The Federal Government Role in the National System of Innovation

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(PowerPoint version)

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Knowledge Flows

- Knowledge is a unique commodity in that while it can be created, it cannot be destroyed. Similarly it can be transferred, but the source retains all of the knowledge it transfers to the recipient.
- Knowledge can flow from one institution to another, either through people, or through financial flows that permit the creation of knowledge in the recipient institution.

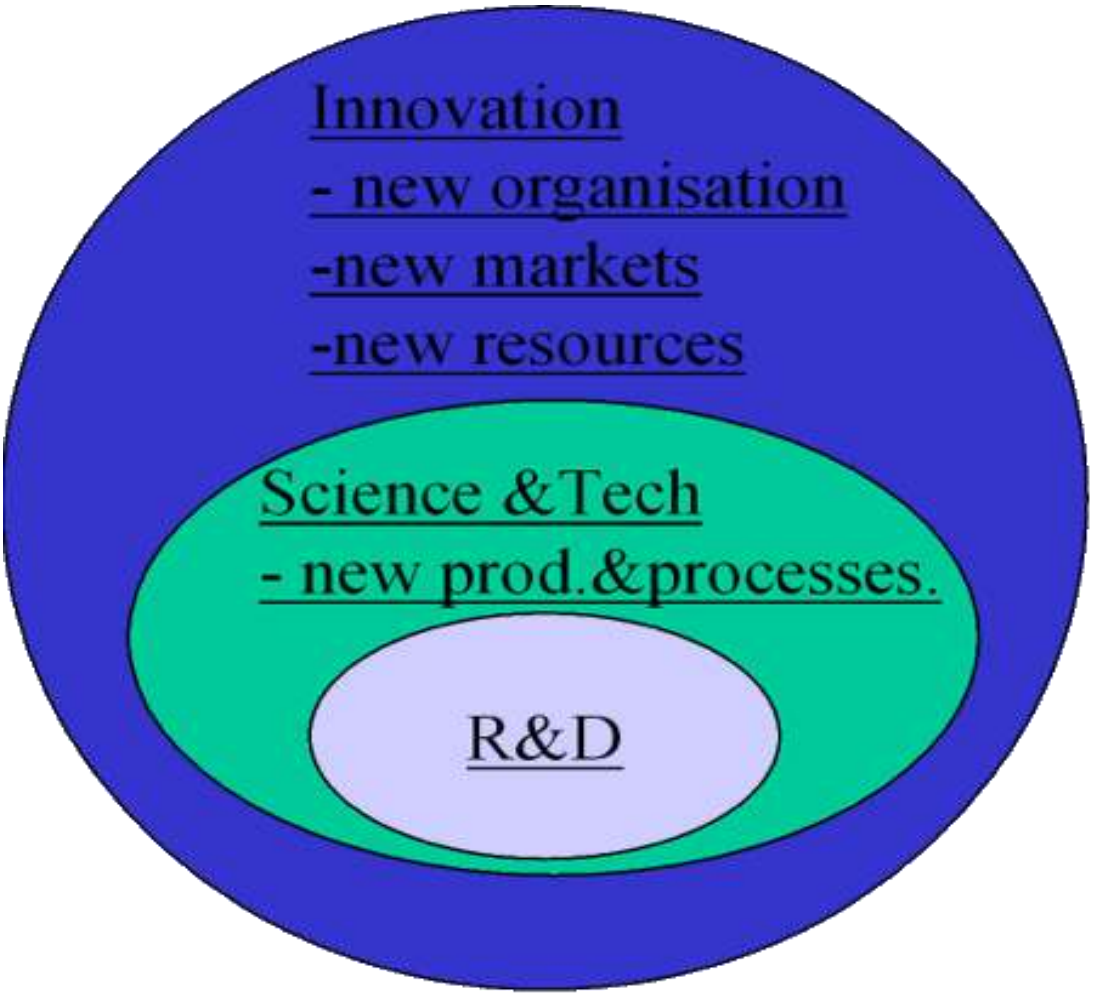
What is innovation?

- Two views – a social view and an economic view
- The social view looks at how innovation are adopted and adapted. The "S" curve; early adopters and late adopters. "Diffusion of Innovation" by Everett M. Rogers
- The economic view: Josef Schumpeter: "The Theory of Economic Development"
- Five forms of innovation: new products, new processes, new markets, new resources , new organizations

The Oslo Manual : Technological Product and Process Innovation

- A *technologically new product* is a product whose technological characteristics or intended uses differ significantly from those of previously produced products. Such innovations can involve radically new technologies can be based o combining existing technologies in new uses, or can be derived from the use of new knowledge
- A *technologically improved product* is an existing product whose performance has been significantly enhanced or upgraded. A simple product may be improved (in terms of better performance or lower cost) through use of higher -performance components or materials, or a complex which consists of a number of integrated technical subsystems may be improved by partial changes to one of the subsystems
- *Technological process innovation* is the adoption of technologically new or significantly improved production methods, including methods of product delivery. These methods may involve changes in equipment, or production organization, or a combination of these changes, and may be derived from the use of new knowledge. The methods may be intended to produce or deliver technologically new or improved products, which cannot be produced or delivered using conventional production methods, or essentially to increase the production or delivery efficiency of existing products

Figure 1 NSI Diagram



National Systems of Innovation

- The OECD has noted that the study of national systems of innovation offers new rationales for government technology policies. Previously government S&T policies focussed on *market failures*. Studies of innovation systems can identify *systemic failures.*
- In federal states the national system of innovation is the sum of several regional systems. These regional systems of innovation are weak because:
    - a need for leadership - the technological future appears to depend more on social than on technological processes
    - regional innovation systems are fragile because they are weakly institutionalized
- A national system of innovation describes the relationships among institutions, both public and private. These relationships are usually through financial flows or movements of people

Regional Systems of Innovation

- In Canada, the national system of innovation is regionalized. The Ontario/Quebec economy is not the same as the BC or Prairie regions. National statistics are biased by the Windsor – Quebec corridor.
- Canada is a country of metropolitan islands: Vancouver, Calgary , Toronto, Montreal, etc. The policy question is how small can an island be before it is not viable.
- In non-metropolitan areas it is important to have a seamless technology delivery system. A "single window", through which government can deliver services collectively would be useful. Non-metropolitan areas require more effort by governments simply because regional systems are weakly institutionalized - they lack the richness of connections usually found in the technopoles

Clusters and Innovation

- Industrial clusters (according to Michael Porter) are geographic concentrations of economic activity that has some competitive advantage, and thus (usually) exports.
- The change, over time, of a cluster, or group of clusters is best described by a system of innovation
- The change, over time , of a system of innovation, can be measured as economic growth (or contraction) and is usually closely tied to similar social trends

Government Innovation Policy Options

- Knowledge is an input to economic growth and social development. Governments seek to promote the generation of knowledge and its application to the economy.
- Governments have a mandate to increase economic well-being, social well-being, national security and administrative efficiency
- Governments have a variety of policy options to implement their national vision: direct actions and indirect actions

Government Innovation Policy Options

	Direct Interventions	*Indirect Interventions*
Directed R&D	Government laboratories	Research grants to universities and firms
General R&D support	Technology-based projects	R&D tax credits under WTO article 8.2
Directed S&T activities	Testing, standards, data collection	Regulatory activities
General S&T support	Technology outreach	S&T education

Indirect Support by Governments

- Governments can support the creation of knowledge in industry indirectly through:
    - support for post-secondary education
    - support for infrastructure (libraries, technology transfer agents, and access to the information highway)
- Infrastructure is perceived as better than direct support by government as there is no element of choice by government departments/agencies
- Subsidies are a form of indirect support in that they support economic (or social) decisions made by the private sector, whether as firms or individuals

Government Intervention in the technological activities of Industry

- Direct government interventions (particularly in firms in regions where the local system of innovation contains less than a critical mass of technology) often follow a linear sequence:
    - Technology services
    - Technology assistance
    - Research and development
- Technology services provide an opportunity for government departments/agencies to "acquire a customer". Through learning about a firm's needs by providing services, the department/agency can identify areas for technical assistance and finally areas where collaborative R&D may be beneficial (the need for outreach technology advisors is crucial)
- Also, direct funding of specific projects identified by the government department/agency (usually large capital projects)

Role of Laboratories

- First, and foremost, is the generation of new knowledge in specific areas mandated by the government's innovation policy.
- Laboratories provide direct and indirect support to the private sector and to other public institutions such as state corporations, educational institutions, and non-governmental, non-profit organizations.
- Laboratories also provide for the incubation of spin-off firms and the delivery of direct technical assistance to existing firms.

Innovation in line departments

- Innovation is not limited to the private sector or government labs
- The operational arms of government innovate for the same reasons as other large service-based organizations – to meet competition and to reduce costs
- Its innovation is not merely "new to the firm" – sometimes it can be a leader nationally or even internationally
- Pilot studies at CPROST have confirmed this in a number of service-oriented departments

Innovation program analysis supports:

- formulation of innovation policy, in support of economic and social objectives;
- provision of advice to ministers and other senior officials;
- support for and justification of innovation program expenditures;
- information on innovation activities for elected officials, journalists and other stakeholders; and,
- analysis of the national system of innovation