Towards a National Nanotechnology Strategy for Canada

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Role and Priorities of National Science Advisor to the Prime Minister

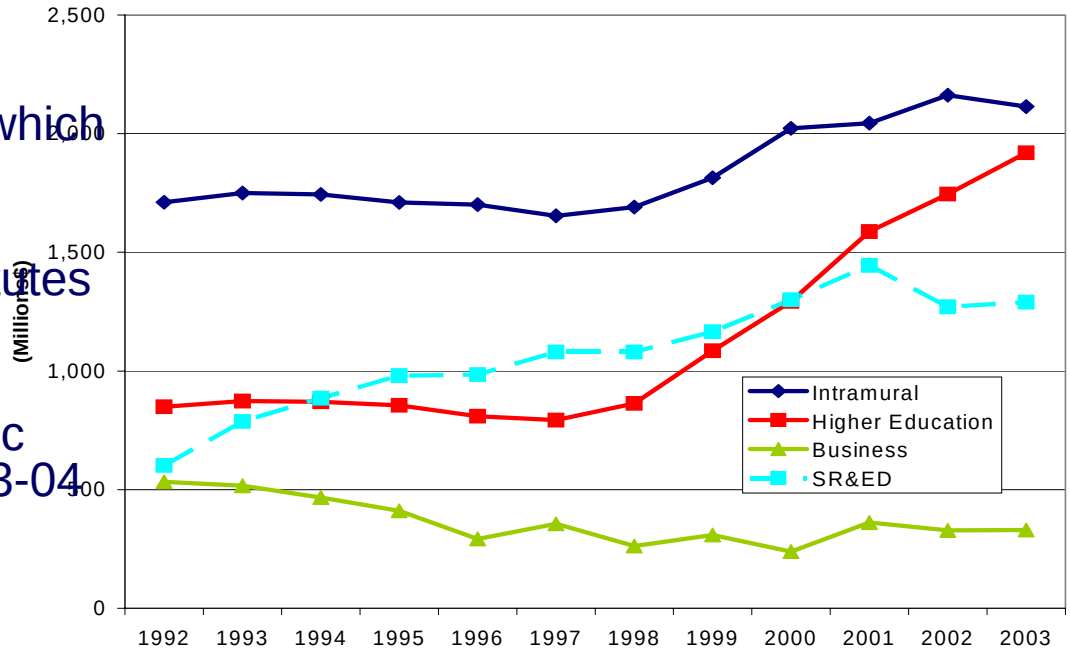
"The National Science Advisor is assisting the Government to ensure that investments are strategic, focused and delivering results, and is working to bring about a fuller integration of the Government's substantial in-house science and technology activity." Speech from the Throne, October 2004

- Position created in April 2004
- Provide sound, independent, non-partisan advice on directions and priorities
    - Long-term vision for Canadian S&T
    - Horizontal collaborations between various departments, agencies, institutions, and business
    - Balance excellence in S&T with benefits to society and the economy
    - International S&T and challenges of the developing world
    - Commercialization and innovation

Investing in Canada's Future

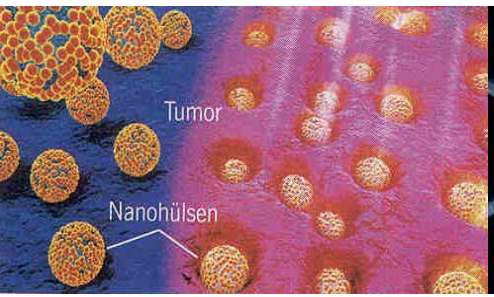
- In 2004-2005, total Canadian R&D expenditures are expected to reach $24.5 billion
- Total Canadian federal S&T expenditures in 04-05 are projected to be $9.2 billion of which 63% ($5.8B) will be for R&D
- R&D spending per capita in universities and research institutes is the highest in the G-8
- $13 billion in incremental investments committed to basic research from 1997-98 to 2003-04
- Almost 70% of this has been allocated in the last 4 years
- Research environment has improved significantly in the academic sector

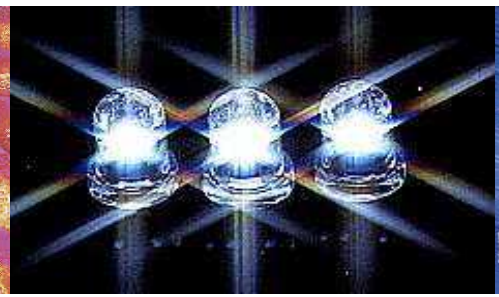
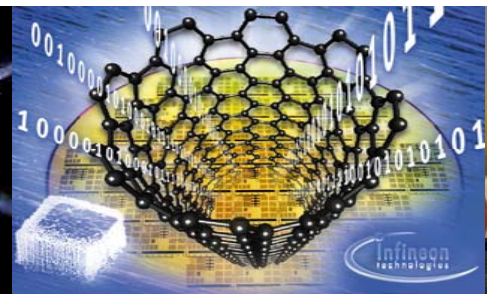
Federal direct and indirect expenditures on R&D, by performing sector (1992-2003*)

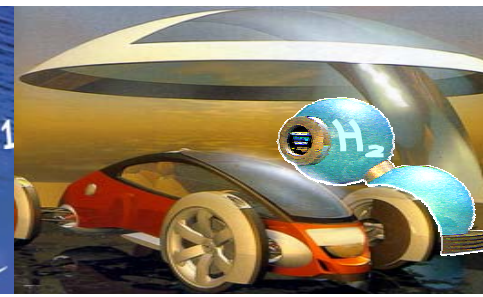


The Opportunity for Canada

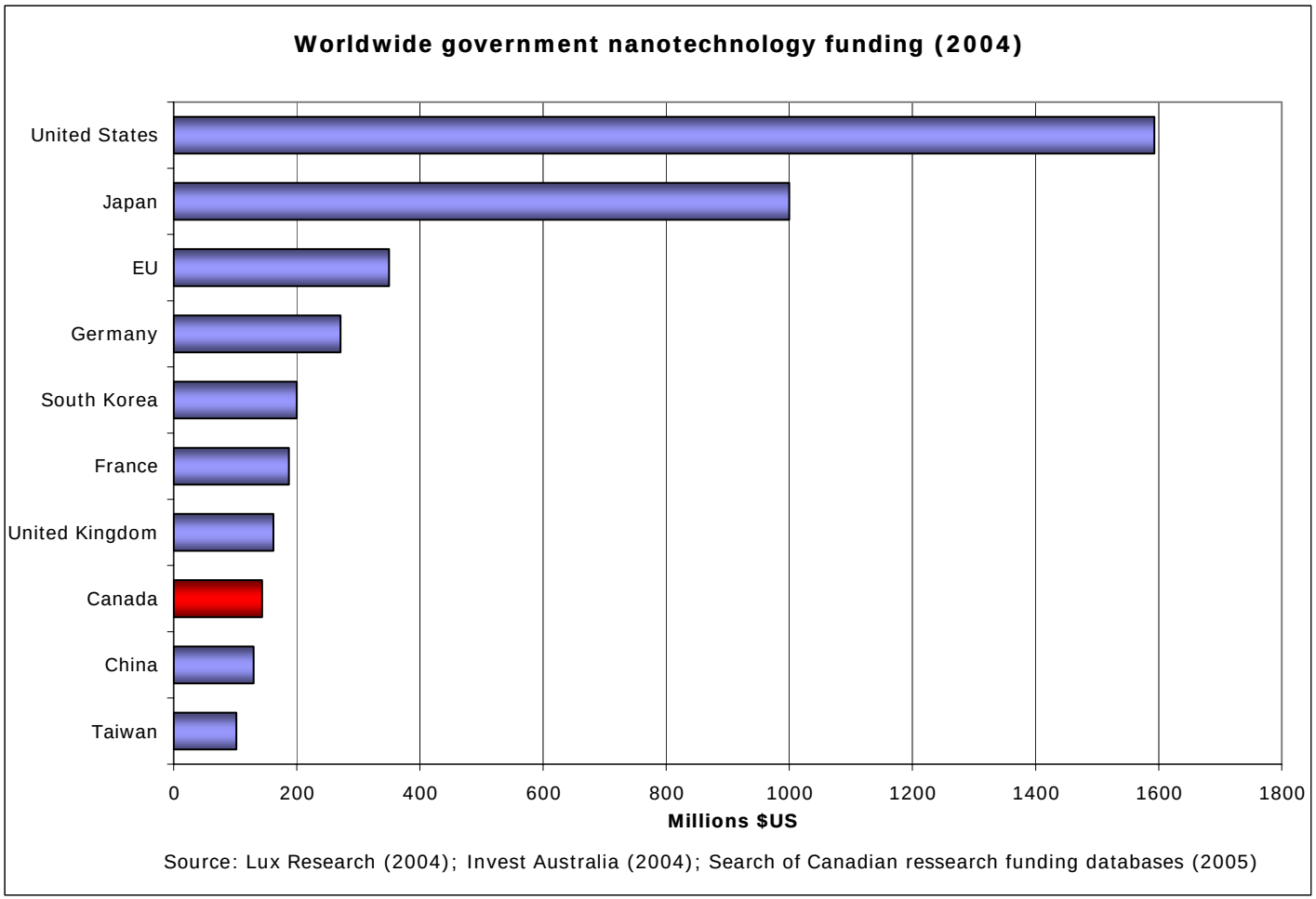
- Huge opportunities for Canada and Canadian industry
- Still very much an emerging, disruptive technology with almost unlimited potential applications
- Pockets of world-class research strengths across Canada
- Growing number of small Canadian-based industrial players
- Linkages to environment, agriculture, manufacturing, health and energy, communications and security





Canadian Investment



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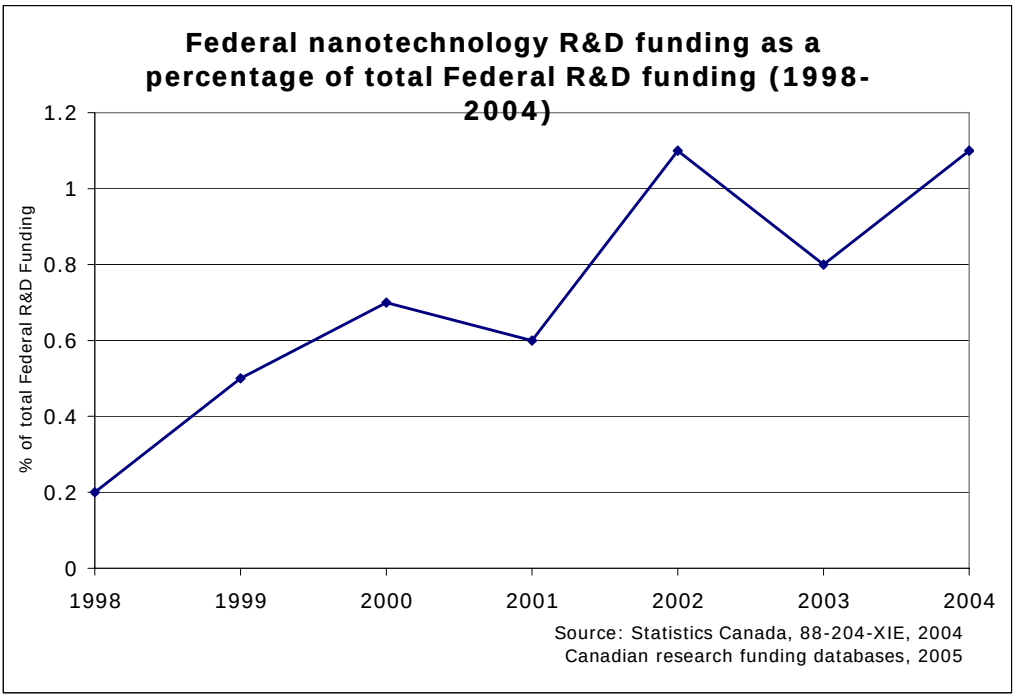
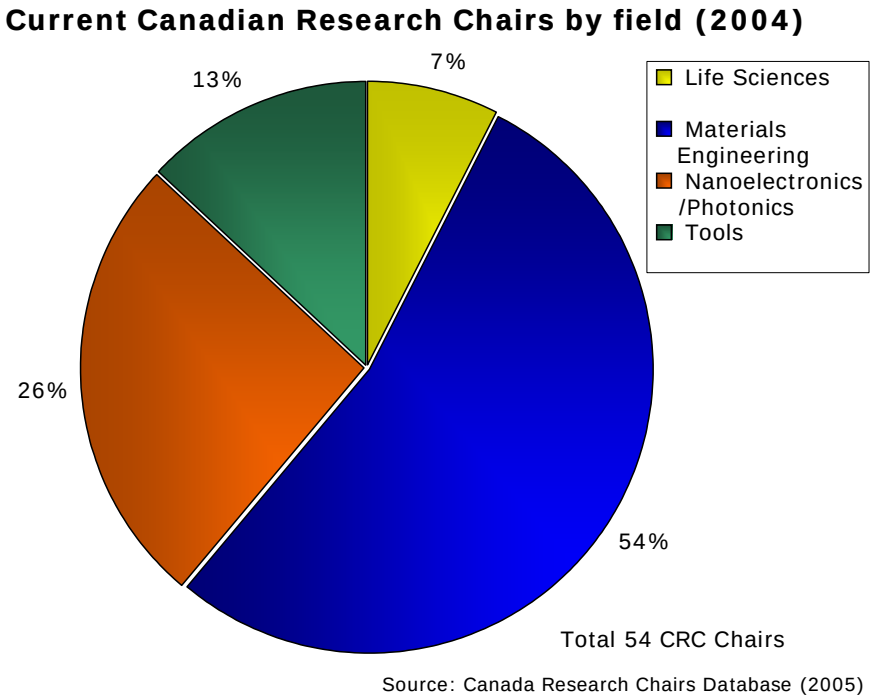
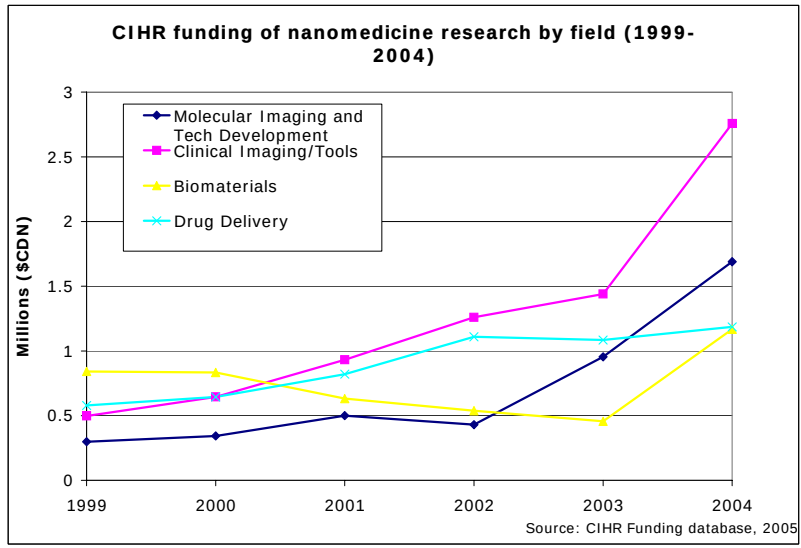
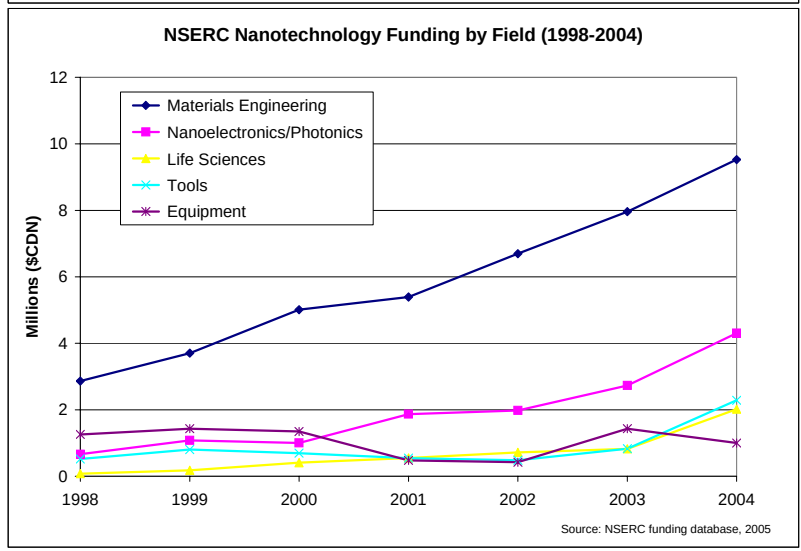




Nanotechnology

- Heavy investment - over $300 million in nanotechnology infrastructure since 1998
- Extensive support by the National Research Council, Federal Granting Councils, Canada Foundation for Innovation and Provincial Governments
- National Institute for Nanotechnology - $120 million joint venture between Government of Canada, Government of Alberta and University of Alberta
- Prime Minister's Advisory Council on Science and Technology to release assessment of Canadian nanotechnology and advise on strategy development





NanoQuébec's Mission

NanoQuébec's basic mission is to foster the development and commercialization of nanotechnology, which is seen as becoming a key vector of the competitiveness and productivity for the industrial sectors that are at the heart of the Quebec economy and generators of collective wealth for the entirety of its regions.

NanoQuébec acts through four main thrusts:

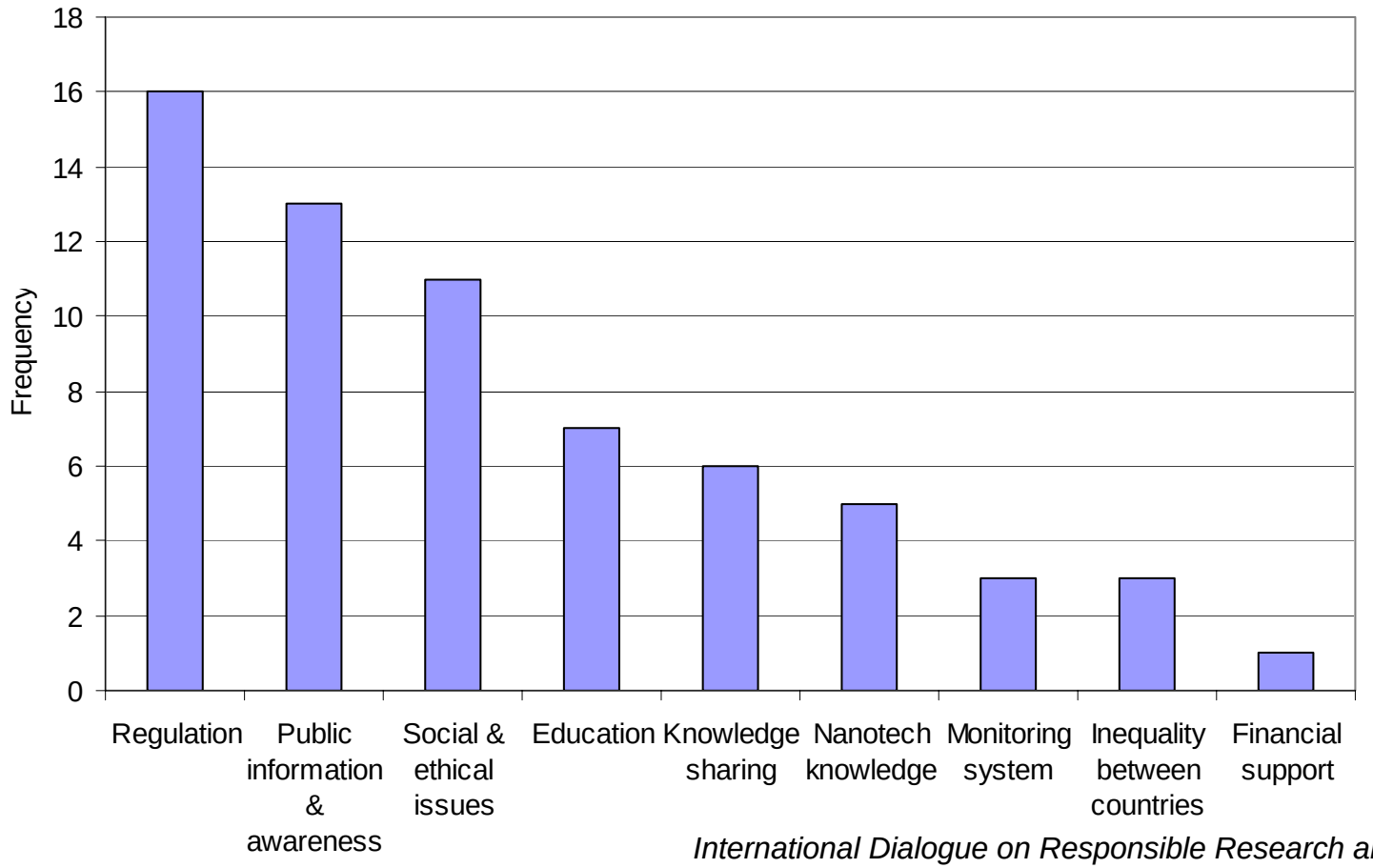
- ***Networking and Focusing of R&D efforts***
- ***Support for the Operation of Research Infrastructure***
- ***Awareness and Dissemination of Information***
- ***Strategic Positioning of Quebec activities***

Canadian Strengths

- Outstanding talent in areas such as quantum computing, quantum devices; lab on a chip/biodiagnostic devices; materials self assembly, nanophotonics; instrument development
- Pockets of leading-edge research in both universities and NRC
- Expertise in environment, agriculture, manufacturing, health and energy, communications and security - prime nanotech opportunities

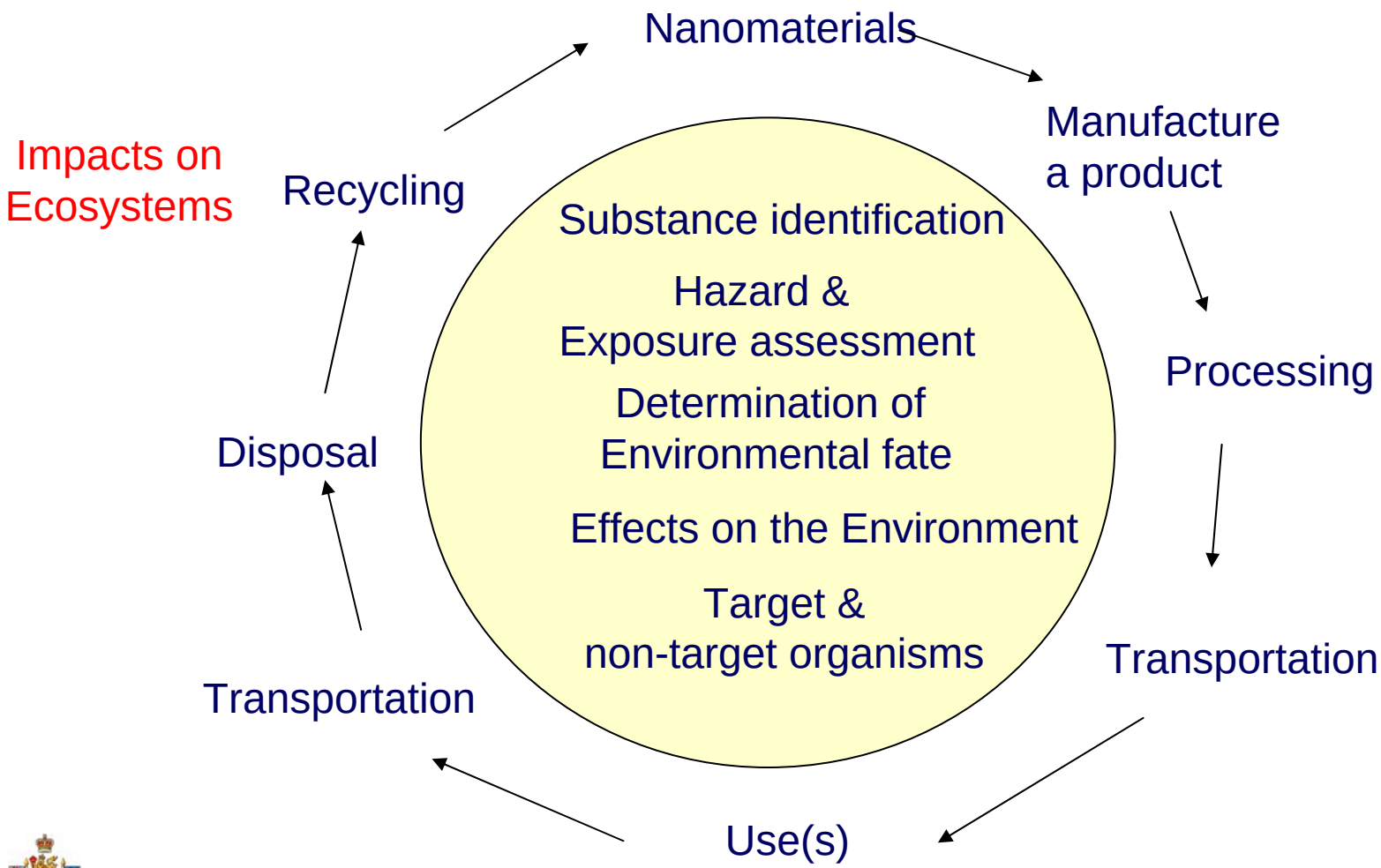
Regulation: An emerging issue

Key issues that need to be addressed to ensure responsible development of nanotechnology: International Dialogue of NT, 17-18 June 2004



International Dialogue on Responsible Research and Development of Nanotechnology, Conference held in Virginia, United States

Regulatory issues: Life cycle approach for environmental management

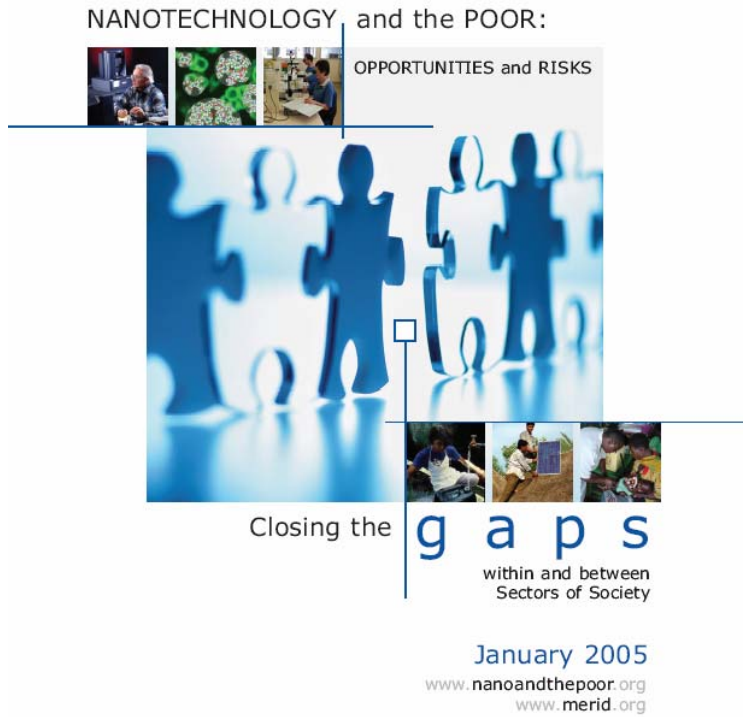


1. Source: Environment Canada

Top 10 Nanotechnology Applications for Development

"Top 10" Nanotech for Development

1. Energy
2. Agricultural Productivity
3. Water Treatment
4. Disease Diagnosis
5. Drug Delivery
6. Food Processing & Storage
7. Air Pollution
8. Construction Materials
9. Health Monitoring
10. Pest Detection & Control



Salamanca-Buentello F, Persad DL, Court EB, Martin DK, Daar AS, et al. (2005) Nanotechnology and the Developing World. PLoS Med 2(5): e97

Development of a National Strategy

- **Research and Development**
  - Covering the broad spectrum of scientific disciplines from the natural, engineering and health sciences to the social sciences and humanities
- **Innovation and Commercialization**
  - Looking at the wide range of applications covering existing and emerging markets in Canada and internationally, as well as the barriers and incentives to commercializing disruptive technologies
- **Regulatory Considerations**
  - Dealing with health, safety, security, environment, trade, intellectual property and economic development
- **Education and Engagement**
  - Ranging from public awareness and engagement, to new curriculum development in universities colleges and secondary schools

Prime Minister's Advisory Council on Science and Technology: Nanotechnology Project Objectives

1. To undertake an early assessment of Canada's current areas of expertise within a comparative world context, including past experiences with other enabling technologies
2. To better understand both potential national niche capacity and competitive timelines
3. To understand the wider social, economic and regulatory context, in which a national strategy, if adopted, would operate

Conclusions

- Canada has an opportunity to be an important player in the emerging field of nanoscience and nanotechnology
- Sustained investments are necessary but will not be effective without a strategy that is national in scope, integrated, multidisciplinary, and internationally linked with both developed and developing countries
- Environmental, health, societal and ethical issues associated with Nanotechnology will be a core element of the Canadian Strategy

Canada

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Canada