Innovation Systems and Economic Development: The Role of Local and Regional Clusters in Canada

SSHRC Major Collaborative Research Initiative

Milestones and Framework Document

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1.0 Project Framework

The goal of our research is to determine how the formation and growth of clusters contribute to economic development and long–run prosperity within a set of regions across Canada. We want to know how local networks of firms in these regions, along with the supporting infrastructure of institutions and organizations, interact to foster innovative dynamism leading to robust economic development. To what extent — and in what ways — do local, extra–firm relationships and interaction enable firms to make the transition to more innovative and knowledge–intensive forms of production?

The study will investigate the process of cluster development in a wide range of locales, in both knowledge–intensive sectors as well as more traditional ones, and in both metropolitan and non–metropolitan settings. The proposed initiative builds upon the unique research capabilities and partnerships of the Innovation Systems Research Network (ISRN), which was established in 1998 with initial network grants from SSHRC, NSERC and the NRC.

The members of the research team have benefited from three years of working together to construct a common intellectual framework and research agenda. Every aspect of the theoretical framework, research questions and methodology have been thoroughly discussed and vetted at our annual national conferences and more recently at project planning meetings of the management committee (see below). Every aspect of the project has been designed as part of an integrated and cohesive research agenda from the outset.

1.1 Management Structure

We shall use the existing structure of the ISRN to provide a management framework and organizational structure for the research over the next five years: a national office based in the Munk Centre of International Studies at the University of Toronto, and five regional subnetworks distributed across the country (at Simon Fraser, Ottawa U, Toronto, Laval and Fredericton). Each local cluster study will be conducted by a senior member of the appropriate subnetwork, and funds for each study will be distributed and administered through the heads of the regional subnetworks. Funds will also be allocated to allow each regional subnetwork to continue their networking activities established under the ISRN, as a way to maintain and strengthen interaction and knowledge transfer with our research partners in government agencies and the private sector.

We shall maintain the overall management structure that has served us well to this point. The *Management Committee* (MC) will consist of David Wolfe (Toronto), Meric Gertler (Toronto), Adam Holbrook (SFU), Réjean Landry (Laval), John de la Mothe (Ottawa U) and Norbert Schaefer (UNB), along with Jack Smith (NRC) representing our various government partners.

In addition, we have created a *Research Advisory Committee* which will include all the international collaborators listed in the proposal. The Research Advisory Committee (RAC) will first meet in Toronto on May 9, 2001, in a day–long session with the MC before the annual meeting to discuss the conceptual and methodological framework for the project. They will continue to meet annually on this occasion throughout the life of the project.

1.2 Research Plan

The research will proceed along three lines of inquiry: a statistical analysis of the data in Statistics Canada's 1999 Innovation Survey (SCIS); detailed case studies of the individual clusters in each region; and a cross–cluster/cross–region comparative analysis in the latter stages of the project.

I. Statistical Analysis:

The statistical work, to be carried out largely within the first two years of the project, will be coordinated by a subcommittee chaired by Meric Gertler at Toronto and Réjean Landry at Laval. The substantive work will be carried out by two postdoctoral students – Yael Levitte at Toronto and Nabil Amara at Laval, and one research associate – Rick Audas at UNB. There will be a meeting of the full statistical subcommittee (including postdocs and research associate) with Brian Nemes and Frances Anderson of Statistics Canada, during the first national meeting in Toronto, May 9-11, 2001, to co–ordinate this phase of the analysis.

This statistical work will allow us to measure the number and importance of product and process innovations produced by firms (dependent variable) and explore its relationship to a set of independent variables including: the importance of different external sources of innovative ideas, firm size, and the sophistication, internal resources or 'absorptive capacity' of the firm. We can also explore how this varies by key dimensions such as sector/industry and location (including a differentiation between metropolitan and non–metropolitan regions).

The data from the survey will be analysed to provide a systematic, consistent overview of innovation–generating behaviour in the key sectors selected below. Special emphasis will be placed on the relative importance of internal versus external sources of innovative ideas, co–operative/collaborative inter–firm interaction, relationships to innovation–supporting institutions and the use of government programs. Despite the relatively large sample size (6,000 manufacturing firms and 800 natural resource firms), we do not expect to be able to conduct this analysis at the level of every one of the individual sectoral and regional clusters identified below, due to potential problems of small cell counts when disaggregating by location and industry. Much of the analysis will therefore be conducted at the national and provincial level. Hence, the insights arising from this analysis will form a useful backdrop and complement to more detailed research carried out through the case study approach.

We can then match this information to our selected industry/region clusters to give us a systematic baseline analysis of the extent of collaboration and cluster–type relations present. We can also learn useful information from the SCIS about the motivations underlying this kind of collaboration, the benefits arising from it, and the obstacles or challenges preventing further collaboration.

This documentation is essential in helping us to:

(a) identify key *members* or *elements* of the *regional innovation system*;
(b) identify key *assets and obstacles to collaboration* in the region/industry;
(c) identify *region–wide characteristics* (i.e. those which appear to be common to all or most sectors in the region);
(d) identify important *sources of innovative ideas inside and outside the region*;
(e) make systematic quantitative *comparisons across locations* within each sector/industry (and also across industries) on a, b, c and d above.

The profile of each industry/region cluster arising from our analysis of the SCIS data will thus provide a preliminary benchmarking of the density, strength, and structure of local cluster relationships using explicit measures. This will facilitate cluster–to–cluster comparisons, as well as comparisons to national and international benchmarks.

II. Cluster Case Studies:

For the second line of inquiry, we will conduct 22 cluster studies (listed below). Most of these will take three years to complete. All investigators will employ a common framework that has been developed by the Management Committee, and which will be finalized through discussions with the full project team and RAC at the May 2001 annual meeting. The cluster studies will be based on 50 individual interviews/cases spread across the ten groups listed below. Interview guides will be customized to match the particular role of each of these stakeholder groups:

a. 'Lead' firms (large, technologically dynamic, export-oriented)
b. Smaller and mid–sized firms, including suppliers
c. Industry associations, chambers of commerce
d. Labour organizations
e. Government agencies (federal, provincial, local)
f. Technology transfer organizations
g. Universities: offices of technology transfer; relevant departments and faculties
h. Colleges and other training institutions
i. Financial sector (venture capitalists, banks, other)
j. Local political leaders and 'civic entrepreneurs'

The list of clusters has been determined through detailed discussions among the members of the Management Committee on the basis of existing research expertise and areas of interest, relevance to the local and regional economies across the country and the need for comparability. The final list of clusters (with cluster study leaders) is as follows:

Clusters	BC/Alberta	S. Ontario	Ottawa	Québec	Atlantic
Biotech/ Biomed	✓Holbrook	✓Gertler	✓Niosi/Dalpé	✓Niosi/Dalpé	✓Rosson
Culture/ Multimedia	✓Smith	✓Britton		✓Tremblay	
Photonics/ Wireless	✓Langford	✓Wolfe	✓de la Mothe (Doutriaux)	✓Landry	
Wood Products	✓Schuetze				
Food & Beverage (including wine)	✓Padmore	✓✓Donald Mytelka[1]			
Information Technology			✓de la Mothe (Doutriaux)		✓✓Schaefer Johnstone/ Haddow[4]
Auto/Steel Aerospace		✓✓Warrian Holmes/ Kumar[2]		✓Niosi[3]	

Notes:

1. Donald: specialty food and beverage cluster; Mytelka: Niagara wine cluster.
2. Warrian: steel; Holmes/Kumar: automotive parts
3. Niosi: aerospace cluster in Montréal
4. Schaefer: New Brunswick IT cluster; Johnston/Haddow: Cape Breton IT cluster

The cluster analyses will examine:

i. size and composition of the cluster
ii. history of the cluster's evolution, including key events (intentional and accidental)
iii. relationships between firms
iv. relationships between firms and research infrastructure
v. geographical structure of these relationships
vi. role of finance capital (especially angel investors and venture capitalists)
vii. role of local social capital and 'civic entrepreneurs'
viii. other factors contributing to the growth of the cluster

A draft set of interview questions will form the basis for discussion among the researchers responsible for individual clusters on May 11 at the first national meeting.

III. Comparative Analysis:

Comparative analyses will begin in Year 4. We will look at clusters within a region, clusters across the country, new sectors versus traditional sectors (eg wireless versus wood products), and metropolitan versus rural issues. Our goal is to generate a set of comparative papers across regions and clusters in years four and five. The heads of each regional subnetwork will be responsible for coordinating the cross–cluster analyses in their own region. Additionally, we will undertake cross–regional comparative analyses for the six major sectors for which we are conducting studies in more than one region: biotech/biomed (Holbrook, coordinator); cultural industries/multimedia (Gertler, coordinator); photonics/wireless (Wolfe, coordinator); food/beverage/wine (Padmore, coordinator); information technology, including telecom equipment (de la Mothe, coordinator); auto/steel/aerospace (Warrian, coordinator).

We will use both quantitative results from our analysis of SCIS and structured, qualitative results from our interviews to make these systematic comparisons between different case studies. Given that we have selected multiple clusters in the same or similar industry/sector, this analysis will permit us to better understand the following questions:

1. How does each cluster compare to the other(s) in its industry (or to national standards and benchmarks) in terms of competitive performance and the character, strength and structure of cluster relations?
2. To what extent are the character, strength and structure of cluster relations dependent on the dominant industrial sector?
3. To what extent do location–specific characteristics determine cluster characteristics and performance?

Finally, we aim to produce a study of 'lessons learned', with a strong policy focus examining the following issues:

- ▸ identify a set of 'best practices' that work elsewhere to assist local and regional development agencies to identify policy instruments and design programs that promote cluster formation and monitor their progress;
- ▸ develop guidelines to design and animate interactive learning and governance in the various parts of local innovation systems, as well as provide narratives and exemplars about trends in firm location decisions;
- ▸ provide universities and public research laboratories with better insights into their roles in cluster formation and how they can participate more effectively.

1.3 Budget Structure

Our expenditures fall into three broad categories:

a. Cluster study direct costs
b. Networking and communication costs (for each regional subnetwork)
c. National office central functions (statistical analysis, national meetings, publications)

Cluster studies will each be funded at between $72,000 and $75,000 over three years, with the timing of each study staggered to spread expenditures as evenly as possible over the five–year life of the project (see Budget and Milestones Chart below for details). Exceptions are the Southern Ontario wine and steel clusters, which will be funded at between $40,000 and $45,000 per year. Variations in cluster budgets reflect different travel needs and other logistics related to the characteristics of each case.

Networking and communication costs will be funded on a per–subnetwork basis over the life of the project. Each subnetwork will receive $23,000 per year, plus $5,000 for equipment (in Year 1 only) for the purpose of organizing regional meetings with public and private sector partners, communication and outreach activities such as electronic newsletters, web sites, working papers, and other related expenditures.

National office central functions will include expenditures associated with all national meetings (including the travel costs of international collaborators), statistical analysis (with some funds for this going directly to RQSI in Québec and ACISN in New Brunswick), central outreach and communications functions such as project website maintenance, working papers, publications arising from the annual meetings, and public relations.

1.4 Deliverables

The deliverables for the project will include:

a. a set of papers arising from the statistical analysis.

b. papers arising from individual cluster studies. This should result in a set of 22 individual papers. A considerable number of them will be presented at the annual ISRN meetings and included in the publication from Queen's University's School of Policy Studies. We will continue to post all of our papers on the ISRN website.

c. a set of papers arising from the comparative analysis. This will include up to 11 comparative analyses of the individual cluster studies: 5 regional cross–cluster studies comparing the similarities and differences across the various clusters studied within each region; 6 cross–regional studies comparing the nature of the various clusters in the different parts of the country (for those cases where the same industry will be studied in more than one region). These will primarily be presented at the ISRN annual meetings in Years 4 and 5.

2.0 Milestones

Time Frame	Milestones	Deliverables
Q1, 2001	Confirmation of Study Participants Organization of Research Agenda Planning for ISRN National Meeting – May, 2001	Milestones document
Q2, 2001 National	Research Advisory Committee Meeting, May 9 ISRN National Meeting and Official Launch, May 10 &11 – approve cluster framework & interview guide Consultations with Statcan on Data Analysis, May 11	ISRN Papers, Vol. 2
Innocom (BC/AB)	Launch **Wood Products** Cluster Study	
PROMIS (Ottawa)	Launch **Telecom Equipment** Cluster Study Launch **Photonics** Cluster Study Launch **Biomedical Equipment** Cluster Study	
RQSI (Quebec)	Launch **Aerospace** Cluster Study Launch **Biotechnology** Cluster Study	
Q3, 2001 Statistical Analysis	prepare descriptive statistics for cluster studies (2 reports)	
Innocom	Regional Meeting – Cluster Framework and Interview guide Workshop on Innovation for PCO/PRS Launch **Food/Wine** Cluster Launch **Wireless** Cluster Study	
ONRIS (S. Ont.)	Regional Workshop – Cluster Framework and interview guide – consult public sector partners, MEST, MEDT Launch **Steel** Cluster Study	
PROMIS	Research plan for **Telecom** and **Photonics** cluster study Data analysis of existing indicators for **Biomed** cluster	
RQSI	Data analysis of existing indicators for **Biotech** cluster Datal analysis of existing indicators for **Aerospace** cluster	
ACISN (Atlantic)	Regional Workshop with public sector partners (NRC, ACOA, IC, & NB Govt. Launch **NB IT** Cluster Study Launch **Cape Breton IT** Cluster Study	
Q4, 2001 Statistical Analysis	continue work on 2 reports	
Innocom	**Food/Wine** Cluster – 25 Interviews **Wireless** Cluster – 20 Interviews in Calgary **Wood Products** Cluster – 25 Interviews Launch **Multimedia** Cluster study Launch **Biotechnology** Cluster study	

ONRIS	**Steel Cluster** – refine interview guide and interview list	
ACISN	**NB IT** Cluster – develop contact database **Cape Breton IT Cluster** – develop contact database	
Q1, 2002 National	Management Committee Meeting – plan national meeting	
Innocom	Innocom Regional Meeting **Food/Wine** Cluster – 25 interviews **Wireless** Cluster – 20 interviews in Calgary **Wood Products** Cluster – 25 interviews **Multimedia** Cluster – define cluster **Biotechnology** Cluster – define cluster	
ONRIS	ONRIS Regional Meeting **Steel** Cluster – begin interviews Launch **Wine** Cluster study	
PROMIS	**Telecom Equipment** Cluster – begin interviews **Photonics** Cluster – begin interviews	MBA Research Papers
ACISN	**NB IT** Cluster – 25 interviews **Cape Breton IT** Cluster – 25 interviews	
Q2, 2002 National	ISRN Annual Meeting and RAC meeting	Initial Cluster Reports
Statistical Analysis	complete first two analytical reports	Reports on Cluster Characteristics
Innocom	**Food/Wine** Cluster **Wireless** Cluster – define Vancouver cluster **Wood Products** Cluster **Multimedia** Cluster – map research networks **Biotechnology** – map research networks	Initial Report Initial Report Initial Report
ONRIS	**Steel** Cluster – 25-30 interviews **Wine** Cluster – begin interviews Launch **Auto Parts** Cluster study	Initial Report
PROMIS	**Telecom Equipment** Cluster – 25 interviews **Photonics** Cluster – 25 interviews **Biomed** Cluster – 25 interviews	Initial Report Initial Report Initial Report
RQSI	**Biotech** Cluster – 25 interviews **Aerospace** Cluster – 25 interviews Launch **Multimedia** Cluster Study Launch **Photonics** Cluster Study	Initial Report Initial Report
ACISN	**NB IT** Cluster **Cape Breton IT** Cluster Launch **Halifax Biotech** Cluster study	Initial Report Initial Report

Q3, 2002 National		ISRN Papers 3
Statistical Analysis	begin next round of analytical studies (2 reports)	
Innocom	**Biotech** Cluster – 25 interviews **Multimedia** Cluster – 25 interviews	Conference Paper
ONRIS	Regional Fall Workshop **Steel** Cluster – complete interviews **Wine** Cluster – continue interviews **Auto Parts** Cluster – cluster definition based on preliminary analysis of secondary data Launch **Wireless/Photonics** Cluster study Launch **Multimedia** Cluster study	
RQSI	**Multimedia** Cluster study – 25 interviews **Photonics** Cluster study – 25 interviews	
ACISN	Regional Workshop with public sector partners (NRC, ACOA, IC, & NB Govt. **Halifax Biotech** Cluster study – develop contact database	
Q4, 2002 Innocom	Workshop on Innovation in the Public Service **Wireless** Cluster study – 20 interviews in Vancouver **Wood Products** Cluster **Biotech** Cluster – 25 interviews **Multimedia** Cluster – 25 interviews	Conference Paper
ONRIS	**Steel** Cluster – analysis of interview data & integration with statistical overviews **Wine** Cluster – complete interviews (25-30) **Auto Parts** Cluster – refine interview guide; preliminary interviews **Photonics/Wireless** – refine interview guide and develop contact database **Multimedia** Cluster study – refine interview guide; update & reconcile databases	Draft Report Interim Report Background Paper
PROMIS	continue interviews	
RQSI	continue interviews	
ACISN	**Halifax Biotech** – 25 interviews	
Q1, 2003 National	Management Committee Mtg – review progress, plan National Conference, draft interim report	
Innocom	**Wireless** Cluster – 20 interviews in Vancouver **Food/Wine** Cluster	Conference Paper Draft Report

ONRIS	**Auto Parts** Cluster – begin field interviews **Photonics/Wireless** Cluster – begin field interviews **Multimedia** Cluster – 25 interviews in film segment & locational analysis of spatial pattern of activity Launch **Food & Beverage** Cluster study Launch **Biotech** Cluster study	
PROMIS	**Telecom Equipment** Cluster – 25 interviews **Photonics** Cluster – 25 interviews **Biomed** Cluster – 25 interviews	
RQSI	**Aerospace** Cluster – 25 interviews **Biotech** Cluster – 25 interviews **Photonics** Cluster – 25 interviews	
ACISN	**NB IT** – 25 interviews **Cape Breton IT** – 25 interviews	
Q2, 2003 National	ISRN Annual Meeting and RAC Meeting Complete Interim Report to SSHRC	Conference Papers Interim Report
Statistical Analysis	Complete two analytical reports	Reports on Cluster Characteristics
Innocom	**Wireless** Cluster – comparative analysis of Calgary and Vancouver **Biotech** Cluster **Multimedia** Cluster	Conference Paper Interim Report Interim Report
ONRIS	**Steel** Cluster – complete final report **Wine** Cluster – draft final report **Auto Parts** Cluster – 25 interviews **Multimedia** Cluster – draft report **Food & Beverage** Cluster – finalize interview guide and develop contact database **Biotech** Cluster – finalize interview guide and develop contact database	Conference Paper Conference Paper Conference Paper
PROMIS	**Telecom Equipment** Cluster – interim report **Photonics** Cluster – interim report **Biomed** Cluster – interim report	Conference Paper Conference Paper Conference Paper
RQSI	**Aerospace** Cluster – interim report **Biotech** Cluster – interim report **Multmedia** Cluster – interim report **Photonics** Cluster - quantitative analysis	Conference Paper Conference Paper Conference Paper Conference Paper
ACISN	**NB IT** Cluster **Cape Breton IT** Cluster **Halifax Biotech** Cluster	Conference Paper Conference Paper Conference Paper

Q3, 2003 National	Interim Review Meeting – September	ISRN Papers 4
Innocom	**Wireless** Cluster	Conference Paper
ONRIS	Regional Fall Workshop **Wine** Cluster – final report **Auto Parts** Cluster – analyse interview data **Photonics/Wireless** Cluster – 25 Interviews **Biotech** Cluster – 25 interviews	Conference Paper Conference Paper
PROMIS	**Telecom Equipment** Cluster – revise report **Photonics** Cluster – revise report **Biotech** Cluster – revise report	
RQSI	**Aerospace** Cluster – comparative analysis **Biotech** Cluster – comparative analysis **Multimedia** Cluster – 25 interviews	
ACISN	Regional Workshop with public sector partners (NRC, ACOA, IC, & NB Govt. **Halifax Biotech** – 25 interviews	
Q4, 2003 National	Management Committee Mtg to discuss results of Interim Review and plan cross-cluster studies	
ONRIS	**Auto Parts** Cluster – 25 interviews **Photonics/Wireless** interviews – 25 interviews **Food & Beverage** Cluster – 25 interviews	
ACISN	**NB IT** Cluster – analyse results **Cape Breton IT** Cluster – analyse results	
Q1, 2004 National	Plan National Conference Initiate first round of cross-cluster studies	
Statistical	Integrate statistical analysis with cluster studies	
Innocom	Regional Meeting Conclude **Wood Products** Cluster study	
ONRIS	**Auto Parts** Cluster study – complete interviews and begin analysing data **Multimedia** Cluster study – 25 interviews **Photonics/Wireless** Cluster study – complete interviews and analyse interview data	
PROMIS	Conclude **Telecom Equipment** Cluster study Conclude **Photonics** Cluster study Conclude **Biotech** Cluster study	

RQSI	Conclude **Aerospace** Cluster Study Conclude **Biotech** Cluster Study	
Q2, 2004 National	ISRN Annual Meeting and RAC Meeting Initial Round of Cross-Regional and Cross-Sectoral Cluster Studies – BC/AB, Ottawa, Atlantic, Steel/Auto/Aerospace, IT (including telecom equipment	Conference Papers
Innocom	Conclude **Wireless** Cluster study **Biotech** Cluster study **Multimedia** Cluster study	 Conference paper Conference paper
ONRIS	**Multimedia** Cluster study **Photonics/Wireless** Cluster study **Biotech** Cluster study **Food & Beverage** Cluster study	Conference paper Conference paper Conference paper Conference paper
RQSI	**Multimedia** Cluster study **Photonics** Cluster study	Conference paper Conference paper
ACISN	Conclude **NB IT** Cluster study Conclude **Cape Breton IT** Custer study	
Q3, 2004 National		ISRN Papers 5
Innocom	Conclude **Biotech** Cluster study Conclude **Multimedia** Cluster study	
ONRIS	Regional Fall Workshop	
ACISN	Regional Workshop with public sector partners (NRC, ACOA, IC, & NB Govt.	
Q4, 2004 ONRIS	**Auto Parts** Cluster study – conclude interviews and final analysis of data, draft report **Multimedia** Cluster study – analyse data and draft final report **Photonics/Wireless** Cluster study – final report **Food & Beverage** Cluster study – draft final report	
RQSI	**Multimedia** Cluster study – complete interviews **Photonics** Cluster study – complete interviews	
ACISN	**Halifax Biotech** Cluster study – analyse data	
Q1, 2005 National	Management Committee Mtg – plan annual meeting, coordinate cross-regional and cross-sectoral cluster studies	
Innocom	Regional Meeting	

RQSI	Conclude **Multimedia** Cluster study Conclude **Photonics** Cluster study	
Q2, 2005 National	ISRN Annual Meeting and RAC Second Round of cross-regional and cross-sectoral cluster studies – S. Ontario, Quebec, Multimedia, Biotech, Wireless/Photonics, Food & Beverage Plan Final Report	Conference Papers
ONRIS	Conclude **Photonics/Wireless** Cluster study Conclude **Multimedia** Cluster study **Biotech** Cluster study **Food & Beverage** Cluster study	Conference paper Conference paper
ACISN	Conclude **Halifax Biotech** Cluster study	
Q3, 2005 National		ISRN Papers 6
ONRIS	Fall Regional Workshop **Biotech** Cluster study – draft final report **Food & Beverage** Cluster study – draft final report	
ACISN	Regional Workshop with public sector partners (NRC, ACOA, IC, & NB Govt.	
Q4, 2005 National	Draft Final Project Report & Final Report to SSHRC	Final Report
ONRIS	Conclude **Biotech** Cluster study Conclude **Food & Beverage** Cluster study	

3.0 MCRI Participants

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