The Innovation Systems Research Network:

An Experimental Design for Knowledge Management

David A. Wolfe

Program on Globalization and Regional Innovation Systems
Centre for International Studies
University of Toronto

Innovation Systems Research Network

Context

- *Innovation Systems Research Network (ISRN)*
- *Established in 1998 to support interaction among researchers and their partners*
  - *To promote the diffusion of findings to public and private sector partners*
- *Instrumental role of Statistics Canada Workshop*
  - *March 1997*
- *Strong network of international collaborators*
  - *Research Advisory Committee*

Objectives

- *Encourage the creation of linkages and the exchange of ideas and information among the academic community, private sector firms and associations, government policy makers that will lead to a better understanding of the nature of innovation in the Canadian context;*
- *Develop agendas for research on the relationship among innovation, the new knowledge-based economy, and regional economic clusters;*
- *Foster a multidisciplinary approach to the research that includes a variety of disciplines such as business, economics, urban planning, public administration and science and technology management;*
- *Encourage the development of graduate students with the interests and skills necessary to contribute to future research in this area and/or to practice as managers of science-based innovation; and*
- *Improve innovation systems and thereby strengthen Canadian competitiveness, by influencing public policy and corporate strategy.*

Design Features

- *Nodal Structure*
- *Five subnetworks*
- *Multidisciplinary membership*
- *Structure mirrors regions being studied*
  - *Research methodologies tailored to regions being studied*
- *Research dissemination*
  - *Regional workshops*
  - *National meetings*
  - *Web sites and electronic newsletters*
  - *Annual publication*
- *Links with extensive network of government partners*
  - *Policy advice tailored to the regions*

Research Dissemination

- *Web Site: www.utoronto.ca/isrn*
  - *Subnetworks*
  - *Bibliography*
- *Electronic newsletters*
  - *Rin – Le Bulletin Innov*
  - *Thecis Newsletter*
  - *ONRIS – OREDI Newsletter*

"For anyone interested in cultivating the widest possible understanding of the tech-based economic development, one of the best possible web sites is Ontario's OREDI Newsletter. Every issue of the newsletter is packed with links to quality articles, academic research papers, reports, proceedings and events. The content selection is a good balance between Canadian, US and other international perspectives on this field."

SSTI Bulletin, Feb. 22, 2002

Ontario's Regional Economic Development and Innovation Newsletter

- **Ontario's Regional Economic Development and Innovation Newsletter**
- Issue #37 April 2, 2002

- **Studies & Publications:** Announcements | Editor's Pick | Innovation Policy | Regions & Clusters | E-Commerce | University Research
  Events
  Be a Regional Reporter!
  Subscriptions & Comments

- **ANNOUNCEMENTS**
- Canada's Technology Triangle contributes a net $900 million to provincial and federal government
  EDITOR'S PICK
- Fast Forward 3.0: Maintaining the Momentum
- Benchmarking Industry-Science Relationships
- Research Strategies for Smaller Countries
- Government innovation support for commercialization of research, new R&D performers and R&D networks
- **REGIONAL INNOVATION & CLUSTERS**
- Economic Profiles for US States
- University of Minnesota's industry cluster work
- **E-COMMERCE**
- The Best States for E-Commerce
- E-commerce Market in Canada
- **UNIVERSITY RESEARCH**
- Innovation U.: New University Roles in a Knowledge Economy
- Assessing the Effectiveness of Technology Transfer Offices at U.S. Research Universities
- Industry Perspectives on Licensing University Technologies: Sources and Problems

Innovation Systems Research Network

ISRN Bibliography

- **RESEARCHERS' BIBLIOGRAPHY (Selected Publications since 1995)**

  ACISN NETWORK
  Charles H. Davis Rod Haddow Harvey Johnstone Philip Rosson Norbert Schaefer

- **INNOCOM (BRITISH COLUMBIA)**
  J. Adam Holbrook Cooper Langford Tim Padmore Peter Phillips Hans Schuetze Richard Smith

- **ONTARIO NETWORK ON THE REGIONAL INNOVATION SYSTEM (ONRIS)**
  Neil Bradford John N.H. Britton Betsy Donald Meric Gertler John Holmes Pradeep Kumar Lynn Mytelka Tod Rutherford Peter Warrian David Wolfe

- **OTTAWA NETWORK (PRIME)**
  John de la Mothe Jerome Doutriaux

- **RÉSEAU DU QUÉBEC POUR L'ÉTUDE ET LA PROMOTION DES SYSTÊMES D'INNOVATION**
  Robert Dalpé Benoit Godin Rejean Landry Jorge Niosi Diane-Gabrielle Tremblay

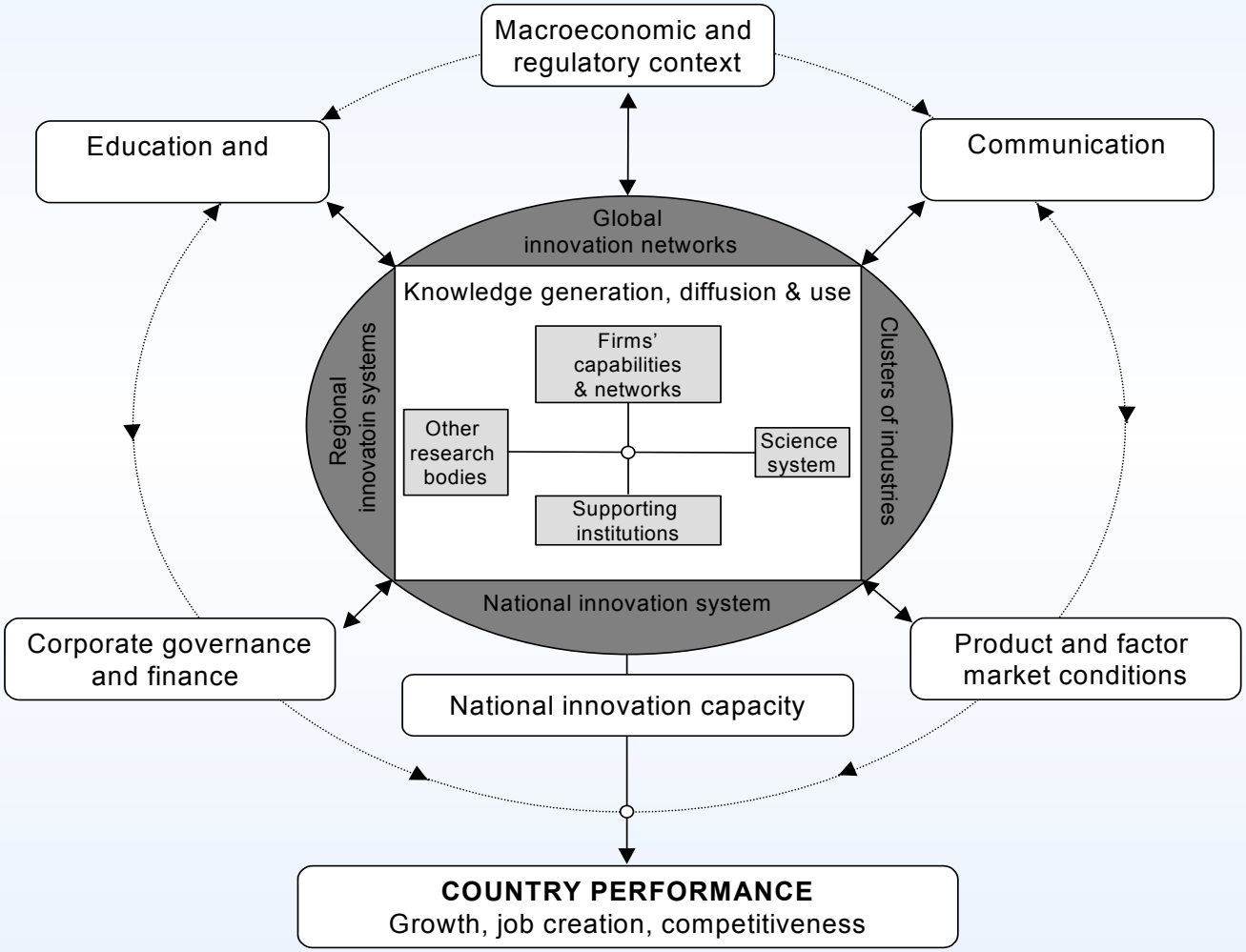
The Innovation Systems Approach

- *network of institutions that interact to initiate, import and diffuse new technologies*
  - *government policy*
  - *corporate R&D*
  - *education and training system*
  - *structure of industry*
- *patterns of interaction between firms as collective learning process in acquisition and use of new knowledge*
  - *internal organization of firms*
  - *network of interfirm relationships*
  - *role of public sector*
  - *degree of R&D intensity*
  - *nature of R&D organization*

Spatial Scales

- *National*
  - *Industry structure*
  - *Corporate organization and governance*
  - *Legal/regulatory framework*
  - *Fiscal (taxation) and macroeconomic environment*
  - *Framework of industrial relations and labour training*
  - *Financial system*
  - *Government policy*
- *State/Provincial*
  - *Regional areas of specialization*
  - *Research infrastructure – higher education sector*
  - *Specialized training institutions*
  - *Industrial attraction and retention*
  - *Government policy/support*
- *Local /Cluster*
  - *Civic governance*
  - *Physical /communications infrastructure*
  - *K-12 education system*

National System of Innovation



Innovation Systems Research Network

From the National to the Regional

- *Shift in focus from the national to the regional level:*
  - *Recognition that spatial proximity facilitates the sharing of tacit knowledge and capacity for localized learning;*
  - *Firms clustered in a region share a common regional culture that facilitates learning;*
  - *Localized learning is facilitated by a common set of regional institutions*
- *Regional Innovation System:*
  - *"The set of economic, political and institutional relationships occurring in a given geographic area which generates a collective learning process leading to the rapid diffusion of knowledge and best practice" (Nauwelaers and Reid)*

Elements of the Regional Innovation System

- *Consists of the infrastructure of R&D institutions in the region*
  - *Internal and external networks of relationships between public R&D institutions and private actors*
- *RIS includes both supply and demand side of the process*
  - *Supply side includes the institutional sources of knowledge creation*
  - *Demand side includes the private firms that absorb and use scientific and technological knowledge*
- *Innovation support organizations bridge the gap between the two*
  - *Technology brokers and technology transfer centres*
  - *Organizations in the PSE sector to facilitate knowledge transfer*
  - *Outreach from public research labs*
  - *Venture capital firms*

Knowledge Spillovers in the RIS

- *Strong geographic spillovers between public research centres and industrial R&D*
- *Distance Matters*
  - *firms located close to research centres benefit disproportionately*
- *Benefits of knowledge spillovers (Martin and Salter)*
  - *Increasing the stock of useful knowledge*
  - *Training skilled graduates*
  - *Creating new scientific instrumentation*
  - *Forming networks and promoting social interaction*
  - *Increased capacity for scientific and technological problem solving*
  - *Creating new firms*

Sources of Competitive Advantage in Regional Economies

- *'untraded interdependencies' – technological spillovers*
  - *knowledge and practices transferred between firms*
  - *not always codified or explicit – ie. tacit dimension*
  - *transferred through networks*
- *networking – based on trust*
  - *shared intelligence of group of firms*
  - *grounded in a regional economy*
- *social capital – shared norms and trust*
  - *facilitates cooperation among firms and sectors*

Conceptions of Social Capital

- *Features of social organization of a region or community that facilitate coordination and cooperation among economic actors*
  - *Capital refers to asset*
  - *Social connotes that it is attained through community*

- *Two concepts of social capital:*
  - *Communitarian – attributable to historic and cultural factors buried deep in the region's past;*
  - *Performance-based – built up through the dense interactions of firms engaged in interrelated economic activities that generate high level of trust in mutual dealings*
  - *Silicon Valley —'swift trust' (Brown and Duguid)*

Research Findings

- *National Survey of Innovation*
  - *Sources of information for the innovation process*
  - *Distinctions between innovators and non-innovators*
- *Regional Innovation Surveys*
  - *Innovative firms share common characteristics firms across regions*
  - *High tech firms not automatically innovative*
  - *Human resource dimension critical for innovation*
  - *Critical dimensions of social capital*
  - *Performance of indigenous versus foreign firms*
  - *Response to trade liberalization and continental integration*

Research Findings II

- *Analysis of clusters – GEM Model*
  - *WED study of western clusters*
- *Clustering of industrial competencies:*
  - *Biotechnology, IT, industrial materials*
  - *Localization of knowledge spillovers*
  - *Gov't laboratories not always located near clusters*
  - *Absorptive capacity – investing firms assets in research*
- *Emerging clusters – new media*
  - *Importance of the three T's*
  - *Important role of demand drivers*
  - *Clusters sometimes driven by inadvertent policy – ie. Canadian content*
  - *Challenges of creating 'innovative milieux'*

Research Findings III

- *Innovation on the periphery*
  - *Challenges of resource-based clusters*
    - *Critical role of human resource management*
  - *'Thin' basis of clusters in peripheral regions*
    - *Full blown clusters are the exception*
  - *Industrial base of regions often drives research infrastructure*
    - *Pattern of interaction between components of the innovation system*
  - *Challenges of creating 'new' clusters around research infrastructure*

Policy Implications

- *Importance of social factors and institution building*
- *Linkages between elements of the system*
  - *Especially research infrastructure and clusters*
- *Importance of demand side of innovation system*
  - *Absorptive capacity*
  - *Knowledge is not a 'free good'*
- *National policies impact at the local level*
- *Growing role of networks and clusters*
  - *Talent as a key attractor*
  - *Combination of educational resources and quality of life factors*

Policy Implications II

- *Broad mix of policies*
  - *Support for upgrading innovative capacity of firms*
  - *Infrastructure to promote rapid diffusion of technologies*
  - *Support growth of SME's through networking and interaction*
  - *Role of financial system*
  - *Stimulate both supply of and demand for new knowledge*
- *Critical role of strategic planning and regional foresight and the local and community level*
  - *Coordinate federal agencies at local level*

Elements of the Innovation System

- *Private firms – especially R&D performers*
- *Science System – S&T infrastructure*
  - *Public research institutions*
  - *Private and cooperative research organizations*
  - *Technology transfer agencies*
- *Government Programs*
- *Networks to facilitate knowledge and technology transfer*
  - *Including business organizations*
- *Education and Training System*
  - *Including local labour markets and training institutions*
- *Financial system – support for technology financing*