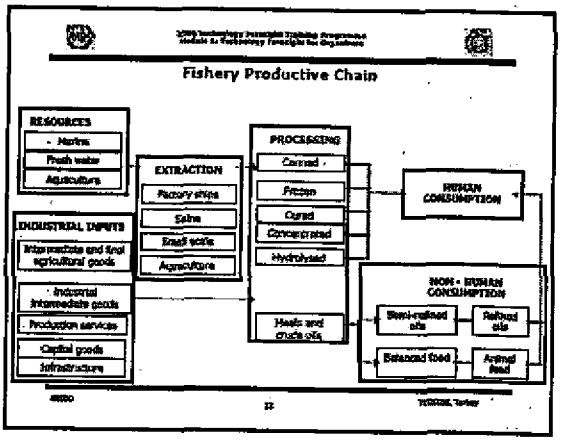
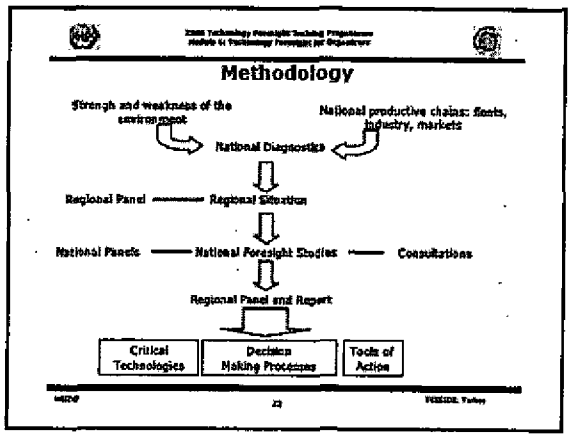
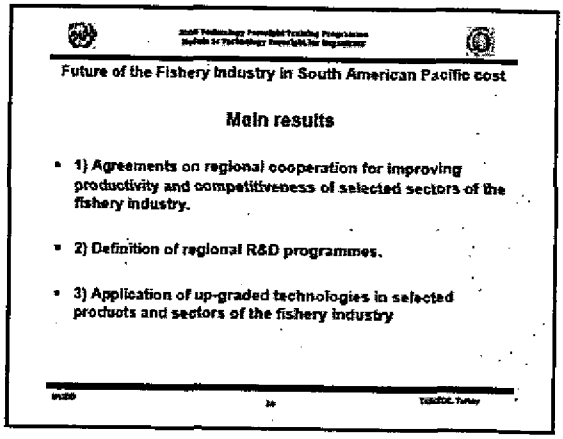
Presentations (16)











Appendix C (continued)

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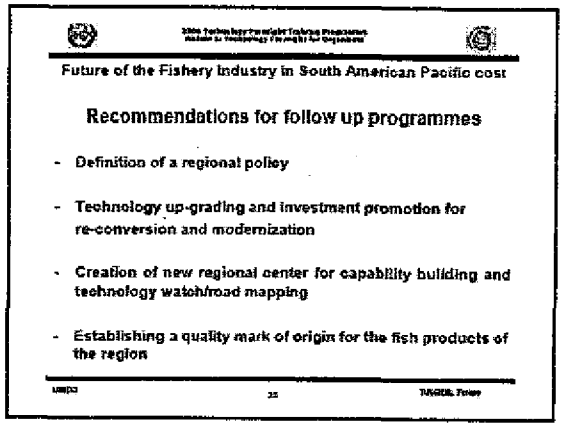
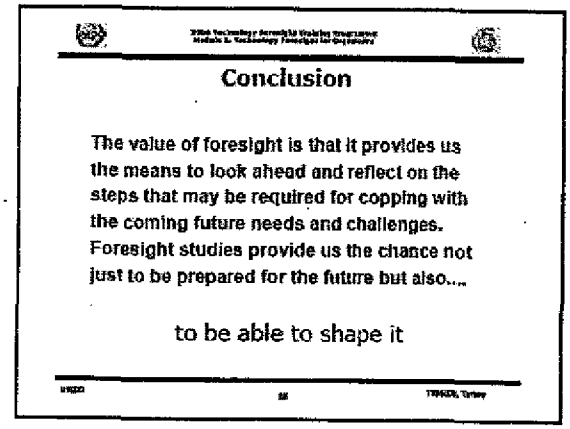
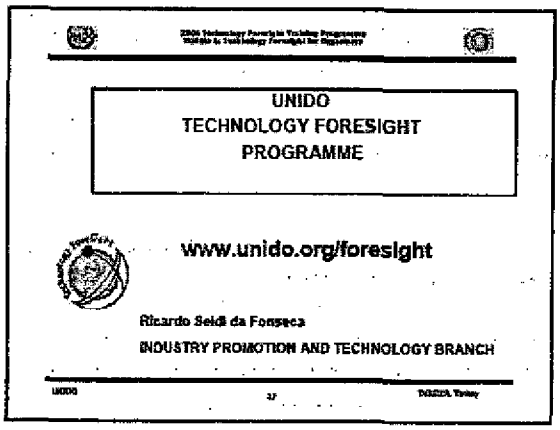
Presentations (16)







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
Mr.	Ahmet	Öztürk	The Scientific and Technological Research Council of Turkey(TUBITAK)	Scientific Programs Assistant Expert	Ankara	Turkey	onur.ozturk@tubitak.gov.tr
Mr.	Alexander	Makarov	Perm Region Investment Assistance Agency	Expert	Perm	Russian Federation	venture@permkrai.ru
Mr.	Alexandar	Uspenskiy				Republic of Belarus	uspenskiy@mail.ru
Mr.	Ali	Fikirkoca	Ankara University Faculty of Political Sciences Department of Business Administration	Research Fellow	Ankara	Turkey	afikir@politics.ankara.edu.tr
Ms.	Birut¤	Mikulskien¤	Ministry of Education and Science of The Republic of Lithuania	Head of Division of Science and Technologies	Vilnius	Lithuania	birute.mikuslskiene@smm.lt
Mr.	Elfadil	Hamid	Energy Research Institute	Researcher	Khartoum	Sudan	elfadil60@hotmail.com
Ms.	Elizabeta	Buova	Secretariat for European Affairs, Government of the Republic of Macedonia		Skopje	Macedonia	buova@hotmail.com
Ms.	Enkhzul	Gonchigzeveg	Ministry of Industry and Trade	Officer of The Finance and Economy Division	Ulaanbaatar	Mongolia	enkhzul@mit.pmis.gov.mn

Appendix D (continued)

List of Participants 2/4

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
Ms.	Fatima	Kindawi	Ministry of Industry	Director of Training Dept.	Khartoum	Sudan	fatma_555555@hotmail.com
Mr.	Fuad	Aliyev	Center of Economic Reforms under the Ministry of Economic Development	Senior Researcher	Baku	Azerbaijan	f.aliyev@cer.az
Mr.	Habtamu	Madessa	Bahir Dar University, Engineering Faculty	Lecturer	Bahir dar	Ethiopia	habtamuba@yahoo.com
Mr.	Haiying	Ren	Beijing Economics and Social Development Research Institute, Beijing University of Technology	Associate Director	Beijing	China	renhaiying@bjut.edu.cn
Mr.	Hakan	Karataş	TUBITAK		Ankara	Turkey	hakan.karatas@tubitak.gov.tr
Mr.	Iqbal Hussain	Rai	Pakistan Council For Science and Technology	Assistant Chief	Islamabad	Pakistan	raiiqbal@pcst.org.pk
Ms.	Iwona	Nowicka	Ministry of Science and Higher Education	Head of Foresight Unit	Warsaw	Poland	iwona.nowicka@mnisw.gov.pl
Mr.	Jan	Polecha	Ministry of Education, Youth and Sports		Praha 1	Czech Republic	jan.polecha@msmt.cz

Appendix D (continued)

List of Participants 3/4

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**
Mr.	Jovan	Miljkovic	SIEPA-Serbia Investment and Export Promotion Agency	FDI Advisor	Belgrade	Serbia and Montenegro	jovan.miljkovic@siepa.sr.gov.yu
Ms.	Limyaa	Mohamed Saeed	Ministry of Industry	Manager of External Relations	Khartoum	Sudan	limyaaelnur@hotmail.com
Ms.	Miray	Karakuzu	TUBITAK	Assistant Expert	Ankara	Turkey	miray.karakuzu@tubitak.gov.tr
Mr.	Miroslav	Polzer	Centre for Social Innovation Vienna - Austrian Science and Research Liaison Office (ASO) Ljubljana	Director of ASO Ljubljana	Ljubljana	Slovenia	polzer@zsi.at
Ms.	Nadezda	Kaliuzhnova	Irkutsk State University	A head of Departament of Economics	Irkutsk	Russian Federation	nk@home.isu.ru
Ms.	Nargiza	Abdullaeva	The University of World Economy and Diplomacy	Teacher, Researcher	Tashkent	Uzbekistan	nargiza_abdullaeva@yahoo.com
Mr.	Samuel	Olusunle	National Agency for Science and Engineering Infrastructure (NASENI)	Chief Engineer	Abuja,Nigeria.	Nigeria	tolusunle@yahoo.co.uk
Ms.	Selvi	Ak	The Scientific and Technological Research Council of Turkey (TUBITAK)	Assistant Expert	Ankara	Turkey	selvi.ak@tubitak.gov.tr

Appendix D (continued)

List of Participants 4/4

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
Mrs.	Svetlana	Tvorogova			Moscow	Russian Federation	svt@hse.ru
Ms.	Sylwia	Melanowicz - kielbiewska	Ministry of Science and Higher Education	Management Officer	Warsaw	Poland	sylwia.melanowicz-kielbiewska@mnisw.gov.pl
Mr.	Tibebu	Abebe	Ethiopian Science and Technology Commission	Senior Expert	Addis Ababa	Ethiopia	commadv@estc.gov.et
Mr.	Tolgahan	Oysal	Technology Development Foundation of Turkey	Project Officer	Ankara	Turkey	toysal@ttgv.org.tr
Ms.	Tugba	Gokdogan	Suleyman Demirel University	Management and Organization	Isparta	Turkey	sdusmyo@hotmail.com
Mr.	Zamir	Awan	Pakistan Council for Science and Technology, Islamabad	Deputy Chief Technology	Islamabad	Pakistan	awanzamir@yahoo.com