Technology Foresight

Federal Innovation Networks of Excellence (FINE) Initiative

The Federal Innovation Networks of Excellence (FINE) initiative is modelled after the Networks of Excellence concept. It is focused on government wide 'horizontal' futures based, science and technology research and development.

The objectives for FINE are to:

- Build on existing federal initiatives by pulling together all segments of the Canadian System of Innovation to create efficient networks
- Build a focus on national priorities for federal S&T and follow-through from R&D to innovative policies and products.

FINE is managed by a committee of Deputy Ministers from federal science based departments and agencies with the assistance of a committee of Assistant Deputy Ministers. Horizontal working groups have been organized to identify themes and emerging issues that will be important to Canada in the next ten to twenty-five years. Such themes as water, national security and counter-terrorism, food security, and certain aspects of biotechnology have been suggested. The groups have also discussed the best practices and technology futures research tools that can be used to aid in the identification and development of themes, with a special focus on technology foresight.

Technology Foresight Pilot Project

Technology foresight involves systematic exploration of the longer-term future of science and technology, and their potential impacts on society, with a view to identifying emerging factors driving change, and the source areas of scientific research and technological development likely to influence change and yield the greatest economic, environmental and social benefits during the next 10-25 years.

In early 2002 NRC proposed this experimental S&T foresight pilot project as part of the FINE agenda. The project is positioned as exploratory and independent of any ongoing or regular funding process for science and technology research. It is hoped that it's outputs will enable participating Departments and Agencies to better prepare for the integrative challenges associated with increasing Canada's capacities for science and technology-based innovation in key domains. The project will also provide strategic insights and ideas for emerging and future technology policy challenges and linkages to the S&T investments that will be required to further develop Canada's innovation capacity during the coming decade and beyond.

Revised October 28, 2002

Deputy Minister & ADM Endorsement

The project was endorsed by the FINE Deputy Ministers and Assistant Deputy Ministers, and a FINE Working Group was tasked to define two sectors for the project. Through a process of review and discussion that examined almost 40 specific topics submitted by individual Departments and Agencies, two key technology sectors have been chosen:

- *Geostrategics:* the future horizons and applications of geo-spatial data and related knowledge management technologies for decision support. This sector could include pattern recognition software, wireless communications infrastructure futures, as well as links to major new capacities in surveillance, ecological monitoring and resource management technologies; and
- *Biosystemics:* the convergence of nanotechnology, biotechnology, information technology, and cognitive sciences and their prospective impacts on materials science and the management of complex public systems for bio-health, eco and food system integrity and disease mitigation.

The Foresight Pilot Project will develop potential visions, circa 2010-2025, for the two sectors in terms of their end-states, possible applications, and the research domains, innovative technologies and competencies required to achieve several prospective end-states.

Deliverables

Specifically, the Foresight Pilot Project will deliver:

- A series of expert opinions, study and analysis reports that could have application to future Departmental research planning and priorities within a horizontal, government wide initiative;
- Scenarios for potential future high-payoff technologies and policy relevant R&D strategies. These will contribute to an informed context for the development of the agendas and investment strategies for federal S&T policies and research activities;
- Ideas and an emerging consensus amongst FINE member organizations on how to collaborate on horizontal research on future S&T opportunities;
- Strengthening and focussing networks of Canadian and international experts from all sectors in advanced 'geo' and 'bio' S&T;
- A learning and training experience for all participating Departments and Agencies;
- Information to assist in the establishment of science and technology policy as well as future horizontal research priorities; and
- A tested methodology for future foresight studies.

Three Stage Process: First Stage - Sector Scoping Workshops

The project is being undertaken through a three-stage process. In the first stage Sector Scoping Workshops will be held to:

- Brainstorm a vision of what the geostrategic and biosystemic sectors could look like 20 years into the future;
- Identify the capabilities and competencies that would be required to achieve that vision;
- Identify 4 or 5 specific topics within each sector that will be subjected to a more detailed foresight study;
- Identify technology experts for each topic;
- Advise on knowledge, challenges, and issues related to the topics as well as the overall project.

Second Stage - Expert Technology Panels

In the second stage Technology Panel meetings will be convened for each of the 4 or 5 topic areas identified above. These panels will be designed to bring together experts from industry, government, and academia to:

- Build upon the work of the Scoping Workshops by developing in greater depth the vision and capabilities for each topic,

- Develop ideas on the S&T needed to meet the capabilities identified and their developmental pathways, as well as the related challenges for R&D and S&T capacity; and

- Identify opportunities and methods for horizontal collaboration among departments and agencies to fill to fill the S&T needs identified.

- Identify some 'quick hits' that could be initiated now or incorporated into research projects being contemplated or underway

Reports will be produced capturing the results of each of the workshops and panels. These reports will be reviewed and synthesis documents prepared for each panel by members of the Project Team, with guidance from the participants in the Scoping Workshops. All participants will also have an opportunity to review and provide suggestions to the project outputs, including the synthesis documents.

Third Stage—Synthesised Reports

In the third and final stage, the synthesised reports will provide the basis for the development of the project deliverables, starting with scenarios, circa 2020, for each topic. A series of scenario workshops will be held to develop at least two views of future opportunities in the topic areas. Each scenario will include a mix of options for technology and research to meet the end-state developed by the process, and outline what efforts would be needed to meet that end-state. Subsequent analysis of the scenarios and the results of all the above workshops, panels and other expert advice will form the basis of the project deliverables.

Final Foresight Project Report

The final Foresight Project Report will present an overview of the main findings of the work and the project process. It will include:

- Summaries of the results of each stage of the project
- The 2010-2025 technology scenarios for each sector and their topics
- High priority 'robust' technologies that emerge across the scenarios
- R&D strategies to develop these technologies
- Potential roles for Government, Industry and Academia
- Suggestions for further action including; potential horizontal S&T/R&D priorities and mechanisms, lessons learned, capacity requirements and best practices, project methodology, and issues & challenges.
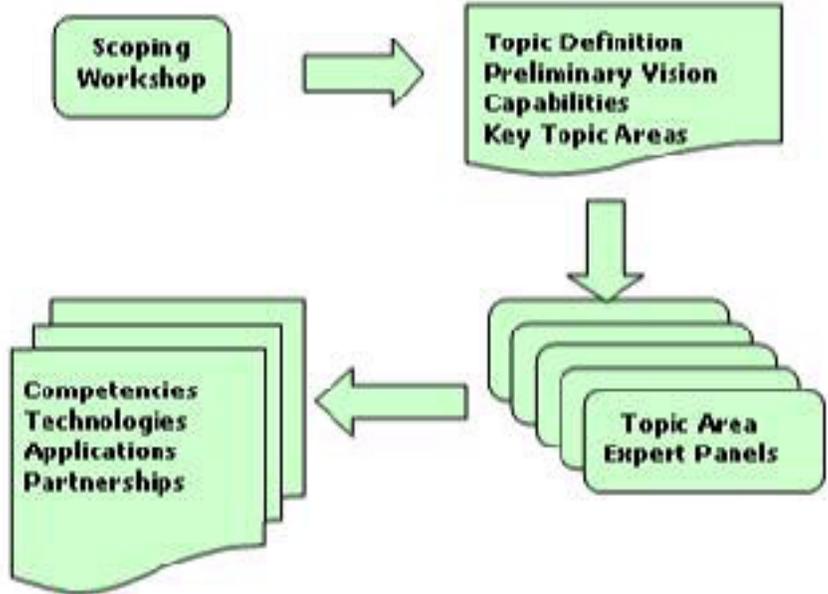
This Canadian Foresight Pilot Project will also be linked to international projects of a similar nature such as those from the Asia Pacific Economic Cooperation (APEC) Center for Technology Foresight, European Union, United States National Science Foundation (NSF) and the UN Millenium Project.

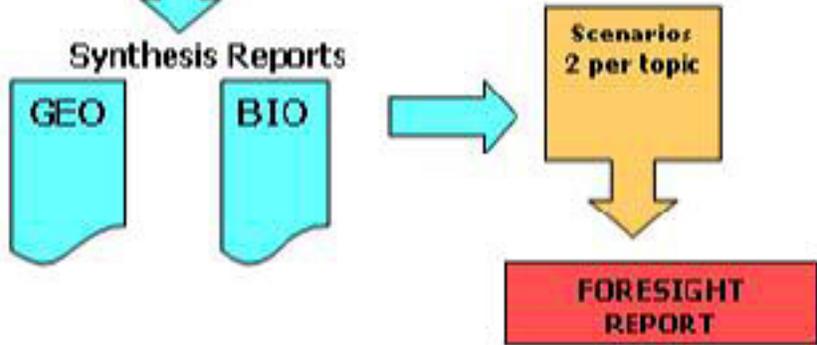*More information about this FINE S&T Foresight Pilot Project can be found at: http://nrc.tomoye.com*

Technology Foresight Process

Phase 1
Process
for each
area topic
area

| Scoping Workshop | → | **Topic Definition**
Preliminary Vision
Capabilities
Key Topic Areas |

Competencies
Technologies
Applications
Partnerships

← **Topic Area Expert Panels**

Phase 2

Synthesis Reports

GEO   **BIO**

→ **Scenarios 2 per topic**

FORESIGHT REPORT

Phase 3

Robust Technologies across Scenarios – Key Priorities
R&D Gaps & Strategies to Meet Needs
Respective Roles of Government, Industry, Academia
Template for Further Action-ideas on how, issues &
challenges