Minding the Gap between Promise and Performance: 
The Ontario Liberal Government’s 
Research and Innovation Policy, 2003-2011

by

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A thesis submitted in conformity with the requirements 
for the degree of Doctor of Philosophy 
Graduate Department of Political Science 
University of Toronto

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Doctor of Philosophy
Department of Political Science
University of Toronto
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Abstract

The Ontario Liberal government committed an unprecedented $3 billion between 2003 and 2011 to support research and innovation in order to drive economic growth and prosperity. Premier Dalton McGuinty established Ontario’s first Ministry of Research and Innovation and appointed himself the inaugural minister, instantaneously pushing research and innovation to the top of the political agenda. Given the scale of new resources committed, Ontario’s research and innovation actors intensified efforts to influence the development of research and innovation policy and secure their share of research and innovation money. This study examines the dynamism of policy development in a sector with a state that demonstrated a strong political will to advance an innovation-oriented agenda, and different groups of societal actors intent on influencing the development of that agenda and its supporting policies and initiatives.

Using policy network analysis as an explanatory framework and bearing in mind the power of ideas on policy outcomes, this study explains why Ontario’s Ministry of Research and Innovation policy developed the way that it did. The dissertation contends that various research and innovation actors played critical roles in ensuring that the ministry’s suite of support programs maintained a supply-side innovation orientation between 2003 and 2007.
However, changes in the policy network post-2008 made decision-makers more receptive to demand-side innovation programmatic ideas. And while the government introduced a small number of demand-side innovation initiatives to address recessionary concerns, Ontario’s policy mix maintained a supply-side innovation bias. The dissertation identifies the factors that constrained a shift to a more demand-side innovation policy orientation, discusses the adverse impact these policy choices had on the government’s efforts to realize its economic goals, and offers policy recommendations on how decision-makers can move forward towards implementing a strategic, integrated, place-based approach to policy development that will drive growth and sustainability.
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How tedious this entire process would have been without the support of friends and colleagues! I especially wish to thank Amoy Jacques, Tamika Lattibeaudiere-Palmer, Janana Yoganath-Thomas, and Jasmin Dorsett. And to the last POL2100 Canadian Politics cohort to have had the pleasure of being taught by the incomparable Graham White-Richard Simeon tag team, I cherish the memories. Carey Doberstein, Paul Thomas, Jerald Sabin, Michael Morden, and Alex Pelletier – your friendship meant more to me than you’ll ever know.

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We did it – together.
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Chapter 1
Research and Innovation Policy Development in Ontario

1.0 Introduction: What’s so interesting about research and innovation policy development in Ontario?

The Premier has established two goals for the new Ministry of Research and Innovation he is leading: to support the process of innovation and to create a culture of innovation…By aligning initiatives that had previously been spread across nine ministries, and working to develop new ones, your government is ensuring that, for the first time, Ontario will have a clear plan for research and innovation.

Lieutenant Governor James Bartleman, *Speech from the Throne*
Ontario Legislative Assembly October 2005

We knew from the day we first formed the government that beating out the Chinas and the Indias meant we needed to do a better job of turning the remarkable ingenuity of Ontarians, their creative ideas, into brand new products. That’s why three years ago, we created our province’s first Ministry of Research and Innovation. By the end of the year we will have invested $1 billion to support about 1,000 research and commercialization projects which are helping us create the jobs of the future.

Premier Dalton McGuinty, *Orders of the Day*
Ontario Legislative Assembly, October 2008

In 2005, the Premier established Ontario’s first Ministry of Research and Innovation and appointed himself the inaugural minister. An estimated $3 billion was committed from 2003 to 2011 to enable Ontario to compete with some of the most creative and innovative jurisdictions around the world, to extract more economic value from provincial investments in research and innovation, and ultimately to drive economic growth and prosperity (Ministry of Research and Innovation, 2008d). The unprecedented move to create a ministry exclusively focused on harnessing Ontario’s research and innovation capacity; the government’s sharpened focus on developing policy to realize this goal; the watershed
investment of public money to support research and innovation activity\textsuperscript{1}; and, the Premier’s decision to become Ontario’s very first Minister of Research and Innovation all occurred over the course of the McGuinty government’s two terms in office, and piqued my curiosity as a student of Canadian politics and public policy. The policy decisions of the McGuinty government also caught the attention of thousands of research and innovation actors spread across the province, and raised an important question: Would this era of research and innovation policy development be any different from the past? With this much public dollars at stake, the importance of influencing the development of research and innovation policy came into clear focus for a number of Ontario’s research and innovation actors, and this dissertation explores the extent to which those actors capably organized and mobilized to influence the policy process and secure their share of research and innovation money. But was Ontario really ushering in a new stage of policy development, or was more of the same type of policy with the same rate of return on public investment Ontario’s inevitable fate? These questions make the topic of research and innovation policy development in Ontario between 2003 and 2011 a worthwhile dissertation project.

In short, this study examines the dynamism of policy development in a sector with a state that demonstrated a strong political will to advance an innovation-oriented agenda and different groups of societal actors intent on influencing the development of that agenda. The dissertation underscores the complexity of establishing a mix of policies that will harness the province’s research and innovation capacity, meet the evolving needs of Ontario’s researchers and innovators, as well as address the social and economic challenges of a knowledge-based economy. Using policy network analysis as an explanatory framework and

\textsuperscript{1} Between 1971 and 2003, each of Ontario’s premiers dedicated millions of dollars to build up Ontario’s research and innovation capacity, but never had a single premier committed billions of dollars in multi-year funding to research and innovation as McGuinty had done.
bearing in mind the power of ideas on policy outcomes, this study aims to explain why Ontario’s research and innovation policy developed the way that it did. While other Ontario government ministries play a key role in supporting research and innovation across the province through the delivery of different funding programs and initiatives, the scope of analysis for this dissertation is narrowed to focus on the development of the Ministry of Research and Innovation’s mix of multi-year funding programs in order to (1) explain why the Ministry’s suite of funding initiatives were predominantly supply-side innovation oriented between 2003 and 2011; (2) determine why the Liberal government introduced more demand-side innovation policies during its second term (i.e. 2008 to 2011) when compared to its first term (i.e. 2003 to 2007); and (3) identify the factors that constrained a shift to a more demand-side innovation policy orientation in Ontario.

This dissertation also discusses the globally pervasive idea that sustainable innovation is critically linked to a jurisdiction’s long-term economic development, and it explores the extent to which this idea has motivated governments from jurisdictions across the world to make innovation a centerpiece of their economic policies with the expectation that public initiatives designed to support an economy’s research and innovation activities will help to bolster competitiveness, productivity and prosperity. As the following section demonstrates, the importance of advancing research and innovation is on the political agenda of many leading jurisdictions.
1.1 What is innovation? Why is innovation important? What is the value of innovation policy?

Innovation is the creative process of developing new knowledge and ideas, new processes and new methods and applying these for economic and societal benefit. Innovation involves leaders – talented, educated people with a variety of experiences and skills. Innovation draws on the full range of sciences, humanities and social sciences; on basic and applied research; and on technology, investment, judgment, action and timing. By definition, it entails initiative, creativity, daring and excellence. Innovation thrives with the close location of clusters of interconnected institutions within a sector, and innovation systems wherein clusters network productively across sectors to realize advancement toward a common cause. Innovation benefits from an environment in which competition and collaboration coexist, wherein one’s strongest competitor is often one’s closest ally. This aims to create a “winners and winners” outcome, in which all parties strive for and stand to benefit from excellence and opportunity.

Drs. Heather Munroe-Blum, James Duderstadt and Sir Graeme Davies, 1999

The Organization for Economic Co-operation and Development (OECD) defines innovation as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method or a new organizational method in business practices, workplace organization or external relations.” (OECD, 2005a) As such, innovation is concerned with developing new concepts, finding new ways of doing things and realizing new ways of applying ideas in order to create economic and/or social value. Decision makers from OECD countries consider innovation to be a major driver of economic growth and a means to address acute social challenges in advanced industrial economies (OECD, 2010a; OECD, 2010b). In today’s knowledge-based economy, innovative activity occurring within and across a spectrum of sectors is informed and advanced by cutting-edge basic or fundamental research and applied research. Given that basic research expands the frontiers of human knowledge and fundamental understanding, while the value of applied research lies

Refer to Donald Stokes’ Pasteur’s Quadrant: Basic Science and Technological Innovation for a more fulsome discussion on the difference between pure basic research, pure applied research and use-inspired basic research and their relation to innovation.
in its practicable applicability to real world situations, the research enterprise is integral for
intensifying a jurisdiction’s scientific, technological and innovation capabilities (Stokes,
1997), which supports government efforts at addressing societal needs and economic
challenges.

Innovation success is particularly important to Ontario if it expects to compete in the
21st century global market. Deindustrialization and increased economic globalization
undermined the province’s traditional strengths (Jobs and Prosperity Council, 2012: 1),
specifically hollowing out Ontario’s manufacturing and resource industries. Similar to other
leading economies seeking new ways to generate prosperity, innovation has become
somewhat of a talisman for the province, i.e. the key to unlocking economic growth in a
knowledge-based, technologically-driven economy. Between 1971 and 2003, Ontario
premiers committed millions of dollars to support research, commercialization, and the
exportation of innovative goods, services and products in the effort to ensure job creation and
a higher standard of living for all Ontarians.3 After decades of public investments in the
innovation sector, the political pressure to realize a significant economic return was most
palpable between 2003 and 20114. Indeed, Premier McGuinty’s decision to raise research and
innovation policy development closer to the top of the policy agenda demonstrated the
government’s resolve to finally “get innovation right.”

A number of leading jurisdictions have prioritized efforts at developing research and
innovation policy. Like Ontario, many decision makers from around the world believe that
research and innovation policy is important because it can serve as a blueprint for identifying
areas of strategic comparative advantage in order to improve productivity, bolster wealth

3 Chapter 4 provides a detailed review of the historical development of policies to support research and
commercialization in Ontario.
4 Chapter 5 discusses the intense political pressure the Ontario government was under to realize a return on investment
in innovation.
creation, and enhance sustainable growth. However, policy development in this sector is complex, and duplicating the policy decisions of other innovative jurisdictions is not a viable option. Global innovation leaders like the United States, Sweden, Germany, Switzerland, the United Kingdom, Singapore, and Finland\(^5\) have vastly different policy statements and public institutions that support the activities of their research and innovation actors, and their respective regional governments have implemented different mixes of funding programs and other resources to encourage productivity across different sectors of their economies.

There are a number of political, economic and historical factors that influence the variable development of research and innovation policies between jurisdictions; these factors are responsible for constraining some policy decisions, while enabling others. Each jurisdiction also has different constellations of state-societal relations that influence policy outcomes. In many instances the structural arrangements that evolve as well as the agency of the actors involved will change over time and these too will influence the decision-making process. Moreover, actors across different jurisdictions who participate in the policy-making process use a range of strategies to promote different philosophical, programmatic and policy ideas regarding innovation, and these ideas condition which set of policy alternatives are chosen. All of these factors influence the development of a jurisdiction’s suite of research and innovation policies. This dissertation is intended to identify the range of factors that influenced the development of Ontario’s research and innovation policy in order to address the core research question: Why did Ontario’s research and innovation policy develop the way that it did between 2003 and 2011?

\(^5\) Between 2007 and 2013, these countries placed within the top 20 of INSEAD’s Global Innovation Index, an initiative that ranks the innovation performance of over 100 countries based on an integrated metric comprised of a select set of weighted variables (The Global Innovation Index, 2011: xi).
1.2 The Province of Ontario as a Case Study

Over the last century, research and innovation actors in Ontario have produced an array of innovations that have changed the world, including insulin (1922), the electronic microscope (1938), the pacemaker (1949), the computerized geographical information system (GIS) (1960), IMAX movies (1970), the BlackBerry (1999) and the remote robotic surgery service (2003) (Council of Canadian Academies, 2013a). These innovations were made possible because of several innovation-enabling characteristics and capabilities that make Ontario an ideal location for leveraging innovation potential (Refer to Box 1.1).

**Box 1.1 Ontario’s Innovation-enabling Characteristics**

Ontario has a number of key characteristics that are necessary for enabling the activities of its research and innovation ecosystem members. Firstly, the province’s highly diversified sectoral structure provides research and innovation actors the opportunity to collaborate and exchange ideas, resources and other assets across different disciplines, thereby seeding the prospect for discovery and innovation in areas such as biotechnology, green technology, advanced manufacturing, information and communications technology, digital media and nanotechnology. Second, Ontario is the most populous province in Canada with a high concentration of the creative talent necessary for developing innovative products, processes and services, as well as the business expertise needed to bring those innovations to market. In particular, this creative talent – largely located within Ontario’s city-regions – has the potential to attract increased investment; develop local partnerships and linkages into global networks and markets; and draw even more innovative, entrepreneurial talent into the province (Wolfe, 2009a). Third, Ontario’s business sector is comprised of a range of firms – from large multi-national corporations to small-medium enterprises – and many of them have the capacity to advance innovations in areas where the provincial government had identified as integral for enhancing productivity levels. Moreover, a number of innovation intermediary organizations across the province provide researchers and entrepreneurs with the technological, business and financial support and networking expertise they need to develop and commercialize their ideas.
In light of these advantages, it is critical for decision-makers to develop a policy mix that will bolster the activities of its research and innovation actors and ultimately ensure the growth and sustainability of the province’s research and innovation ecosystem. Given that Ontario is Canada’s innovation and technology leader, and the province has historically led investments in research and development in Canada (relative to the other provinces), an examination of the policy process aimed at developing initiatives to bolster the economic impact of Ontario’s research and innovation ecosystem at a time when political pressure to realize a return on investment was most intense makes Ontario an interesting case to study. See Tables 1.1 and 1.2 for gross R&D expenditure (GERD) levels by province.

---

**Box 1.1 Ontario’s Innovation-enabling Characteristics and Capacities**

Ontario also has a vibrant research community of internationally acclaimed universities, colleges, teaching hospitals, and other research institutes that have forged strong collaborative ties with local and international research organizations and business firms to drive the discovery of innovative solutions to complex problems. Finally, the province has a sound political and legal environment that supports the innovation activities of local entrepreneurs (Jobs and Prosperity Council, 2012).

All of these components feed into the growth and sustainability of a robust innovation ecosystem, and in turn brings to bear the importance of developing a mix of policies that will support the activities of that ecosystem.

1 Ontario accounts for 38% of Canada’s population. Source: Statistics Canada, Summary Tables. Population, urban and rural, by province and territory (Ontario). [http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo62g-eng.htm](http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo62g-eng.htm)

2 Innovation intermediaries include venture development organizations, trade associations, accelerators, incubators, economic development agencies, centres of excellence and a host of non-profit and social enterprises that provide leadership and expertise in business growth (Dalziel, 2010; Communitech, 2011) Chapter 6 provides an overview of these organizations.

---

An innovation ecosystem is comprised of complex networks of relationships between a variety of individuals, communities, organizations, rules and policies that work together to facilitate knowledge production, knowledge diffusion and industry-driven commercialization (Wessner, 2007; Tawney et al, 2011).

Gross expenditure on research and development (GERD) is the broadest indication of a region’s commitment to R&D (Creutzberg and Wolfe, 2010).
Table 1.1 Gross expenditure on research and development, by province, 2003 - 2009 (Million$)

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<td>2007</td>
<td>14,059</td>
<td>7,949</td>
<td>2,709</td>
<td>2,838</td>
<td>600</td>
<td>324</td>
<td>261</td>
<td>509</td>
<td>60</td>
<td>504</td>
</tr>
<tr>
<td>2008</td>
<td>14,055</td>
<td>8,092</td>
<td>2,968</td>
<td>2,906</td>
<td>586</td>
<td>321</td>
<td>257</td>
<td>523</td>
<td>64</td>
<td>536</td>
</tr>
<tr>
<td>2009</td>
<td>13,386</td>
<td>7,855</td>
<td>2,851</td>
<td>2,798</td>
<td>653</td>
<td>327</td>
<td>259</td>
<td>500</td>
<td>66</td>
<td>596</td>
</tr>
</tbody>
</table>


Table 1.2 Gross domestic expenditure on research and development, by province, 2011 (Million$)

<table>
<thead>
<tr>
<th>Province</th>
<th>Provincial Government Expenditure</th>
<th>Gross expenditure on research and development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>558</td>
<td>14,601</td>
</tr>
<tr>
<td>Quebec</td>
<td>536</td>
<td>7,888</td>
</tr>
<tr>
<td>Alberta</td>
<td>377</td>
<td>2,822</td>
</tr>
<tr>
<td>British Columbia</td>
<td>139</td>
<td>2,977</td>
</tr>
<tr>
<td>Manitoba</td>
<td>38</td>
<td>683</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>6</td>
<td>294</td>
</tr>
<tr>
<td>Newfoundland and Labrador</td>
<td>27</td>
<td>299</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>14</td>
<td>504</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>3</td>
<td>65</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>42</td>
<td>553</td>
</tr>
</tbody>
</table>


Ontario is also an interesting case study to focus on due to the unique policy and public administration decisions the McGuinty government made to support the activities of its research and innovation ecosystem and enhance its innovation-enabling capabilities. As mentioned earlier, the Premier established Ontario’s first Ministry of Research and

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8 Gross expenditure on R&D includes all monies invested to support R&D performed within each province, from the government sector, business enterprises, higher education sector, private non-profits and foreign.
Innovation, and appointed himself the inaugural minister. This was a trailblazing move for Ontario, and Canada more broadly; indeed, no other province in Canada had ever created a ministry dedicated exclusively to advancing research and innovation, and no other premier had assumed a clear leadership role in this sector. This demonstration of "positional policy" (Aucoin, 1971) enabled the ministry to secure a position of relative independence from the other ministries and agencies. In this regard, MRI was empowered to use its authority to influence policy-making in order to advance its own mandate.\(^9\) Essentially, by naming himself the Minister of research and innovation, the Premier had signaled that innovation was a policy priority.\(^10\) Moreover, by redesigning the machinery of government to establish the province’s first ministry of research and innovation, the Premier altered the organizational design of the government apparatus to ensure the likelihood that innovation objectives established would be addressed.

No other Premier or Prime Minister in Canada had made such a bold and decisive set of administrative decisions, and McGuinty was keen on using his position to enhance the province’s reputation at a global level. As the Minister of Research and Innovation, the Premier was instrumental in raising awareness of Ontario’s research and innovation capacity at an international level. During the Liberal administration, Ontario was more aggressively marketed as a highly competitive, innovative region. In 2005 fDi magazine, published by the Financial Times, recognized Ontario as the “Canadian Province of the Future” at the Bio 2005 Conference in Philadelphia (MEDT, 2005c). In 2007, the Premier led a delegation of 300 people to BIO 2007, representing private sector companies, universities, municipalities

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\(^9\) Positional policies are government initiatives that alter the configuration of the power in the executive-bureaucratic arena in order to ensure that the leadership attains the desired position of power vis-à-vis other individuals or groups so that the government’s substantive policy priorities are addressed (Aucoin, 1971; Aucoin, 1988).

\(^{10}\) Aucoin (1986) points out that when new political leaders are elected to office, changes in the machinery of government typically follows as these new leaders seek to mould structure and process to their personal philosophies to leadership, management styles and political objectives (p. 3 – 4).
and medical research institutions. At the conference, the Premier announced his intentions to “tell the world that we have the people, the talent and the commitment to be a global leader in innovation – there really is no better place to do business” (MRI, 2007f). International recognition of Ontario’s research and innovation strengths provided the province with increased opportunities to forge research and innovation partnerships with other jurisdictions. Memoranda of Understanding were signed by the Premier and leaders from several different countries and regions including India, Japan, China, Catalonia and California (MRI, 2007e; MRI, 2007f).

1.3 **Observations, Analytical Limitations, Questions, Assumptions**

Once I decided to focus my research on Ontario, a number of observations were made during the early research stage of this dissertation. First, it was readily apparent that the majority of the new research and innovation funding initiatives created over the course of the McGuinty government’s two terms in office was delivered by the new Ministry of Research and Innovation. Several Ontario government ministries and agencies had innovation incorporated into their mandates and as such, also provided funding support for research and/or innovation initiatives across Ontario; these other governmental offices include the Ministry of Agriculture, Food and Rural Affairs, the Ministry of Economic Development and Trade, the Ministry of Energy, Ministry of Health and Long-term Care, the Ontario Media Development Corporation, and the Northern Ontario Heritage Fund Corporation. However, this study has limited its scope of analysis to the development of the suite of multi-year research and innovation funding programs delivered by the Ministry of Research and Innovation after 2005 as well as the programs established between 2003 and 2005 which the Ministry inherited after its creation in 2005.
A second observation was made regarding the type of funding programs MRI delivered between 2003 and 2011: the ministry had developed a suite of support initiatives comprised of more supply-side innovation policies rather than demand-side innovation policies. In the most recent innovation literature, instruments to drive innovation have been categorized as either supply-side innovation (i.e. technology push) or demand-side innovation (i.e. market pull) (OECD, 2014). In this dissertation, the distinction between supply-side and demand-side innovation policy provides the basis to demonstrate the degree to which Ontario’s research and innovation policy mix changed between 2003 and 2011. Supply-side innovation policy is defined as publicly sponsored initiatives designed to ensure that firms and research organizations have the resources and capabilities necessary for advancing research and innovation activities; these policies include public funding (direct and indirect) to support R&D in the public and private sectors, public support to venture capital funding, the creation of research infrastructure and investments in higher education and human resources. Between 2008 and 2011, more demand-side innovation policies were introduced into the suite of research and innovation funding programs. Demand-side innovation policy is defined as “a set of public measures to increase the demand for innovations, to improve the conditions for the uptake of innovations or to improve the articulation of demand in order to spur innovations and allow for their diffusion” (Edler, 2007; Edler, 2011: 179).

I observed that even though a greater number of demand-side innovation policies were introduced, and existing ones were strengthened after 2008, the supply-side bias in

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11 In Chapter 3, I explain that decision makers must select the appropriate balance of demand-side and supply-side innovation instruments that will realize the goals of their innovation strategy and reflect the strengths, weaknesses and opportunities of their jurisdictions. This dissertation will demonstrate that after the financial crisis, the Ontario government reassessed its economic and political goals, and attempted to implement a new innovation strategy that placed increased emphasis on intensifying innovation demand in order to realize a return on investments that had been made through supply-side innovation initiatives. In order to address this new priority, the government would have had to introduce more demand-side innovation policies. By using this supply-side and demand-side innovation distinction, the dissertation brings to bear the list of factors that constrained the governments’ efforts at changing the existing mix of policies, which essentially mitigated the level of success Ontario had in achieving its innovation goals by 2011.
MRI’s research and innovation policies remained up to 2011. Table 1.3 lists the supply-side and demand-side research and innovation programs this dissertation considers.

Table 1.3 Ontario’s Supply- and Demand-side Innovation Support Programs, created between 2003 and 2011, by date program announced

<table>
<thead>
<tr>
<th>Program</th>
<th>Date Program Announced</th>
<th>Demand- or Supply-side Innovation</th>
<th>Funding Details, 2004 - 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Research Commercialization Program</td>
<td>2004</td>
<td>(S) Supply-side program integrated into a demand-side framework, i.e. OCN</td>
<td>$31.4 million committed(^{12})</td>
</tr>
<tr>
<td>Ontario Research Fund – Infrastructure and Excellence(^1)</td>
<td>2004</td>
<td>(S) Supply side program, funding based on selected themes/focus areas</td>
<td>$368.6 million invested in ORF-RE $593.8 million through ORF-RI by 2011(^{14})</td>
</tr>
<tr>
<td>Ontario Commercialization Investment Fund</td>
<td>2004</td>
<td>(S) Supply</td>
<td>$36 million committed</td>
</tr>
<tr>
<td>Regional Innovation Network (RIN) program</td>
<td>2004</td>
<td>(D) Demand</td>
<td>$13 million was invested in 2005.(^{16})</td>
</tr>
<tr>
<td>Ontario Commercialization Network</td>
<td>2005</td>
<td>(D) Demand-side framework with supply-side programs</td>
<td>$13.8 million was invested in the OCN between 2006-07 and 2008-09(^{16})</td>
</tr>
<tr>
<td>Ontario Fuel Cell Innovation Program</td>
<td>2005</td>
<td>(D) Demand – systemic(^{17})</td>
<td>$3 million committed up to 2007-08</td>
</tr>
<tr>
<td>YSTOP</td>
<td>2005</td>
<td>(S) Supply – talent development; human capital support</td>
<td>$5 million was invested by 2010 to support 42 projects(^{18})</td>
</tr>
<tr>
<td>TSTOP</td>
<td>2006</td>
<td>(S) Supply – talent development</td>
<td>N/A</td>
</tr>
<tr>
<td>Early Researcher Awards</td>
<td>2006</td>
<td>(S) Supply</td>
<td>$79.5 million had been committed to 568 researchers by 2011(^{19})</td>
</tr>
<tr>
<td>Premier’s Awards Program: Catalyst, Discovery, Summit</td>
<td>2006</td>
<td>(S) Supply</td>
<td>$27.6 million invested by 2010(^{20})</td>
</tr>
<tr>
<td>Innovation Demonstration Fund (IDF)</td>
<td>2006</td>
<td>(S) Supply-side program</td>
<td>$80 million committed by 2010(^{21})</td>
</tr>
</tbody>
</table>


\(^{13}\) This program is fundamentally a supply side program. The matching component in ORF adds a demand element.


\(^{15}\) Ministry of Finance, 2005a: 110; ORIN, 2007


\(^{17}\) Includes lead market initiatives and cluster-promoting policy instruments. These policies feature demand-side policies with supply-side components.


In light of the timing of the introduction of more demand-side innovation policies, I assumed that the economic crisis of 2008 was the catalyst and also expected that other variables may have influenced the shift in MRI’s mix of policies. Altogether, these observations and assumptions informed the development of three supplementary research questions:

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Funding Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Readiness Program: IAF and BMEP</td>
<td>(S) Supply-side program, integrated into a demand-side framework, i.e. OCN</td>
</tr>
<tr>
<td>Post-Doctoral Fellowship Program</td>
<td>(S) Supply</td>
</tr>
<tr>
<td>International Strategic Opportunities Program</td>
<td>(S) Supply</td>
</tr>
<tr>
<td>Angel Network Program</td>
<td>(S) Supply</td>
</tr>
<tr>
<td>Ontario Venture Capital Funding</td>
<td>(S) Supply</td>
</tr>
<tr>
<td>Biopharmaceutical Investment Program (NGOIF)</td>
<td>(D) Demand-side program – lead market initiative</td>
</tr>
<tr>
<td>Ontario Tax Exemption for Commercialization</td>
<td>(S) Supply – R&amp;D tax credit</td>
</tr>
<tr>
<td>Ontario Network of Excellence</td>
<td>(D) Demand-side framework with supply-side programs</td>
</tr>
<tr>
<td>Ontario Emerging Technologies Fund</td>
<td>(S) Supply side program</td>
</tr>
<tr>
<td>Green Schools Pilot Initiative</td>
<td>(D) Demand - procurement</td>
</tr>
<tr>
<td>GreenFIT</td>
<td>(D) Demand - procurement</td>
</tr>
<tr>
<td>WaterTAP</td>
<td>(D) Demand-side program – lead market initiative</td>
</tr>
<tr>
<td>Business Ecosystem Support Fund</td>
<td>(D) Demand-side program - systemic</td>
</tr>
</tbody>
</table>

In light of the timing of the introduction of more demand-side innovation policies, I assumed that the economic crisis of 2008 was the catalyst and also expected that other variables may have influenced the shift in MRI’s mix of policies. Altogether, these observations and assumptions informed the development of three supplementary research questions:

• Why did Ontario’s suite of research and innovation policies have a predominantly supply-side innovation orientation between 2003 and 2011?

• Why were more demand-side innovation policies introduced during the Liberal government’s second term in office (i.e. 2008 and 2011), compared to its first term (i.e. 2003 to 2007)?

• What factors constrained the development of a mix of policies that is more demand-side innovation oriented?

During the early investigatory stages of this study, I also acknowledged that a variety of governmental and non-governmental stakeholders in Ontario held a range of interests, preferences and ideas regarding innovation and the innovation process. Despite the fact that many of them promoted different ideas about how government officials should allocate limited public resources in a way that would fully harness the province’s research and innovation potential, a number of individuals from a small selection of societal groups regularly participated in the policy-making process. I expected that the nature of state-societal relations between the members of Ontario’s research and innovation policy community would have a critical impact on the developmental trajectory of public policy.

1.4 Theoretical Approach and Analytical Framework

In order to address the aforementioned observations, questions, and critical assumptions, this dissertation advances a governance approach to policymaking. A governance approach brings to bear the complex, “pluri-centric” nature of policy making in a sector where governmental and non-governmental actors are involved (Kersbergen and Waarden, 2001: 22). It also draws attention to a number of behaviours and challenges associated with state-societal governance arrangements which ultimately impact policy development in sectors where multiple actors participate in the policy-making process. These behaviours and challenges include but are not limited to collaboration – the most constructive
relationship between civil society and the state (Korkut, 2007); the balancing of competing interests; the persistence of power struggles between societal and state actors; and the impact of uncertainty on decision making. This dissertation will demonstrate that policy networks are useful meso-level heuristics for conducting policy analysis at a sectoral level in order to explain the influence of governance arrangements on policy outcomes (Toke, 2010). In short, I have chosen policy network analysis as the best general theory to explain policy development for the research and innovation sector.

A “policy network” is defined here as “a set of relatively stable relationships which are of non-hierarchical and interdependent nature linking a variety of actors, who share common interests with regard to a policy and who exchange resources to pursue those shared interests acknowledging that co-operation is the best way to achieve common goals” (Borzel, 1998, 254). This study acknowledges three different approaches to policy network analysis, i.e. the structural approach, the interpersonal approach, and the diversified frameworks approach – and applies the tenets promoted by each of these approaches to demonstrate the extent to which the structure, agency and context of Ontario’s research and innovation policy network impacted policy development. An ideational approach to policy networks is employed to draw special attention to the power of ideas and their capacity to facilitate and constrain change in MRI’s suite of research funding programs over time.

1.5 Hypotheses

Using policy network analysis as an explanatory framework and bearing in mind the impact of ideas on the policy-making process, two hypotheses were developed.
Hypothesis 1:

The structure, context and agency of the policy network influenced the development of the Ontario Ministry of Research and Innovation’s mix of policies between 2003 and 2011.

Hypothesis 1 (H1) proposes that the relationship between the state and societal actors has explanatory power vis-à-vis policy outcome. More specifically, this hypothesis posits that the three dimensions of Ontario’s research and innovation policy network – the structure, context and agency – influenced the mix of policy instruments MRI established and delivered over the course of the McGuinty government’s term in office. To this end, the policy network is the independent variable and MRI’s mix of policies is the dependent variable.

In considering the nature of the policy network’s structure, the dissertation draws attention to the institutional parameters within which state and societal actors exist and the extent to which structural arrangements affect how these actors interact and their capacity to influence the policy-making process. This dissertation argues that Ontario’s research and innovation policy network most closely resembled a state pluralist arrangement – one in which (1) the state was “dominant” i.e. there was a high concentration of power situated in the state which meant a high level of state authority (capable of setting policy priorities) and (2) there was a large number of societal actors attempting to influence the policy making process.

In regards to the context of the policy network, the study limits its analysis to three contextual factors: the historical, political (i.e. ideological, institutional and cultural) and economic contexts. Hence, the dissertation explores the extent to which the historical legacy of the past provincial governments affected the development of research and innovation
policy between 2003 and 2011. By focusing on the influence of the historical context of the policy network, this study provides evidence of policy continuity and discusses the impact of path dependency on policy development. A focus on the economic context draws attention to the extent to which the state of the provincial economy (i.e. whether or not Ontario was in a recession) affected the decision-making process and it also brings to bear the impact that the state of the global economy had on policy outcome in Ontario. In considering the political context of the policy network, this study aims to demonstrate the extent to which the development of MRI’s suite of research and funding programs was influenced by the political ideology and goals of the ruling party; political culture; federalism; and opposition parties represented in the Ontario Legislature.

An examination of the agency of the policy network actors is critical for determining how key actors increased their chances of influencing policy. It discusses the set of strategic actions that government authorities and non-governmental research and innovation stakeholders employed to realize their interests and preferences. This dissertation draws attention to the interpersonal relationships that were established between different actors, the power struggles that persisted, and the scope of framing techniques and causal stories used by these agents. By focusing on the agency of the policy network, this dissertation helps to map out the set of actors who had a critical role to play in the policy-making process.

In terms of considering “the influence” that the policy network structure, context, and agency had on policy outcome, \( H_1 \) contends that these variables had an impact on the problem recognition and definition stage of the policy making process – that is, the agenda-setting stage – by conditioning the process by which an issue became defined as a problem and the extent to which that problem became important enough to be included on the government’s political agenda. As Howlett and Ramesh (2003) point out, “the manner and form in which
problems are recognized, if they are recognized at all, are important determinants of how they will ultimately be addressed by policy-makers” (p. 120). Moreover, I propose that these variables affected which set of policy alternatives (i.e. research and innovation funding programs) were expanded and/or introduced into MRI’s mix of policies. To this end, H₁ suggests that the policy network structure, context and agency affected the policy formation stage of the policy process, conditioning the design of the government’s mix of policies.³²

In short, H₁ was developed with the expectation of providing some insight into why MRI’s suite of research and innovation politics had a strong supply-side orientation as well as to help identify the factors that constrained the development of a more demand-side innovation oriented policy mix.

Hypothesis 2:

Research and innovation programmatic ideas that promoted a demand-side innovation approach became more acceptable to decision makers due to changes in the structure, context and agency of the policy network that occurred between 2008 and 2011; these changes influenced the balance of MRI’s policy mix.

This dissertation acknowledges that the economic crisis of 2008 had a marked impact on the environment in which participants in the policy-making process interacted as well as the capacity of these actors to actualize their interests and preferences. Changes in the economic and political contexts post-2008 were most readily discerned merely by reviewing government publications (i.e. Ontario Budgets and press releases). Indeed, due to declining growth rates and increased political pressure to realize a return on public investments made up to this point, MRI initiated a review of its political goals and policy instruments in the attempt to respond the new fiscal and political reality.

³² Howlett (2011) provides an overview of the process and outcomes of policy design.
Hypothesis 2 (H₂) proposes that shifts in the context, structure and agency of Ontario’s research and innovation policy network led to a new round of problem recognition and definition for MRI, and facilitated the introduction of more demand-side innovation policies. I presumed that during this new agenda-setting stage, agents (both within and outside of government) that promoted programmatic ideas that aligned with a demand-side innovation approach to policy development were successful at persuading decision makers that an alternative set of policies were more capable of resolving Ontario’s innovation problem/challenge. In turn, ideas are the independent variable, the policy network is the intermediary variable, and MRI’s mix of policies is the dependent variable.

To test this hypothesis, I had to demonstrate that the three dimensions of the policy network that existed during the government’s first term in office (i.e. 2003 – 2007) differed from those that were present during the government’s second term in office (i.e. 2008 – 2011). Secondly, I had to establish that a new round of problem recognition and definition had occurred that would have made one set of programmatic ideas (i.e. those that advanced a demand-side innovation approach) appear more suitable for addressing the post-2008 problem than another set of programmatic ideas (i.e. those that advanced a supply-side innovation approach). To this end, H₂ is aimed at responding to this study’s second supplementary research question by demonstrating that the legitimization of programmatic ideas that promoted a demand-side innovation approach to policy development post-2008 drove the government’s decision to introduce more demand-side innovation policies.

1.6 Data Collection

Several different research sources informed this dissertation including academic and non-academic literature on research and innovation; provincial and federal government
documentation; participation in meetings and conferences organized by various members of the province’s research and innovation ecosystem; and, interviews.

A broad range of archived government documents was used to verify the government’s stance on different political and economic issues and to confirm public research and innovation funding allocations; some of these publications included the annual *Speech from the Throne*; annual and special reports released by the Ministry of Research and Innovation; annual reports and publications from the Ontario Ministry of Finance, including the *Public Accounts of Ontario*, the *Ontario Budget*, and the *Ontario Economic Outlook and Fiscal Review*; and several years of press releases from different ministries and the Office of the Premier. Hansard searches conducted were useful for referencing research and innovation-related proceedings that took place during standing committees hearings and Question Period at the Ontario Legislative Assembly. Publications produced by a spectrum of institutional stakeholders (e.g. individual universities and colleges, MaRS-Medical and Related Sciences, the Ontario Centres of Excellence, the Institute for Competitiveness and Prosperity), organized groups, and associations (e.g. the Council of Ontario Universities, the Council of Academic Hospitals of Ontario, Colleges Ontario, Ontario Chamber of Commerce, the Council of Canadian Academies) were also reviewed.

Given the expansive membership of Ontario’s research and innovation ecosystem, every effort was made to interview a wide representation of individuals from different sectors of the economy. Fifty-one semi-structured elite interviews with research and innovation actors across the province were conducted over the phone or in-person. All informants were guaranteed confidentiality and anonymity. Two schedules of questions were created – one for governmental informants and the other for non-governmental informants. A copy of the questionnaire was forwarded to the interviewee beforehand, upon request.
Interviewees were drawn from a number of sectors and subgroups across Ontario including universities\(^{33}\), colleges, hospitals, the Ontario Ministry of Research and Innovation, the Ontario Ministry of Finance, the Ontario Research and Innovation Council, the Ontario Commercialization Network Review Panel, the Ontario Network of Excellence (Interviewees included senior representatives from various regional innovation networks, MaRS, and the Ontario Centres of Excellence), financial investor groups, advocacy groups representing the university and college sectors, incubators and accelerators, private consultants, and the federal government (Interviewees included senior representatives from the research tri-councils of Canada and Industry Canada). Fortunately, a number of informants were affiliated with multiple research and innovation sectors and/or had served more than one institution, association or government-commissioned advisory body between 2003 and 2011.\(^{34}\) Interviews with individuals with this breadth of experience were structured to obtain feedback that reflected the full range of knowledge and understanding these persons acquired when serving in their various roles.

Data were also collected while attending conferences and meetings organized by different governmental and non-governmental stakeholders. Given that the researcher directly participated in some of the events mentioned in this study,\(^{35}\) to reduce researcher bias, a conscientious effort was made to verify the outcome of these events by referring to archived public documentation and consulting with interviewees.

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\(^{33}\) Many of these interviewees were members of the Ontario Council of University Research.

\(^{34}\) For example, hypothetically speaking, between 2003 and 2011, an interviewee with experience developing his/her own technology-based company may have worked for a college for several years, then moved on to work in the technology transfer office of a university and may have also served on one or more of the provincial government’s advisory councils as a result of his/her experience in the research and innovation space.

\(^{35}\) The researcher worked as a policy analyst at the Ontario Confederation of University Faculty Associations (2005-2006; 2009) and a research analyst at the Council of Ontario Universities, supporting the activities of the Ontario Council on University Research (2006-2008).
1.7 Contributions of this Thesis to the Literature

The thesis makes several contributions to the public policy and innovation literatures. Firstly, it demonstrates the value of integrating micro-level explanations of human behaviour and macro accounts of the state and the political economy, using a meso-level concept – that is, policy networks – in order to provide a better understanding of the dynamism of the policy making process at a sectoral level. Secondly, the study establishes an explicit link between network models and models of the policy process – and more specifically between the policy network approach and the pre-decision stages of policy development – to demonstrate the extent to which an analysis of the context, structure and agency of policy networks can help to explain how issues become recognized as problems; why some efforts at problem definition are more successful than others; and, the extent to which the problem definition process influences the design of policy/policy mixes. Thirdly, in line with the ideational literature, this dissertation underscores the value of applying an ideational approach to policy network analysis in order to explain policy change. In doing so, the study demonstrates that ideas have explanatory power and as such, an analysis of the impact of ideas on policy outcomes is important (Kisby, 2007; Berman, 1998). Moreover, the Ontario case study contributes to the literature on policy network analysis and policy change by demonstrating the explanatory power of policy networks as an independent variable (as in the case of H₁) capable of sustaining policy continuity and as an intervening variable (as in the case of H₂) capable of conditioning policy change.

This dissertation also contributes to the innovation literature by showcasing a range of policies and practices regional governments may employ, with a focus on Ontario. The study also discusses the breadth of funding instruments and other policy initiatives regional decision makers have established to provide public support for research and innovation actors.
and maximize a return on those investments. To this end, the dissertation is intended to contribute to policy learning by raising awareness of the policy options available to decision makers as they search for policy solutions that address the multifarious social and economic challenges affecting their economies.

One of the single most important contributions this dissertation makes to the innovation literature is that it focuses on the pre-decision stages of innovation policy development, i.e. the agenda-setting and policy design/policy formation stages. Most studies in the innovation policy literature focus on policy outcome, paying little attention to the policy process, and in particular, the complex web of interaction that occurs between different innovation actors, communities and organizations as they seek to influence the important early stages of policy development. This is an unfortunate oversight in the innovation literature, and somewhat ironic omission, given that innovation itself is such a highly social and interactive activity. This dissertation focuses squarely on the process of innovation policy development and in doing so, it aims to fill an existing gap in the innovation policy literature.

1.8 Outline of Thesis

This dissertation is organized into nine chapters. Chapter 2 discusses the value of employing a governance approach in order to better understand research and innovation policy development and it presents policy network analysis as the ideal explanatory framework for discussing policy development in Ontario between 2003 and 2011. Moreover, it seeks to demonstrate the importance of considering how the structure, agency and context of a policy network impact policy outcomes and the influence that ideas can have on policy development.
Chapter 3 reviews the innovation literature to discuss why, when and how governments intervene in the innovation process. It includes a synopsis of the mix of innovation policy instruments decision makers may develop to address their jurisdiction’s innovation problems, and special attention is paid to the development of demand-side and supply-side innovation policies intended to drive innovation-based economic growth. The chapter ends with a discussion on the value of employing an innovation ecosystem approach in order to establish a “smart” policy mix – that is, innovation policy that is strategic, integrated and place-based.

Chapter 4 examines the historical evolution of policies aimed at supporting Ontario’s research strengths, driving commercialization and advancing innovation between 1971 and 2003. The chapter demonstrates the influence of state-societal relations on policy development and explores the extent to which different political, economic and historical factors conditioned the province’s policy development trajectory over time.

Chapter 5 presents the story of research and innovation policy development between 2003 and 2011. It provides a detailed account of the breadth of institutions and policies that were created to advance an innovation agenda across Ontario. This chronological review is intended to underscore the messy, unpredictable nature of the policy process.

Chapter 6 introduces the set of actors and ideas that had a prominent influence on the development of research and innovation policy in Ontario between 2003 and 2011. In particular, this chapter discusses the different ways key actors defined Ontario’s “innovation problem” and highlights the challenge of developing policy in an environment where conflicting perceptions of innovation and the innovation process compete to influence the policy process.
Chapters 7 and 8 focus on the policy formation stage of MRI’s research and innovation funding programs. Chapter 7 demonstrates the extent to which the context, structure and agency of the policy network influenced the development of the ministry’s research and innovation support programs and ultimately helped to preserve a supply-side innovation orientation mix of policies between 2003 and 2007. Chapter 8 shows how programmatic ideas that promoted a demand-side innovation orientation became more acceptable to decision-makers due to changes in the policy network post-2008. It is argued that these changes in the policy network influenced the introduction of more demand-side innovation policies into MRI’s mix of policies.

Chapter 9 revisits the three supplementary research questions of this dissertation. An epilogue is included to discuss the political and economic shifts that occurred between 2011 and 2013 to determine the extent to which these changes impacted Ontario’s research and innovation ecosystem and policy development. The chapter ends with a critique of the current mix of research and innovation policy initiatives and a reflection on the future of research and innovation policy development in Ontario.
Chapter 2
A Framework to Explain Research and Innovation Policy Development in Ontario: Policy Networks and Ideas Matter

2.0 Introduction

A governance approach to the policy-making process provides innovation analysts with a sophisticated understanding of research and innovation policy development. In particular, it offers “an analytical language” to identify, examine and interpret the dynamic relationships that exists between the state and civil society in the policy development process (Creutzberg, 2006: 12). Policy Network Analysis (PNA) is situated in the governance literature and acts as an ideal explanatory framework for discussing the development of research and innovation policy in Ontario between 2003 and 2011. This chapter reviews the governance approach and discusses (1) how the structure, agency and context of a policy network influence policy outcomes and (2) the impact of ideas that policy network actors promote in their efforts to influence policy development, particularly during the pre-decision stages of the policy process.

2.1 A Governance Approach

The literature on governance has benefited from the contributions of scholars across several disciplines including economics, political science, public policy, international relations, organizational studies, law, business administration and sociology (Kersbergen and van Waarden, 2004; Stoker, 1998). Kersbergen and van Waarden (2004) point out that each one of these disciplines defines “governance” differently, though there are a number of core features scholars of the governance approach generally promote (p. 17). The authors summarize those commonalities below (p. 151 – 152):
First of all, the approach is pluricentric rather than unicentric. Second, networks, whether inter- or intra-organization, play an important role. These networks organize relations between relatively, autonomous, but interdependent, actors...In these networks, hierarchy or monocratic leadership is less important, if not absent. The formal government may be involved, but not necessarily so, and if it is, it is merely one – albeit an important – actor among many others. Third, one finds an emphasis on processes of governing or functions as against the structures of government. These processes are relatively similar in the public and private sectors, and concern negotiation, accommodation, concertation, cooperation and alliance formation rather than the traditional process of coercion, command and control. Fourth, the relations between actors pose specific risks and uncertainties, and different sectors have developed different institutions to reduce these in order to make cooperation possible or easier. Finally, many approaches are normative. They prescribe an ideal as well as an empirical reality.

One of the most noteworthy features of governance is the dynamic, interactive relationship that exists between state and societal actors involved in the policy-making process. Neo and Chen (2007) underscore the dynamism of governance by drawing attention to the way in which “chosen paths, policies, institutions and structures adapt to an uncertain and fast changing environment so that they remain relevant and effective in achieving the long-term desired outcomes of a society” (p. 52). Torfing et al (2012) also discuss the interactive nature of governance. By focusing on the role and impact of interactive forms of governance, the authors define governance as “the complex process through which a plurality of social and political actors with diverging interests interact in order to formulate, promote and achieve common objectives by means of mobilizing, exchanging and deploying a range of ideas, rules and resources.” Interactive, dynamic governance best describes the nature of the relations that existed between Ontario’s state and societal actors as they sought to develop research and innovation policy between 2003 and 2011. As such, this conceptualization of governance is applied to examine the first two stages of the policy-making process in order to draw attention to the dynamics of the pre-decision stages of policy development.
A number of political science and public policy scholars acknowledge that networks play an important role in organizing government and societal actors as they attempt to work collaboratively towards understanding economic and social issues, identifying problems, selecting the set of policy alternatives for addressing those problems, implementing policy/policy instruments, and evaluating the performance of those policies (Kersbergen and van Waarden, 2004; Torfing et al., 2012). However, in light of myriad complementary and diverging interests and ideas that exist between these actors, networks are at once both sites of collaboration and power struggles. Policy network analysis (PNA) is useful for examining the dynamic, interactive governance arrangements that develop in sectors like research and innovation that are characterized by a dense network of government and non-governmental actors working towards influencing the policy process.

2.2 Policy Network Analysis

The “roots” of policy network analysis lie in the examination of power sharing between public and private actors (Rhodes, 2006). Scholars who study this state-societal dynamic have expanded the conceptual toolbox to include key terms such as epistemic communities (Haas, 1992), policy communities (Richardson and Jordan, 1979), policy subsystems, iron triangles (Lowi, 1969), issue networks (Heclo, 1978) and policy networks. The concept policy network was first used to describe a model of state-interest group intermediation, though it has evolved to a major construct in theorizing around the policy process (Skogstad, 2008). Over time, public policy students have conceptualized the term differently, and to date, there is very little agreement on the nature and role of policy networks (Marsh and Smith, 2000). However, as Borzel (1998) suggests, it is widely accepted that a policy network may be defined as “a set of relatively stable relationships which are of non-hierarchical and interdependent nature linking a variety of actors, who share
common interests with regard to a policy and who exchange resources to pursue those shared interests acknowledging that co-operation is the best way to achieve common goals” (p. 254). Policy network analysis provides answers to critical questions about governance like, “Who rules?”; “How they rule?” and “In whose interest do they rule?” (Rhodes, 1997, 10; Skogstad, 2005, 2). In order to address these questions, it is important to first distinguish between the “policy community” and the “policy subsystem” and secondly, clarify how these components relate to policy networks. According to Coleman and Skogstad (1990), a policy community “includes all actors or potential actors with a direct or indirect interest in a policy area or function who share a common ‘policy focus,’ and who with varying degrees of influence shape policy outcomes over the long run” (p. 25). The policy community is subdivided into two segments: the sub-government and the attentive public. The attentive public is comprised of individuals who have an interest in a particular policy and may attempt to influence policy development, though not on a regular basis. On the other hand, the sub-government includes the group of state and societal actors that makes policy (Coleman and Skogstad, 2009: 25). It is suggested that the term policy network “captures the power relationship among the actors in the sub-government of [a given] policy community” and in turn distinguishes between those who play a more hands-on role in policy development and those who are more removed from the process (Skogstad, 2008, 208; Coleman and Skogstad, 1990). This dissertation focuses on the interaction that takes place at the sub-government level.

2.2.1 Policy Networks – Structure, Context and Agency Matter

Over the years, students of policy network analysis (PNA) have endeavoured to explain the emergence and evolution of policy networks as well as demonstrate how these state-societal relations influence policy outcomes. As such, different approaches to the study
of policy networks have been established in the effort to identify how and why policy networks develop and to attribute explanatory power to them. The structural approach (Marsh and Rhodes, 1992; Coleman and Skogstad, 1990; Atkinson and Coleman, 1989) and the interpersonal/strategic-relational approach (Thatcher, 1998) are the most prominent within the policy network literature. However, these structural-focused and agency-centred approaches to policy networks have been criticized for prioritizing one dimension of the policy network over the other, thereby perpetuating an “artificial and polarizing dualism” (Hay, 1998: 42) between structure and agency that ultimately mitigates the explanatory power of the policy network concept (Marsh and Smith, 2000: 5). Some scholars have responded to these and other criticisms by promoting the diversification of policy network analysis (Thatcher, 1998). The sections below not only confirm the value of both approaches, but also promote the importance of considering additional variables that influence the policy process that the two other approaches do not (sufficiently) account for.

- **The Structure of the Policy Network Matters**

  Marsh and Smith (2000) explain that policy networks are structural because they “define the roles which actors play within networks; prescribe the issues which are discussed and how they are dealt with; have distinct sets of rules; and contain organizational imperatives [that help] to maintain the network” (p. 5). Scholars that advance this approach to policy networks point out that the structure of the policy network will have a major impact on democratic access to the policy process and the likelihood of policy change (Coleman and Skogstad, 1990, 2; Atkinson and Coleman, 1989; Marsh and Rhodes, 1992). For the purpose of this dissertation it is important to emphasize that the structural attributes of the policy network condition the extent to which actors are successful in raising an issue onto the
political agenda and problematizing that issue. Moreover, the structure of the policy network affects the ability of these actors to influence the selection of policy alternatives.

Howlett et al (2009) identify two key variables that shape the structure of policy networks: the number and type of the network’s membership and the question of whether state or societal members “dominate” the networks’ activities and interaction. In cases where the state is dominant and there are only a few actors, a state corporatist network exists. If there are many societal actors, yet the state remains dominant, a state pluralist network exists. In instances where a few societal actors dominate, these networks are classified as social corporatist, whereas in social pluralist networks, a large number of societal actors dominate. Table 2.1 presents Howlett et al’s taxonomy of policy networks.

Table 2.1 A Taxonomy of Policy Networks

<table>
<thead>
<tr>
<th>Number of Members</th>
<th>Few</th>
<th>Many</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominant Actor</td>
<td>State Corporation Networks</td>
<td>State Pluralist Networks</td>
</tr>
<tr>
<td></td>
<td>Social Corporation Networks</td>
<td>Social Pluralist Networks</td>
</tr>
</tbody>
</table>

In applying Howlett et al’s approach to the study of Ontario’s research and innovation policy process, it is apparent that a state pluralist network existed between 2003 and 2011. Firstly, Ontario’s policy network was comprised of a large number of actors and the membership was diverse; it consisted of stakeholders from different sectors of the economy, including the research community (i.e. universities, colleges, hospitals and other research institutes), private investors, private firms, innovation intermediaries, etc. Chapter 6 provides details on the composition of each stakeholder group and the different and often competing interests and ideas these societal groups promoted.
Secondly, the Ontario government was the dominant actor within the policy network. To measure the dominance of the state, two variables are considered: state authority and state autonomy. State authority is defined as “the degree to which ultimate decision-making power is concentrated in the hands of a relatively small number of officials” (Atkinson and Coleman, 1989: 51). Atkinson and Coleman (1989) contend that in instances when a single agency or bureau dominates relations in a given sector, a high concentration of decision-making power is attainable. In Ontario’s case, decision-making power resided with the state and was facilitated by senior officials from the Ministry of Research and Innovation. Chapters 7 and 8 discuss the integral role state actors played in ensuring a high concentration of decision-making power. State autonomy refers to the degree of independence government officials have from societal groups when they formulate policy objectives (Coleman and Skogstad, 1990: 15). An autonomous state is capable of diagnosing societal problems and generating policy alternatives that are not merely a reflection of societal interests, preferences or demands (Ibid.; Weiss, 1998; Atkinson and Coleman, 1989). According to Weiss (1998), autonomous government decision making “is largely (though never perfectly) insulated from clientelistic political pressures, and from the plurality of special interests that in most liberal democracies tend to privilege the politics of distribution over the politics of growth” (p. 203). As such, the “insulation” or autonomy of the state/bureaucracy from domination by private interests is critical for ensuring that government agencies will pursue initiatives broader than the interests of a particular group (Weiss, 1998: 50). Atkinson and Coleman (1989) provide a list of conditions that impact the degree of state autonomy that might exist at the sectoral level (p. 52):

1. The bureau involved should have a clear conception of their role and a value system consistent with and supportive of that mandate. Strong political support for the bureau’s role is critical: bureaucrats and elected representatives should cooperate easily.
2. Where bureaucrats are charged with conveying and interpreting the demands of clientele groups, they should possess a professional ethos distinct from that prevailing among professionals in society at large. A bureau with a functional mandate rather than a clientele mandate will have an easier time at remaining autonomous.

3. Individual bureaus will be more autonomous when they administer a corpus of law and regulation that defines their responsibilities and those of societal groups. These rules will not be subject to negotiation, either in their interpretation or implementation.

4. Bureaus will be more autonomous when they generate the information – technical or otherwise – that they need to pursue their mandate. Information may still be collected from firms and associations, but the autonomous bureau will possess in-house capacity to evaluate and employ this information.

Weiss (1998) also points out that state autonomy may also be demonstrated in two other ways. Firstly, she notes that greater centralization of power – or concentration of authority – enhances a state agency’s autonomy. Secondly, Weiss suggests that an autonomous state is more likely to have the ability to structure access points for particular groups and deny access to others which increases its level of control on which set of groups will participate in the decision-making process. Chapters 7 and 8 will show that the Ontario government remained the dominant actor within a policy network where there was a broad and not overly coordinated array of special interests. However, the state’s autonomy was limited by an influential, well-organized and highly mobilized societal group: the Ontario universities, a sub-group of the research community.

In this dissertation, the dominance of the universities relative to the other societal actors is determined by considering the extent to which some societal actors were more capable of organizing and mobilizing to promote their interests. To measure stakeholders’ level of societal mobilization, two properties are considered: (a) the degree to which the interest organization could order and coordinate a range of complex information and activity so as to develop a position on a policy question and (b) the degree that an interest
organization was sufficiently autonomous from members (Coleman and Skogstad, 1990: 21). In the first case, Coleman and Skogstad (1990) explain that individual societal members may belong to an associational system, i.e. a collection of associations that mobilize to represent organized interests. An associational system capable of impacting the policy process must reflect the range of issues that are important to the individual members and to provide the specialized information needed to inform the development process of highly technical policy issues, particularly at the agenda-setting stage. Moreover, at the agenda-setting stage, an influential associational system must be able to coordinate and integrate the diverse interests of their membership and transcend special interests (Coleman and Skogstad, 1990, 21). Coleman and Skogstad also point out that a well-developed, highly mobilized associational system has a horizontal division of labour where individual associations in the associational system represent different products, service groups or territories, there are no overlapping organizations and no gaps in representation, one association can speak for the sector and there is considerable in-house capacity to generate information, both technical and political. Chapters 7 and 8 discuss the organizational development of Ontario’s civil society and explain how it impacted the efforts of non-governmental actors to influence the pre-decision stage of research and innovation policy development. Most notably, these chapters demonstrate the extent to which the universities capably mobilized to ensure that their interests were reflected during the policy process. Refer to Appendix 2.1 for a list of questions that were used to assess the organizational development of societal actors as well as the state’s level of authority and autonomy.
In order to show how the structure of the policy network “matters,” it is worth discussing the impact that it has on policy outcome. According to Adam and Kriesi (2007), the structure of policy networks may determine (a) the potential for policy change (i.e. high, moderate, or low potential) and (b) the form of policy change (i.e. incremental or rapid/serial). Table 2.2 summarizes how the distribution of power and the nature of the interaction between policy network actors can influence policy development.

<table>
<thead>
<tr>
<th>Distribution of Power</th>
<th>Type of Interaction</th>
<th>Conflict</th>
<th>Bargaining</th>
<th>Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration</td>
<td>Moderate potential for rapid (serial) shift</td>
<td>Low to moderate potential for incremental change</td>
<td>Low potential for change – maintenance of status quo</td>
<td></td>
</tr>
<tr>
<td>Fragmentation</td>
<td>High potential for rapid (serial) shift</td>
<td>Moderate to high potential for incremental change</td>
<td>Low to moderate potential for change – maintenance of status quo</td>
<td></td>
</tr>
</tbody>
</table>


Markedly, in cases where the policy network is characterized by a high concentration of power, and where there is ongoing bargaining or negotiation between the state and societal actors, policy change is likely to be incremental, and the likelihood of change is low to moderate. This dissertation will demonstrate the extent to which a state pluralist network influenced policy outcome, and in particular, contributed to incremental policy change between 2003 and 2011, thereby allowing Ontario to maintain a more supply-side innovation oriented mix of policies.

- The Agency of Policy Networks Matter

Agency within the policy network also influences the policy process and policy outcome. Proponents of this approach to policy networks propose that policy is a product of

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36 N.B. Adam and Kriesi (2007) do not indicate whether the concentration of power is held by either state or societal actors (p. 145).
the complex interactions between partly interdependent and partly autonomous state and societal actors (Thatcher, 1998, 398; Knoke et al., 1996:6). To this end, policy network actors are linked horizontally, though they do not belong to a single organizational hierarchy (Thatcher, 1998: 398). Furthermore, the relations between the actors – which feature conflict and cooperation – are based on resource and information exchange (Thatcher, 1998, 399). Variability in actors’ access to resources and information affects the capacity of actors to act on their interests, which ultimately influences policy outcome (Skogstad, 2005). Dowding (1995) discusses a range of bargaining strategies, power resources, and coalition possibilities actors use to influence the policy process (p. 145 – 146). He points to five different “bargaining resources” actors may employ: (1) knowledge or information; (2) legitimate authority; (3) unconditional incentives to affect the interests of others; (4) conditional incentives to affect the interest of others; (5) reputation. The author maintains that it is more productive for an analyst to focus on these variables in order to explain outcomes rather than the different types of networks.

Notably, an agency-focused approach is useful for examining the kinds of strategies policy network actors use and the strategic alliances they forge in order to increase the likelihood of having their interests and preferences met. To this point, Hay promotes a “strategic-relational approach” to networks which applies a theory of collective strategic action to the social practice of networking (Hay, 1998, 35 – 36). Given that this approach places an emphasis on constructivism, the analyst can glean a better understanding of why policy develops the way it does by drawing attention to the scope of causal stories37 (Stone,

37 Stone (1989) defines causal stories as the stories policy makers compose to describe harms and difficulties, attribute them to the actions of other individuals or organizations, and in turn, claim the right to invoke government action to stop the harm (p. 282).
1989), framing\(^{38}\) (Druckman 2004; Chong and Druckman, 2007), springboard stories\(^{39}\) (Denning, 2001), etc. that network actors use in their efforts to define a problem, raise it to the attention of government officials and influence how government officials interpret that problem. The strategic-relational approach also brings to bear the extent to which strategic exchanges affect the development of trust between political actors and facilitate some degree of learning even during the pre-decision stages of policy development (Wolfe, 2002). Overall, the agency of the policy network actors is an important element that must be considered when assessing the range of variables that influence policy development (Dowding, 1995). This dissertation pays special attention to the strategic actions of political actors, the range of strategic alliances that emerge and the power struggles that occurred with Ontario’s research and innovation policy network between 2003 and 2011. Refer to Appendix 2.2 for a list of questions that were developed to assess the agency of Ontario’s research and innovation policy network.

- Other Variables Matter – The Diversified Approach

A number of scholars have sought to diversify the PNA approach in order to address the problem of privileging agency and/or structure; these researchers draw attention to other components of the policy network that also have a significant influence on policy outcome. To this end, the diversification of policy network approaches entails broadening the scope of analysis vis-à-vis policy networks (Thatcher: 404). For instance, some scholars have drawn attention to the impact of environmental factors on policy outcomes to show how shifts in the economic conditions of a given polity can modify the structure of a policy network and/or the agency of its actors, and in turn, influence policy development. As such, the context within

\(^{38}\) Druckman (2004) defines framing as the act of using phrases to cast the same information in either a positive or negative light in order to alter individuals’ preferences (p. 671).

\(^{39}\) According to Denning (2001), springboard stories increases an audience’s enthusiasm and understanding of how an organization, complex system, or community may change and grow.
which the policy network is situated is deemed to be an important factor in influencing policy
development and change. Context may include the political institutional context, the
economic context, cultural and historical context of a policy network. As stated in Chapter
1, this dissertation will assess the influence of Ontario’s research and innovation policy
network context by focusing on its political (institutional and cultural), economic, and
historical dimensions.

Policy development in Ontario’s research and innovation sector is complex and in
flux. In an effort to determine how policy change occurred and why the province’s research
and innovation policy developed the way that it did between 2003 and 2011, this study also
examines the ways in which actors used ideas to influence decision-making.

2.3 Ideas, Policy Networks and Policy Outcome

A number of scholars have discussed the critical role ideas play in the policy making
process and the impact that they have on policy outcome (Heclo, 1994; Hall, 1993; Berman
2001; Blyth, 2002; Campbell, 1998; Campbell, 2002). However, few have attempted to
demonstrate the complex relationship between a dynamic policy network, ideas and policy
outcome. Kisby’s ideational approach to the “dialectical” model of policy networks attempts
to address this gap. His analysis is undergirded by a critical realist perspective to policy
making; he underscores the interactive relationship between ideas and material factors (i.e.
the structural, agency and contextual components of the policy network) in order to argue
that not only do ideas establish our understanding of the real world, but material factors also
exert an influence on ideas in so far as they constrain or facilitate the extent to which actors

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40 Thatcher (1990) includes ideas as part of the set of environmental factors that have been added to network analyses
(p. 405). This dissertation does not include ideas as an “environmental” factor. In line with Kisby (2007), this cognitive
dimension of policy networks is recognized as distinctly different from its contextual variables (p. 78-80; 82).
can actualize their ideas, and ultimately influence the policy process (p. 82). Moreover, he discusses the interactive relationship between ideas and the network to demonstrate how agents use and accept ideas in new ways, as well as introduce new ideas themselves (p. 83). Kisby suggests that this dynamic can help to explain how and why new policies are introduced.

While the dissertation is not intended to apply Kisby’s rather complex model to explain policy development in Ontario, his work makes it difficult to ignore the interactive, iterative relations between ideas and the policy network (i.e. its structure, context and agency) that persisted between 2003 and 2011, which in turn had a significant impact on how Ontario’s research and innovation policy was developed. More specifically, these dynamics influenced how, when and why certain issues were raised onto the political agenda. To this point, changes in the policy network that occurred between this timeframe made some ideas more attractive to decision makers than others. Indeed, these dynamic relationships influenced how and why some issues became defined as problems worthy of government intervention, while others did not. Furthermore, focusing on the iterative relationship between the network (and its components) and ideas helps to determine which set of ideas informed the selection of policy alternatives that decision makers deemed most effective for addressing the innovation problem as they had defined it. These points will be discussed in the conclusion of the dissertation as part of the findings of this study.

2.3.1 Programmatic Ideas and the Pre-Decision Stages of Policy Development

Kisby’s decision to focus on programmatic beliefs/programmatic ideas – as opposed to another type of idea – in order to advance his ideational approach to PNA is worth discussing in more detail. The ideational literature identifies a variety of ideas which may influence the policy making process (Campbell, 2002; Campbell, 1998; Schmidt, 2008). For
instance, *cognitive paradigms, world views, public sentiments, and philosophical ideas* exist at the ideological/paradigmatic level and represent broad assumptions about how the world works. These ideas are defined as “taken-for-granted descriptions and theoretical analyses that specify cause and effect relations that lie in the background of policy debates”; they help actors determine desirable policy action and constrain the range of policy choices decision makers may consider when formulating public policy (Campbell, 2002). On the other hand, *policy ideas* represent the policy solutions that are proposed by policy makers (Schmidt, 2008; Beland and Cox, 2010). Berman (2001) contends that these set of ideas are too narrow for an “interesting”, fulsome explanation of how ideas impact policy outcome (p. 21).

Alternatively, *programmatic ideas* exist at the meso level of analysis and they are used by political actors to define the problems to be solved; the issues to be considered; the goals to be achieved; as well as the norms, methods and instruments to be applied (Schmidt, 2008).

During the early stages of the policy process, competing programmatic ideas offered up by different political actors emphasize different aspects of the problem that decision makers recognize and identify as legitimate. In turn, political argumentation is most diverse and discernible during the agenda-setting and policy formation stages (Beland and Cox, 2010). This dissertation will focus on the early stages of the policy process to identify the range of competing programmatic ideas different political actors promoted as well as the various strategies actors employed to draw decision makers’ attention to a policy problem, influence the interpretation of that problem and impact the selection of policy alternatives decision makers deemed appropriate for resolving the identified policy problem(s).

### 2.4 Summary of Theoretical Approach

Overall, policy networks and ideas are useful heuristics for explaining policy stability and change. As mentioned in Chapter 1, this study of research and innovation policy
development in Ontario will analyze how the policy network’s structure, agency and context influenced the development and resilience of a supply-side innovation oriented suite of research and innovation policy instruments. It will also demonstrate how changes in the policy network over time made some programmatic ideas more attractive than other ideas, and as such were critical for shifting the balance of Ontario’s mix of research and innovation policy instruments between 2008 and 2011. Hence, by analyzing the early stages of policy development – i.e. agenda-setting and the selection of policy alternatives – and focusing on the interaction between the policy network and ideas, this dissertation will explain how and why some political actors were successful in influencing research and innovation policy development in Ontario between 2003 and 2011; why decision makers chose one set of policy alternatives over others; and how policy actions were legitimized.

The following chapter draws attention to the fact that there are many different and competing versions of research and innovation policy development – there is no blueprint for policy development in this sector. Governments have many options available to them regarding their choice of policy mix, and there are several possibilities for analyzing the government’s approach, including remedying the “market failure” approach, the systems approach and the demand- vs. supply-side innovation approach. Chapter 3 discusses each of these approaches in turn, and pays particular attention to the demand-side vs. supply-side innovation approach to analyzing innovation policy development in Ontario. By using the demand-side/supply-side innovation policy distinction, the dissertation brings to bear the challenges leading jurisdictions like Ontario face in developing a policy mix that will enable decision-makers to achieve their political and economic goals in an ever-changing, highly competitive sector.
Chapter 3
Public Policy Intervention and the Challenge of Finding a “Smart” Policy Mix

3.0 Introduction

As new knowledge and technologies are rapidly deployed across emerging and high growth sectors, government officials from leading jurisdictions have become increasingly focused on ensuring that the researchers, innovators, entrepreneurs and other private sector actors who drive this innovation-oriented activity are well supported and integrated into an established innovation ecosystem. Hence, answers to the question, “Why, when and how should government intervene in the innovation process?” is of paramount importance to decision-makers worldwide. Over the years, innovation scholars have provided a range of perspectives regarding the policy-makers’ role in advancing research and innovation, and as such, the innovation literature has grown to include theories of government participation in the innovation process, competing models of innovation policy, as well as frameworks for determining the mix of innovation policies and policy instruments a government should establish to support R&D and commercialization.

The following chapter reviews the innovation literature to discuss why, when and how governments intervene in the innovation process. The sections below focus on the mix of innovation policy instruments decision-makers may establish to address their respective innovation problems and discuss the rationale behind these policy choices. Special attention is paid to the development of demand-side and supply-side innovation policies intended to drive innovation-based economic growth and the challenge policy-makers face in creating a balanced policy mix that is suitable to their respective jurisdictions. The chapter ends with a
discussion on the value of employing the innovation ecosystem approach to establish a “smart” policy mix – i.e. innovation policy that is strategic, integrated and place-based.

### 3.1 Why and when should government intervene?

*Government intervention* in the innovation process is defined as the “mechanisms through which the government deliberatively influences resource allocation decisions in order to facilitate technology development and commercialization” (Salmenkaita, J. and Salo, 2002: 184). A number of innovation theorists and researchers have offered two basic rationales for government intervention: (1) to address market failure and (2) to address systemic problems or failures (Charminade and Edquist, 2010; Reid, 2011; Lipsey and Carlaw, 1998). According to Charminade and Edquist (2010), these rationales are partially based on how policy-makers conceptualize innovation at a given point in time and are aligned with one of two economic of innovation theories: neoclassical and evolutionary-systemic theory.

#### 3.1.1 Government Intervention to Address Market Failure

Before the 1980s, innovation was largely synonymous with research and invention (Boekholt, 2010). Theorizing about the innovation process was premised on the *linear model of innovation* which claimed that innovation occurs sequentially from basic research/invention to applied research and development and ends with production and diffusion/marketing (Godin, 2006; Kline and Rosenberg, 1986)\(^4\). Figure 3.1 below depicts the linear model of innovation.

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\(^4\) Kline and Rosenberg (1986) provide a poignant critique of the linear model of innovation (p. 275, 285 – 288).
These ideas about innovation were aligned with a neoclassical conceptualization of government’s role. Scholarship that promoted this neoclassical perspective on the innovation process proposed that government should intervene in the innovation process to address the "market failure" derived from an underinvestment in R&D by private actors due to uncertainty, inappropriability and indivisibility (Reid, 2011; Charminade and Edquist, 2010; Edquist and Hommen, 1999; OECD, 2010). This underinvestment mitigated "the optimal allocation of resources for R&D" and hence, the government could assist in returning the market to a state of equilibrium\(^{42}\) – that is, a state of perfect information, perfect competition and profit maximization – by improving the distribution of technological or market information to firms in order to incentivize investment in research; allocating resources to firms (i.e. R&D grants or tax incentives) to encourage R&D activities; and, providing direct support to universities and other research institutes to perform basic research (Reid, 2011; Charminade and Edquist, 2010; Salmenkaita, J. and Salo, 2002).

By the end of the 1980s, the neoclassical approach to explain government intervention in the innovation process had come under intense criticism. Charminade and Edquist (2010) maintained that the market failure theory could not provide policy-makers with practical guidance on the scale of public intervention that was most appropriate or the area/sector the government should intervene. The existing theory did not consider the

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\(^{42}\) Neoclassical theorizing about the rationale for interventionist government policies was based on the formative work of scholars like K. J. Arrow and Gerard Debreu (Lipsey and Carlaw, 1998; Reid, 2011).
structure and context within which innovation activity takes place, and so rather than strategically target intervention at specific points of weakness within the innovation economy, policies developed along the market failure theory were intended to be applied across the whole economy. Moreover, the linear model of innovation failed to acknowledge the feedback loops that typify the iterative nature of innovation and demonstrate the learning process that occurs between different innovation actors at different points of the knowledge production and diffusion chain (Kline and Rosenberg, 1986; Edquist and Hommen, 1999; Boekholt, 2010). By the early 1990s, the systems of innovation theory (SI) emerged as an alternative framework for understanding the dynamics of the innovation process and allocating public resources to advance R&D and commercialization⁴³ (Reid, 2011; Kuhlmann et al, 2010).

3.1.2 Government Intervention to Address Systemic Problems

A system of innovation is defined as “all important economic, social, political, organizational and other factors that influence the development, diffusion and use of innovations” (Edquist, 1997: 14) The systems of innovation (SI) approach (or the innovation systems approach) therefore emphasizes the interaction that occurs between the components of an innovation system, draws attention to the networked and interdependent nature of the innovation process, and underscores “the role of various institutional structures and social forces in determining innovative capacities” (Wolfe et. al, 2011; Edquist and Hommen, 1999; Feldman et al, 2006: 360). Charminade and Edquist (2010) explain the strengths of the SI approach as follows (p. 100):

⁴³Freeman (1987), B. A. Lundvall (1992) and Nelson (1993) are credited with advancing this approach, which has expanded to include regional and national streams of analysis.
The SI approach emphasizes the fact that firms do not innovate in isolation but with continuous interactions with other organizations in the system (at regional, sectoral, national and supranational levels) (Edquist 1997; 2005; Lundvall 1992). The (SI) approach shifts the focus away from actions at the level of the individual and isolated units within the economy (firms, consumers) towards that of the collective actions underpinning innovation. It addresses the overall system that creates and distributes knowledge, rather than its individual components…”

The SI approach also brings to bear the value of “interactive learning” that takes place during the innovation process (Lundvall, 1992; Lundvall and Johnson, 1994; Morgan, 1997; Hekkert et al, 2007; Cooke et al, 2007). Interactive learning may be defined as “the building of new competencies and the acquisition of new skills, not just gaining access to information” (Wolfe, 2002). To this end, researchers and innovators are involved in a regular two-way exchange of personnel, tacit knowledge and codified knowledge which engenders a shared competency to understand information acquired from other sources and to apply as well as adapt “appropriate innovation” originating elsewhere (Cooke et al, 2007).

Ultimately, the SI approach conceptualized innovation as the product of “the interaction among the specific components of invention, research, technical change and learning that comprise the system” (Wolfe et al., 2011). This new way of understanding innovation had important implications for why and when government should intervene in the innovation process. One set of scholars maintained that the SI approach suggests that public policy intervention should take place when system failures occur (Reid, 2011; Arnold, 2004; Bergek et al., 2010; Woolthuis et al., 2005). However, Charminade and Edquist (2010) dismiss the idea of system “failures” based on the proposition that since the system never achieves equilibrium, it is impossible to specify an ideal system of innovation and as such comparisons between an optimal system and an existing system are not possible. Instead, the authors suggest that systemic problems occur, and it is during these times, the government
should intervene. In their review of the literature Charminade and Edquist present nine systemic problems, summarized below (p. 102 – 104):

- **Infrastructure provision and investment problem**: amount to inadequacies in the physical infrastructure (transport, etc.), the scientific infrastructure (universities and research labs, etc.), and the network infrastructure (IT, telecoms).
- **Transition problems**: difficulties that arise when firms and other actors encounter technological problems or face changes in the existing technological paradigm that exceed their current capabilities.
- **Lock-in problems**: occur due to socio-technological inertia which can hinder the emergence and dissemination of more efficient technologies.
- **Hard and soft institutional problems**: linked to formal rules (regulations, laws) as well as more informal and tacit rules (for instance, social and political culture).
- **Network problems**: derived from too weak linkages or too strong linkages (blindness to what happens outside the network) in the system of innovation.
- **Capability and learning problems**: refer to insufficient competences of firms (human, organizational, technological, etc.) which might limit their capacity to learn, adopt or produce new technologies over time.
- **Unbalanced exploration-exploitation mechanisms**: the system might have the capacity to generate diversity but not have the mechanisms to make the adequate selections, or it may have very refined selection procedures but not the ability to generate diversity.
- **Complementarity problems**: the competences of the system might not complement each other or they might not be connected.

While Charminade and Edquist provide an extensive list of systemic problems, the problem of deficiencies in the demand for innovation has also been considered a sufficient condition for government intervention. Edler (2010) provides two reasons why government should intervene in the market to shore up demand. Firstly, he points out that public policy intervention may be necessary where the demand for innovations is inadequate or non-existent, but where a technology, product or service may have high economic and/or social benefit. Secondly, Edler states that in cases where the articulation of demand may be insufficient, public policy could be useful for helping to translate human and social needs into clear market demands (p. 277). Indeed, the SI framework is useful for identifying where new market demand opportunities may exist within a given economy given its focus on the dynamics of the innovation process and the user-producer interaction that occurs. As such, it
is also useful for informing the development of a suite of innovation policies that could more aptly fulfill a polity’s social and economic goals, particularly increased productivity, wealth creation and an improved standard of living.

The next section will present the scholarly debate around the different suite of policies or “policy mixes” a government may establish for advancing research and innovation. However, before moving forward, it is worth taking note of a thoughtful criticism leveled against innovation theorists who attempt to superimpose the theoretical rationale for government intervention on the policy-maker’s rationale for intervening in the innovation process. Flanagan et al (2011) criticize the innovation policy literature for implying that theory-based rationales – i.e. neo-classical theory and the systems of innovation approach – are the primary driver of policy development. The authors warn against mapping shifts in innovation policy with changes in the scholarly ideas to imply that the former are caused by the latter. Flanagan et al. suggest that this kind of analysis of government intervention “treats policy makers as translators of theoretical rationales into action [and] denies agency to actors in relation to policy change” (p. 711). Further to this point, Flanagan et al maintain that these accounts risk reducing the policy maker “to a passive recipient of rationales from outside, implying an expert-driven or technocratic policy process with little or no role for politics” (p. 704).

The authors’ points are acknowledged, and while the literature review has discussed the rationale for government intervention in relation to the popularized theory, by no means is it implied here that there is a clear causal linkage between shifts in the theoretical rationale and shifts in the policy maker’s decision regarding the design and selection of particular policies. As Flanagan et al (2011) points out, ideas are only one of the many factors that influence the policy-making process and, policy-makers may use theories to justify policy
design and the selection of the mix of policies retrospectively. Likewise, this dissertation is intended to demonstrate the influence of the breadth of factors – including ideas – that affected the pre-decision stages of research and innovation policy development in Ontario.

3.2 How can government intervene?

Leading governments have developed an array of innovation policies and policy instruments intended to bolster their jurisdiction’s research and innovation capacity. Overtime, the task of establishing policy measures to achieve political and economic goals has been elevated to a focused effort at developing a coordinated suite of policy mechanisms that are intended to realize a return on public investments made in R&D and innovation. Most importantly, this mix of policy should align with a government-led innovation strategy that reflects a sophisticated understanding of that jurisdiction’s innovation potential and limits\textsuperscript{44} (OECD, 2011a: 78, 87, 157).

A policy mix may be defined as “the combination of policy instruments which interact to influence the quantity and quality of R&D investments in public and private sectors” (Boekholt, 2010: 353). The term originated in the economic policy literature in the 1960s and transitioned into the innovation literature around the early 1990s (Flanagan et al, 2011: 703). Innovation scholars have used the “policy mix” concept to discuss the suite of policies that are directly linked to intensifying R&D and innovation and aimed primarily at innovative firms and research institutes (Boekholt, 2010; Reid, 2011: 117). However, as Boekholt (2010) points out, policy makers are becoming increasingly aware of the extent to which the development of an innovation policy mix is also influenced by the interactions and

\textsuperscript{44}The OECD (2011a) identifies three families of innovation strategies a regional government may adopt in order to support innovation-led policy instrument development: (1) strategy that builds on current advantages; (2) strategy that supports socio-economic transformation; (3) strategy that drives efforts at “catching up” (p. 20, 79). Overall, these three strategies are intended to reflect the priorities and objectives of a given regional government, namely advancing innovation and bolstering economic development.
interdependencies that occur between different policies – like financial development policies, regional development policies, science and technology policy, higher education policy, industrial and enterprise policy, labour policies, etc. – which ultimately affect the degree to which policy goals will be realized (Flanagan et al, 2010: 702; Kaderabkova and Radosevic, 2011:2; OECD, 2011a: 101-102). To this end, an innovation policy mix is an holistic set of policies involving “the construction of policy portfolios of considerable breadth aimed at rectifying wholesale innovation system deficiencies that, if successful, would stimulate private sector investment in R&D as a natural consequence of a healthy and vibrant innovation system” (Boekholt, 2010: 353). Refer to Table 3.1 for Boekholt’s (2010) review of mainstream R&D and innovation policy measures used in most industrialized countries.

Table 3.1 Mainstream R&D and Innovation Policy Measures in Industrialized Countries

<table>
<thead>
<tr>
<th>Main Category</th>
<th>Types of Instruments</th>
</tr>
</thead>
</table>
| Generic R&D Policy (Public sector) | Discretionary institutional funding for R&D activities (e.g. block funding to universities and research centres)  
                                       Competitive R&D project grants  
                                       Support for R&D infrastructure  
                                       Selective support for centres of excellence  
                                       Structural reform of public research sector                                                                                                               |
| Generic R&D policy (Private sector)| Discretionary institutional funding for R&D (e.g. block funding to firms)  
                                       Competitive R&D project grants  
                                       Competitive R&D loans  
                                       R&D-friendly procurement                                                                                                                                       |
| Thematic/sectoral policy           | Selective (collaborative) R&D support schemes for existing high-tech sectors/technology domains  
                                       Selective R&D support schemes for new high-tech sector  
                                       Selective R&D support schemes for low- to medium-tech sectors  
                                       Selective R&D support schemes for specific societal issues                                                                                                  |
| Linkage policy                     | Collaborative R&D programs without thematic focus  
                                       Technology platforms and similar “stakeholder programming” actions  
                                       Cluster policies and regional growth pole policies  
                                       National support for science parks and other co-location schemes  
                                       Support for other university-industry linkage mechanisms (e.g. university liaison offices)  
                                       Support schemes for spin-offs                                                                                                                                      |
| IPR Policy                         | Reform of IPR regulations  
                                       Support schemes to help secure IPR                                                                                                                                  |
| Financial and fiscal policies      | Risk capital for R&D measures  
                                       Loan and equity guarantees for R&D investments  
                                       R&D tax relief measures for companies                                                                                                                             |
Rather than use the term “policy mix,” a smaller number of innovation scholars have employed another concept, “instrument mix.” Borrás and Edquist (2013) define an instrument mix as “the specific combination of innovation-related policy instruments which interact explicitly or implicitly in influencing innovation intensities” (p. 8). These authors contend that a focus on innovation policy instruments better isolates the set of measures intended to intensify R&D and innovation and address the problem(s) associated with a given innovation system in order to realize a set of economic or social goals (p. 2). A review of the literature indicates that a number of researchers confuse the policy mix and instrument mix concepts, and use these terms interchangeably. For the sake of consistency, the term mix of innovation policy instruments will be used in the following section to discuss the challenge decision-makers face in determining the mix of demand-side and supply-side innovation policy instruments that will realize their innovation objectives and address their unique system problems.

3.3 The Demand- and Supply-side Innovation Policy Challenge

Imagine trying to cut a piece of paper with just one blade of a pair of scissors. It’s near impossible. Yet that is what we try to do with innovation policy. We rely on supply side measures to push technology. We neglect the critical role that demand and markets play in pulling innovation through. We need to use both blades of the scissors.


Luke Georghiou along with many other innovation scholars and researchers have written extensively on the benefits of supply-side and demand-side innovation policies; the

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45 Borrás and Edquist (2013) point out that innovation in itself is rarely a government’s goal, but a means to achieve broader goals like economic growth, job creation, environmental protection, improvement in public health, etc. (p. 3).
difficulty of finding a balanced mix of supply-side and demand-side innovation policy and policy instruments; and the recent shift of attention towards incorporating more demand-side innovation instruments into a jurisdiction’s innovation policy mix. Before delving into those and other related issues, it is useful to first define supply-side innovation policy and the scope of supply-side innovation instruments national and regional governments have historically employed to stimulate innovation.

### 3.3.1 Supply-side Innovation Policy

Supply-side innovation policies support the generation of new knowledge or innovations by making it less expensive for firms and public research institutes to undertake the relevant research or take part in the R&D process (OECD, 2012: 66). This term is often used interchangeably with “supply-push” and “technology push” policies given that these measures push technological opportunities forward from scientific discoveries (Buligescu et al, 2012: 8; Beltramello, 2012; Godin and Lane, 2013: 5). OECD (2012) points out that supply-push or supply-side innovation policies are primarily featured in a linear model of commercialization “whereby universities and [other public research institutions] transfer academic inventions via the sale, transfer or licensing of intellectual property, often on an exclusive basis, to existing firms or to new ventures (e.g. academic spin-offs)” (OECD, 2012: 192).

Examples of supply-side innovation policy instruments include public funding (direct and indirect) to public and business R&D, public support to venture capital funding, creation of research infrastructure, investment in higher education and human resources (OECD, 2012: 66). A report by Ernst and Young (2011) organizes supply-side innovation policies into four categories (p. 24): (1) R&D Support: grants, tax incentives, public venture capital; (2) Provision of scientific base: research centres, infrastructure, trainings, mobility programs; (3)
Information and brokerage: international technology watch, benchmarking, patent databases;

(4) Networking measures: incubators, science parks, cluster support. Alternatively, Table 3.2 below presents Georghiou’s classification of supply-side innovation “measures,” which is divided into two broad categories: finance and services.\(^{46}\)

Table 3.2 Supply-side Innovation Policies

<table>
<thead>
<tr>
<th>Supply-side Measures</th>
<th>Finance</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Support for Public Sector Research</td>
<td>Support for Training and Mobility</td>
</tr>
<tr>
<td>Equity Support</td>
<td>- University funding</td>
<td>- Tailored courses for firms</td>
</tr>
<tr>
<td>- Public venture capital funds</td>
<td>- Laboratoy funding</td>
<td>- Entrepreneurship training</td>
</tr>
<tr>
<td>- Mixed or subsidized private venture funds</td>
<td>- Collaborative grants</td>
<td>- Subsidized secondments</td>
</tr>
<tr>
<td>- Loss underwriting and guarantees</td>
<td>- Strategic programs for industry</td>
<td>- Industrial research studentships</td>
</tr>
<tr>
<td>- Tax incentives for investors</td>
<td>- Support for contract research</td>
<td>- Support for recruitment of scientists</td>
</tr>
</tbody>
</table>

Source: Georghiou, 2006

Other researchers have discussed the thematic nature of some supply-side innovation policies. Cunningham (2009) point out that a number of the policy instruments governments establish to build R&D strengths in specific areas are supply-side measures and a number of these programs are in the “generic areas”\(^{47}\) of ICT, genome research and systems biology, nanotechnologies, transport, aerospace, security, energy and sustainability (p. 7). The author suggests that these measures are not always explicitly linked to a demand-side orientation; however governments may implement these thematic forms of innovation support in the effort to address different challenges research and innovation actors within that particular

\(^{46}\) Refer to Georghiou (2006) for his complete taxonomy of demand-side and supply-side innovation policies.

\(^{47}\) By “generic areas” it is assumed that the author is referring to sectors of the economy where most leading innovative regional and national jurisdictions are investing in regardless of whether these jurisdictions have a comparative advantage in these areas.
sector may face vis-à-vis the innovation process, i.e. advancing an idea from conception to market.

Overall, the innovation policy mixes of a large number of regional and national governments worldwide are still heavily balanced towards a supply-side oriented mix of instruments (Izsak and Edler, 2011). There are many reasons why this mix of policies has been prevalent over the past decades. One of the most interesting rationales for this is based on the perpetuation of the notion that innovation is equated with research and development, science and technology. Leonard (2011) outlines the logical fallacies that underpin the traditionally held idea in Canada that the supply of science and R&D creates its own demand for innovation which will in turn contribute to improved levels of productivity:

- Investments in science and R&D are key ingredients to innovation.
- Innovation leads to higher productivity (by either reducing the cost of producing goods and services or creating new higher value-added products and services, or both)
- Therefore, Canada must invest more in R&D to improve innovation and productivity.

Leonard (2011) acknowledges that other factors, in addition to R&D, are necessary for knowledge to lead to innovation. To this end, he focuses on the importance of governments removing obstacles to competition in order to stimulate demand for business R&D, university knowledge and other sources of innovative ideas. Izsak and Edler (2011) also point out the positive correlation between demand conditions and “the competitiveness of locations” (p. 4) These authors explain that “[d]emand conditions in the home market can help companies create a competitive advantage when sophisticated buyers pressure firms to innovate faster which [results] in more advanced products than those of competitors” (p. 4). These “demand conditions” include (Izsak and Edler, 2011: 4; Edler 2010: 280):

- High per capita income and/or low price elasticity
- Early and clear signals of (potential) buyers to demand innovative solutions;
- Economic ability to pay higher entry costs of innovations;
- Critical mass of demand;
- A certain level of innovation-driving problem pressure (or high political priority/high significance of clear political goals);
- Pioneering regulations;
- Conditions to support rapid learning and adaptation processes for suppliers;
- Adequate technological and productive competence in the entire valued added chain

The task many governments now face is determining the mix of innovation policies that will contribute to the establishment of these demand conditions.

The OECD (2011b) suggests that interest in the demand-side of innovation policy development has more recently intensified due to “a greater awareness of the importance of feedback linkages between supply and demand in the innovation process” (p. 9). As government officials adopt a more holistic view of the innovation cycle (in line with the underlying assumptions associated with the systems approach to innovation), more attention is being shifted towards experimenting with a different mix of instruments; despite the fine-tuning of supply-side innovation policies over the years, for many jurisdictions these measures have not been overly effective at addressing the problem of low innovation intensity (OECD, 2011b:9; Borrás and Edquist, 2013). The decision to reassess and revamp a jurisdiction’s innovation policy mix is also being driven by pressure from the electorate to address fiscal challenges that emerged with the global crisis of 2008. Indeed, the political pressure to realize more value out of research, “[unlock] the growth of enterprises and skills in research and education,” (Izsak and Griniece, 2012: 2) and ultimately demonstrate a return on investments made in R&D overtime has been accompanied by an increased focus on determining the best mix of outcome-driven policies. As such, many decision-makers have more recently considered the incorporation of (more) demand-side innovation instruments into their jurisdiction’s existing mix of innovation policies.
3.3.2 Demand-side Innovation Policy

Demand-side innovation policies are defined as “a set of public measures to increase the demand for innovations, to improve the conditions for the uptake of innovations or to improve the articulation of demand in order to spur innovations and allow for their diffusion” (Edler, 2007; Edler, 2011: 179). These policies “strengthen the demand base, that is the market,” “seek to ensure that firms have sufficient incentives to succeed, and include measures that structure the market or the rewards flowing from it – competition, fiscal, etc.” (Georghiou, 2012; Cunningham, 2009: 1).

There are many benefits associated with government intervening into the innovation process to stimulate demand. Firstly, given that innovation is an uncertain process where the consumers’ needs are not clearly articulated or unknown altogether, the state can play an important role in organizing and supporting the articulation of societal demand in relation to existing innovations (i.e. risk discourse) as well as in terms of establishing a better understanding of societal preferences vis-à-vis the development of new technologies (Edler, 2011, p. 181-182). Secondly, public intervention through demand-side innovation policies can also help to “trigger” private demand (Izsak and Edler, 2011:3). In this respect, policies facilitate the generation of innovation by enabling user-producer interactions, which in turn assists producers in satisfying the needs and wants expressed by potential users (Izsak and Edler, 2011: 3; Edler, 2011: 181). Once private demand is triggered, new innovations or new technologies are “pulled” from peoples’ needs onto the market (Izsak and Edler, 2011; Godin and Lane, 2013: 5). The new and/or improved products and services derived from this process are deemed “demand-pull innovations.” Thirdly, public policy intervention can also be used to encourage and intensify private demand. Policies may be introduced to provide private or industrial demanders with some financial advantage and/or incentive for
purchasing certain innovative technologies (Edler, 2011: 181). Fourthly, public policy may be employed “to improve demand competence” which is important for enhancing the diffusion of innovation (Ibid.) Government may intervene to raise user awareness of innovations that exist and/or improve the capacity of these users to use those innovations.

- **Demand-side Policy Instruments**

  Regional and national governments may employ a number of demand-side innovation policy instruments in the effort to promote and stimulate demand as well as increase its diffusion (Edler, 2009). The innovation literature includes a number of different ways for classifying these instruments. The OECD (2011a) suggests that government may stimulate demand using public procurement, regulations and standards (p. 104-105). Georghiou (2006, 2012) identifies a different mix of demand-side innovation policy instruments: systemic policies, regulation and procurement. However, the most comprehensive taxonomy is presented by Wintjes (2012) who provides a modified version of the Izsak and Edler (2011) classification of demand-side innovation policy instruments which include public procurement, instruments that support private demand, regulation and standardization and systemic policies. This modified version is used in this dissertation to categorize the breadth of demand-side innovation policy instruments the Ontario government developed between 2003 and 2011. Refer to Table 3.3 for a list of the demand-side innovation policy instruments a government may implement to stimulate demand, a short description of each instrument, and the role of the state in promoting demand through the use of these instruments.
Table 3.3  Typology of Demand-side Innovation Policies

<table>
<thead>
<tr>
<th>Demand-side Innovation Policy Instrument</th>
<th>Short Description of Instruments</th>
<th>Role of the State</th>
<th>Potential Strengths, Weaknesses and Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Procurement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public procurement of innovative goods and services</td>
<td>Relies on inducing innovation by specifying levels of performance or functionality that are not achievable with “off-the-shelf” solutions and hence require an innovation to meet the demand</td>
<td>To buy and use innovations</td>
<td><strong>Strengths</strong>: contributes to improved public services; encourages firms to innovate; enables government to create a signaling effect as lead user in order to influence the diffusion of innovation. NB. When government subsidizes procurement, this may offsets risks to purchasers of innovations. <strong>Weaknesses</strong>: could “harm competition, reduce transparency in procurement procedures, decrease value for money and increase public sector’s vulnerability to fraud”; may distort competition by excluding foreign firms from domestic markets\textsuperscript{48}; focus on value for money as well as the problem of fragmentation of public demand (between different levels of government) may limit the scale effects of procurement</td>
</tr>
<tr>
<td>Public procurement of R&amp;D services</td>
<td>Supports suppliers of innovations by procuring R&amp;D services. Governments articulate a specific need, call for R&amp;D proposals and select among the competing tenders</td>
<td>To articulate public demand, acquire R&amp;D services</td>
<td></td>
</tr>
<tr>
<td><strong>Support for Private Demand: Direct and Indirect</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Demand subsidies</td>
<td>Encourages the purchase of innovative technologies by private or industrial demanders (Direct support)</td>
<td>To co-finance private sector acquisition of innovations</td>
<td>Weakness: potentially creates a substantial administrative burden for the applicant and/or government authorities</td>
</tr>
<tr>
<td>Tax incentives</td>
<td>Increases the demand for novelties and innovation by offering reductions on specific purchases (Direct support)</td>
<td>To co-finance private sector acquisition of innovations</td>
<td>Weakness: potentially creates a substantial administrative burden for the applicant and/or government authorities</td>
</tr>
<tr>
<td>Awareness building measures and information campaigns</td>
<td>Bridges the information gap consumers of innovation have about the security and the quality of a novelty (Indirect support)</td>
<td>To inform the public about innovation</td>
<td><strong>Strengths</strong>: Empowers (potential) innovation users; creates public confidence in certain innovations</td>
</tr>
<tr>
<td>Articulation and foresight</td>
<td>Provides societal groups, potential consumers and public and industrial users with a voice in the marketplace. These measures also help users of innovation to signal future preferences and fears re. innovation (Indirect support)</td>
<td>To organize the discourse of societal actors</td>
<td><strong>Strengths</strong>: Empowers (potential) users of innovation</td>
</tr>
<tr>
<td>Training and further education</td>
<td>Raises the awareness of private consumers or industrial actors of innovative possibilities and places them in a position to use them (Indirect support)</td>
<td>To enable societal actors to use innovations</td>
<td><strong>Strengths</strong>: Empowers (potential) users of innovation; creates public confidence in certain innovations</td>
</tr>
</tbody>
</table>

\textsuperscript{48} OECD, 2011b: 115
<table>
<thead>
<tr>
<th>Demand-side Innovation Policy Instrument</th>
<th>Short Description of Instruments</th>
<th>Role of the State</th>
<th>Potential Strengths, Weaknesses and Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systemic Policies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cluster policies, support to user-driven innovation, sector-, technology-or theme-specific platforms</td>
<td>Influences the development of the innovation system by stimulating dialogue between users, producers and other innovation actors so as to promote innovation and the subsequent up-take</td>
<td>To enable coordination and cooperation between innovation actors</td>
<td>These policies include demand-side instruments and supply-side support measures. The challenge is in finding the mix of instruments that will best stimulate and promote innovation.</td>
</tr>
<tr>
<td>Lead market initiatives</td>
<td>Supports the emergence of lead markets. A lead market is the market of a product of service in a given geographical area, where the diffusion process of an internationally successful innovation (technological or not) first took off and is sustained and expanded through a range of policies.</td>
<td>To enable the prioritization of a market that will have an impact at the global level</td>
<td>Challenge: To identify the markets that will define future trends in demand. These initiatives include demand-side instruments and supply-side support measures. The challenge is to find the mix of instruments that will best stimulate and promote innovation.</td>
</tr>
<tr>
<td><strong>Regulation of Demand and Standardization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulations</td>
<td>Sets norms for the production and introduction of innovations (e.g. market approval, recycling requirements).</td>
<td>To collaborate with industry and NGOs to develop regulation that will encourage certain innovative behavior</td>
<td>Strengths: reduced market risk. Weaknesses: conflicting goals between actors may complicate the process.</td>
</tr>
<tr>
<td>Standardization</td>
<td>Establishes technological specifications to inform and encourage market uptake</td>
<td>To cooperate with industry, consumers and other interested parties for the development of standards in order to facilitate market entry</td>
<td>Strengths: reduced market risk. Weaknesses: technology lock-in if standardization occurs too early, and if it occurs too late, the costs of transition to the new standard may prevent diffusion.</td>
</tr>
</tbody>
</table>

Sources: Wintjes, 2012: 5; Edler, 2007; OECD 2011a; 105; OECD, 2011b

- The Difficulty of Separating Demand-side and Supply-side Innovation Measures

Overall, demand-side innovation policies and instrument mixes are credited for facilitating the modernization of public services, accelerating the catch-up process of less-developed jurisdictions, and generally improving the growth of an innovative economy (Izsak and Edler, 2011: 7). Ministries and government agencies of economic development and innovation play an integral role in coordinating these policies across various sectoral and technological domains (Ibid: 32). Notably, a number of innovation policy scholars have raised attention to the fact that many demand-side measures are closely linked with
complementary supply-side supports (Wintjes, 2012: 6; Cunningham, 2009: 3, 7). In particular, systemic policies, (i.e. lead market initiatives and cluster initiatives) combine a number of supply-side and demand-side innovation measures in order to stimulate demand and provide innovators with the resources they need succeed (Izsak and Edler, 2011: 27; OECD, 2011b: 75). Izsak and Edler (2011) also discuss the supply-side component involved in pre-commercial public procurement i.e. public procurement of R&D. These authors point out that a supply-side orientation is evident due to the R&D support that this instrument provides, however, the demand-element exists “through lowering transaction costs of new product adoption by sending a powerful signal to the private sector and thus engendering a spill-over to private demand” (p. 5).

On the other hand, governments may also introduce supply-side innovation policies with demand-side components, i.e. “demand led supply-side policies” or industry led R&D policies (Izsak and Edler, 2011: 37). These thematic, public R&D support programs are fundamentally supply-side innovation instruments which will require the funding recipient to demonstrate measurable economic and societal impact\(^49\) (Wintjes, 2012: 5; Izsak and Griniece, 2012: 5). What is most important to note here is that while it is difficult to clearly delineate innovation policy instruments as either supply-side or demand-side measures, the involvement of users (public or private) and the articulation of demand are the core common features associated with demand-side innovation policies (Wintjes, 2012: 6).

- **Prevalence of Demand-side Innovation Policies**

  Debate between decision-makers and stakeholders on the advantages and challenges of implementing demand-side innovation policies to complement existing supply-side

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\(^{49}\) Izsak and Edler (2011) acknowledge that “the border between demand-based innovation policy and market oriented, thematically focused R&D policies is thus blurred” (p. 17). To this end, many jurisdictions are developing innovation policy intended to connect science and business through thematic prioritization or cluster policies.
innovation policies is growing, and innovation scholars and researchers are continuing to map trends regarding the adoption of these policies\(^\text{50}\) (Cunningham, 2009: 11; Wintjes, 2012: 7; OECD, 2011b: 13-16; Izsak and Edler, 2011). For instance, it has been noted that a number of leading jurisdictions that have adopted demand-side innovation policies use them to promote innovation in certain areas of the economy more than others, particularly environmental and energy technologies, healthcare, mobility, education, communication and security (Izsak and Edler, 2011, 29). The OECD (2011b) suggests that demand-side innovation policies are used in these very specific areas where societal needs and challenges are not met by market mechanisms alone or where private and public markets intersect. The innovation policy literature has also identified public procurement as the most popular form of demand-side innovation policy instruments adopted across leading innovation jurisdictions (Edler 2010: 283; Izsak and Edler, 2011: 20; OECD, 2011b:11). Another discernible development is the increased use of lead market initiatives which are intended to strengthen clusters and encourage interaction between users and producers of innovation which in turn can generate localized learning and increased competitiveness (Wintjes, 2012: 11). The EU has been particular proactive in this area with the launch of the Lead Market Initiative (LMI) in 2008 which was intended to “remove obstacles to enable European enterprises to enter new and fast growing global markets and to facilitate the faster uptake of new products, services and technologies” (Ernst and Young, 2011: 24; OECD, 2011b: 52). Refer to Box 3.1 for a review of this initiative.

\(^{50}\) Izsak and Edler (2011) point out that a number of countries and regions have incorporated demand-side innovation measures into their innovation strategies even if these measures are not explicitly promoted tools to stimulate demand (p. 14).
Despite the potential benefits of implementing demand-side innovation policies, many jurisdictions have only cautiously experimented with incorporating these measures into their regional and/or national innovation policy mixes. Firstly, critics of government intervention in the marketplace point out that certain demand-oriented policies and

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**Box 3.1 The European Commission’s Lead Market Initiative**

The EU’s Lead Market Initiative (LMI) was announced in 2007 as a demand-side innovation policy package (with complementary supply-side policy instruments) designed to introduce a new way of coordinating, engaging and building the capacities and incentives for markets to play a major role in the innovation system in Europe. The European Commission consulted with stakeholders and European Technology Platforms to help identify six markets to support: bio-based products, ehealth, protective textiles, recycling, renewable energy and sustainable construction. These markets were chosen because they were deemed to have potentially high economic and societal value for the EU. To this end, they are highly innovative, capable of responding to customers’ needs, have a strong technological and industrial base in Europe. Additionally, these markets depend more than any other markets on the creation of favourable framework conditions through public policy. Once the lead markets were selected, each sector established an Action Plan that included achievable outcomes with the aim of strengthening sector-wide market conditions. To support the implementation of these Action Plans, four different types of policy instruments were employed including standardization, labeling and certification; legislation; public procurement; and other complementary actions (e.g. business and innovation support services and financial support instruments for supply-side activities.) The Mid-term Progress report on the LMI (2009) commented on the potential of the LMI to address the challenges associated with the financial and sovereign debt crisis. The Final Evaluation of the LMI (2011) includes a discussion on the potential for reconfiguring some of the instruments associated with the LMI; an evaluation of its achievements; and, a list of recommendations.

Sources: Commission of the EC, 2007; Commission of the EC, 2009; CSES, 2011; Cunningham, 2009.
instrument mixes perpetuate the problem of government “picking winners.” Georghiou (2006) discusses the criticism regarding governments driving lead market initiatives and underscores the mistake detractors make in confusing the process of the government selecting firms or technologies with the selection of whole markets. Georghiou contends that when governments make resource allocation decision-making using a lead market approach, the markets that governments choose to target are organically selected “in terms of their importance in the economy [and] their apparent ripeness for innovation…” (p. 14). He explains the process as follows:

No specification is to be made of which firms or even of which solutions should be pursued [by government] in the first instance. Eventually under competitive conditions preferred solutions and suppliers will emerge but this happens in all markets. What must be achieved is an open process the result of which is that winners emerge.

To this end, Georghiou refutes the criticism that lead market approaches are a means for government picking winners on the basis that it is the “competitive arenas” that are being picked, not the firms or technologies (p. 22). Despite this and similar arguments made in support of lead market initiatives and other demand-side innovation instruments, for many jurisdictions the impact of this criticism will continue to mitigate the adoption of demand-side innovation policy alternatives.

The adoption of demand-side innovation policy instruments will also vary based on a jurisdiction’s history of research and innovation policy development and its level of risk aversion. Indeed, a number of governmental structural features hinder risk-taking and innovation (OECD, 2011b: 71) Even though risk-averse governments may occasionally experiment with a small number of tools that are outside of their longstanding policy mix, for the most part, decision-makers often become locked into a particular policy path. Unwilling to face a level of uncertainty that could potentially lead to policy failure, these government
officials continue to implement traditional tools despite the persistence of problems associated with their systems of innovation. Government resistance towards altering its mix of innovation policy instruments is readily apparent in some economies with a strong export orientation and an historical legacy of firms assuming a subsidiary role in the global innovation market. Box 3.2 discusses the extent to which Canada’s export orientation has impacted the province’s mix of innovation policies aimed at supporting indigenous firms.

Box 3.2 The Impact of a Strong Export Orientation on Canada’s Mix of Innovation Policies

For centuries, Canada exported volumes of commodities to the USA and other trade partners. Today, a large number of Canadian firms have assumed an upstream or subsidiary role in the global innovation market; in this capacity, they generate the raw or lightly processed materials that are necessary at the early stage of the innovation process, which are then exported to other countries (CCA, 2013b). The recipient jurisdiction captures the lion’s share of the profits made from transforming those made-in-Canada resources into market-ready innovations. According to the Canadian Council of Academies (2013b), Canadian businesses appear content with focusing on the exportation of raw and/or partially manufactured goods and demonstrate little interest in adopting innovation focused business strategies. Their activities are supported by supply-side innovation policy instruments established at both the federal and provincial levels which enable Canadian firms to profit from “plant floor” innovation – a process that keeps costs low and quality high, e.g. auto assembly (Ibid). However, in light of the continued precipitous decline in national productivity growth (CCA, 2009), decision-makers will have to break from its historical approach of supporting the business activity of many of its indigenous firms. More demand-side initiatives have to be incorporated into Canada’s mix of innovation policies to encourage business innovation as well as stimulate “business demand for innovation inputs”, i.e. R&D, machinery and equipment, and skilled workers (CCA, 2009).

51 The Council of Canadian Academies (2013b) discusses the economic implications of Canadian firms assuming an upstream or subsidiary role in the innovation process.
Izsak and Edler (2011) also discuss the impact of governance and administrative barriers to the increased adoption of demand-side innovation instruments. These bottlenecks are most readily discerned when considering the challenges associated with public procurement. The authors point out the potential for the suppliers of the innovation to find the public tender procedures overly administrative and bureaucratic. On the other hand, the users/purchasers of the innovation – i.e. the government and other public institutions – may consider the application process tedious, particularly if the user must comply to overly strict regulations associated with the procurement contract. These administrative challenges are further exacerbated if the public sector does not have the resources, knowledge and skills necessary for promoting the use of public procurement as a tool for supporting innovation (p. 52).

To facilitate public procurement, a number of jurisdictions (e.g. the governments of Flanders, Korea, North Carolina-USA, Andhra Pradesh-India) have implemented “e-procurement” which is described as the replacement of paper based procedures with ICT-based communications and processing throughout the procurement chain, i.e. publication of tender notices, provision of tender documents, submission of tenders, evaluation, award, ordering, invoicing and payment. There are several advantages to e-procurement: communication between the government and interested companies regarding the list of government contracts available is facilitated by frequent e-notification; the electronic publication of contracts and the electronic submission of tenders enhances SME participation and competition in the procurement system; e-procurement may reduce transaction costs and total tendering costs. Source: Public Governance Department, Flanders: [http://www.governance-flanders.be/e-procurement](http://www.governance-flanders.be/e-procurement) Accessed on July 9, 2013.

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52 To facilitate public procurement, a number of jurisdictions (e.g. the governments of Flanders, Korea, North Carolina-USA, Andhra Pradesh-India) have implemented “e-procurement” which is described as the replacement of paper based procedures with ICT-based communications and processing throughout the procurement chain, i.e. publication of tender notices, provision of tender documents, submission of tenders, evaluation, award, ordering, invoicing and payment. There are several advantages to e-procurement: communication between the government and interested companies regarding the list of government contracts available is facilitated by frequent e-notification; the electronic publication of contracts and the electronic submission of tenders enhances SME participation and competition in the procurement system; e-procurement may reduce transaction costs and total tendering costs. Source: Public Governance Department, Flanders: [http://www.governance-flanders.be/e-procurement](http://www.governance-flanders.be/e-procurement) Accessed on July 9, 2013.

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19). Indeed, the introduction of this kind of demand-side innovation policy instrument necessitates investment in skills and competencies in public administration as well as organizational and cultural change (OECD, 2011b: 10).

One of the most formidable governance-related challenges to increasing the deployment of demand-side innovation policy is ensuring policy coordination between the public sector and influential stakeholders from industry, academia and other sectors of the economy (OECD, 2011b: 10). In cases where these actors do not have a shared vision and roadmap for implementing demand-side innovation policy instruments, innovative efforts will be sub-optimal and/or fail. Moreover, policy coordination has to be achieved within and across the public sector at both national and regional levels, particularly when considering attempts at controlling large procurement projects and budget, establishing regulations, and setting technical standards (Ibid: 70).

Finally, the increased implementation of demand-side innovation policies may be frustrated given that some of these instruments present new expenses for firms (OECD, 2011b: 12). OECD (2011b) suggests that new regulations and standards can impose additional learning and compliance costs for companies. In return, these firms may develop “defensive business strategies” or move away from that jurisdiction altogether. In light of the many policy challenges and uncertainties associated with determining the best way to allocate resources to stimulate innovation, the following section will discuss the set of principles decision-makers should bear in mind in their efforts at establishing a “smart” policy mix that includes a balance of supply-side and demand-side innovation policy instruments.
3.4 Establishing a “Smart” Policy Mix: The Innovation Ecosystem Approach to Policy Development

No single mix of policies or instruments is guaranteed to solve the innovation problem(s) of all jurisdictions (Reid, 2011: 115). Innovation policy mixes are specific to the context within which they are developed. Once decision-makers identify their jurisdiction’s innovation “problem” and determine core objectives and priorities, policy development and innovation policy instruments selection should be guided by a sophisticated understanding of the set of institutional, economic, political, historical, societal (e.g. state-industry-society relations), geographical challenges and advantages that are particular to a given jurisdiction (Borrás and Edquist, 2013: 8). The capabilities of the research and innovation actors involved and the structure of the jurisdiction’s industrial base must also be accounted for during the pre-decision stages of policy development. A consideration of all of these factors will greatly influence the mix of policies a jurisdiction should adopt to achieve its stated goals. Table 3.4 lists some of these variables.

Table 3.4 A Sample of Factors Influencing the Selection of Innovation Policy Instruments

<table>
<thead>
<tr>
<th>List of Factors</th>
<th>Political</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partisan politics; organizational structure of the state (i.e. unitary vs. federated; dispersed vs. concentrated power at the centre); Political Culture; state-market-society relations; political leadership; Regionalism; globalization; level of political contestation from opposition parties, societal groups and individuals; institutional framework for advancing innovation (i.e. a stand-alone ministry, a collection of economic ministries and/or a single agency); Electoral politics; agency of decision-makers and stakeholders; the governing party’s prioritization of innovation; alignment with policy mixes in other domains/sectors; alignment with existing policy mix; interests of research and innovation actors; Political Ideology (i.e. orientations and beliefs, values of decision-makers, stakeholders and electorate)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>List of Factors</th>
<th>Historical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional stickiness; established policy trajectories; state’s (in)experience with policy innovation and experimentation; pattern of policy development overtime; a jurisdiction’s historical trajectory of technological development</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>List of Factors</th>
<th>Economic</th>
</tr>
</thead>
<tbody>
<tr>
<td>State of the economy (national, regional), Global economic conditions, Sectoral configuration of a jurisdiction</td>
<td></td>
</tr>
</tbody>
</table>
(Cont.) **List of Factors**

<table>
<thead>
<tr>
<th>Ideational</th>
<th>Decision-makers and stakeholders ideas regarding innovation and economic development; ideas on how to stimulate innovation and raise productivity; ideas re. a jurisdiction’s “problem”; priorities of decision-makers and stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>Capacity of research and innovation actors to conduct innovative activity; local and global rate of technological change; strength of local and global networks/clusters; the quality of the learning environment in which research and innovation actors operate; uncertainty; roles of innovation actors; government and societal actors’ attitude towards risk</td>
</tr>
</tbody>
</table>

The innovation literature offers a limited but rich collection of comparative research on the diverse innovation policy paths different jurisdictions follow to achieve similar objectives. For instance, Breznitz (2007) explores how the state governments of Israel, Taiwan, and Ireland employed different sets of innovation policy instruments in pursuit of the same objective. These three countries all focused on developing policy intended to support “rapid innovation-based industrial growth” with a particular focus on the development of these countries’ IT industry. However, each one chose a different mix of policies to achieve the same goal with comparable levels of success in attaining that goal. Many of the factors listed in Table 3.4 influenced the state’s decision to choose different mixes of policies, though Breznitz’s focus is on emphasizing the impact and importance of politics, i.e. “the process of crafting, debating, deciding and acting on different alternatives” (p. 192). Similarly, this dissertation is intended to underscore the influence of politics on the pre-decision stages of research and innovation policy development.

Not only is it important to dispel the myth of a one-size-fits-all innovation policy mix, but according to Flanagan et al (2011), it is also “unrealistic to hope to identify unambiguously ‘good’ mixes” (p. 702). The authors criticize normative assumptions regarding policy mixes and in turn reject the idea that instruments can be classified as “appropriate,” “effective” or “balanced” (p. 703). Moreover, Flanagan et al contend that this

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53 Borrás, S. and Edquist (2013) also use this example to demonstrate how variation in policy instrument choice between these three countries resulted in the achievement of the same policy goal.
conceptualization of policy mixes reveals a static assumption about the mix and argues that interactions in the policy mix are overlooked. To address this issue, it is suggested that careful attention should be paid to “the trade-offs between policies as they impact upon the extent to which the ultimate intended goals or outcomes of innovation policy are realized, in a particular space and at a particular time” (p. 704). Moreover, they point out that “the context and implementation of an instrument can be fluid over time as instruments are interpreted and reinterpreted in the light of [the] changing rationales” held by different governmental officials and innovation actors (p. 706). These are important points given that they underscore how the rationale, use and impact of a given mix of policy instruments are susceptible to ongoing change (p. 708). The authors also discuss the error in assuming that a mix of instruments is expected to pursue a single goal or a set of well-articulated objectives. Alternatively, Flanagan et al maintain that the goals themselves are also constantly changing; some of them are implicit while others are explicit; and they can range from final goals to intermediate goals. Additionally, many of these goals will conflict (overtime). These are the tensions policy practitioners must bear in mind during the pre-decision stages of the policy process as well as after the implementation the chosen mix of innovation policy instruments when they may attempt to evaluate its performance.

Overall, Flanagan et al provide poignant points on how decision-makers should approach the development of innovation policy mixes. While a “good” policy mix may not be attainable, the OECD (2011a) promotes the development of a “smart” policy mix that addresses many of the shortcomings Flanagan et al discuss regarding the popular conceptualization of innovation policy mixes. Broadly speaking, the OECD (2011a) describes a smart policy mix as one that “strike[s] the right balance between the goals of knowledge creation, diffusion and absorption for the regional context. [It] also ensure[s]
synergies across individual instruments in view of their overall effectiveness” (p. 69). More specifically, the smart policy mix (OECD, 2011a: 105-106):

- Is guided by a clear definition of objectives and target groups and are properly evaluated;
- Focuses on outcomes;
- Avoids negative interactions among various policy instruments and fosters positive ones. Decision makers should have a clear understanding of the scope and impact of existing instruments which would help to encourage synergies and complementarities rather than duplication or other adverse unintended effects; and,
- Reflects a balance between instruments acting on various aspects of a regional innovation system depending on a good understanding of the system

Keeping in mind the analysis provided by Flanagan et al, a smart policy mix may also be described as strategic, integrated and place-based. For a number of innovation researchers and theorists today, the ecosystem approach to policy development is critical for guiding the development of a jurisdiction’s smart policy mix.

3.4.1 The Innovation Ecosystem Approach

The systems of innovation (SI) approach, with its regional and national levels of analysis, continues to be a popular model for guiding the creation of public policy. Indeed, the SI literature has provided substantive insight into the link between innovation, learning and economic development; debunked the one-size-fit-all approach to innovation policy development; and draws focus to the set of actors, institutions and interests that are involved in the innovation process (Doloreux and Parto; Edquist, 2001; Lundvall, 1992). However, a few scholars have drawn attention to its shortcomings.

In particular, innovation researchers have criticized the SI approach for being too static; some scholars have suggested that it is incapable of capturing the full set of dynamics that influence the innovation process (Merca and Göktas, 2011; Smits et al, 2010; Flanagan et al, 2011). Smits, Kuhlmann and Teubal (2010) apply an evolutionary perspective to SI in the attempt to underscore “the co-evolutionary nature of innovation processes and systems”
(p. 419). The authors’ “system-evolutionary approach” brings to bear the dynamic, transformative nature of the innovation system by explaining how creative destruction and Neue Kombinationen are at the core of innovation processes (p. 426-427). Smits et al argue that innovation systems’ processes and systems have a dynamic and a systemic character to them, and as such it is important for decision-makers to develop two sets of innovation policies to support the innovation system: operational innovation policies that support “the steady state” and strategic innovation policies which support structural change within the innovation system (p. 427). This approach to innovation systems is applied to two case studies – the emergence of a venture capital industry in Israel and the transition of the Dutch agricultural sector – to emphasize the need for developing policy instruments that are customized to the degree of structural change that occurs within a jurisdiction’s innovation system.

Other scholars have promoted the *innovation ecosystem approach* in order to draw increased attention to the dynamic nature of the innovation system. This approach likens the innovation system to a biological ecosystem\(^{54}\) in order to underscore the complex, constantly changing set of relations that exist between interdependent economic, social and political actors as they cooperate and/or collaborate to create knowledge, support its diffusion and encourage its absorption and application. To this end, the innovation ecosystem has been defined as\(^{55}\):

> the inter-organizational, political, economic, environmental, and technological systems through which a milieu conducive to business growth is catalyzed, sustained, and supported. A dynamic innovation ecosystem is characterized by a continual realignment of synergistic relationships of people, knowledge, and resources that promote harmonious growth of the system in agile responsiveness to changing internal and external forces.

\(^{54}\) Jackson (2011)
Innovation ecosystems include all the individuals, communities, material resources, rules and policies that cut across SMEs and LMEs, universities, colleges, government, research institutes and labs, and investors within a given region and contribute to knowledge generation and flows, technology transfer and the application of that knowledge (Wessner, 2007; Washington Economic Development Commission, 2009: 1-2; Jackson, 2011; World Resources Institute, 2011; NSF Directorate for Engineering, 2010). Based on this definition, students of the innovation ecosystem approach emphasize that it is “[an] ever changing structure which is guided by new wants and new circumstances.” (Mercan and Gökta, 2011: 104). These new circumstances may include the emergence of new markets and new industries as well as the introduction of new firms into the innovation system. It has been suggested that these dynamics and their impacts are ignored or insufficiently considered when employing the SI approach (Smits et al, p. 426), and as such it is critical to develop an improved analytical framework for incorporating these elements into a discussion of innovation systems.

Most notably, Mercan and Gökta (2011) assert that the strength of the innovation ecosystem approach also lies in its recognition of the fact that changes to the innovation system are not only driven by changes in institutions, but also by shifts in market conditions. The authors credit the innovation ecosystem approach for placing greater emphasis on the impact that market factors play on the innovation process (p. 106).

The innovation ecosystem approach is becoming a more widely acceptable framework for developing “smart” innovation policy. Many EU members, Korea, China the UK and Australia, as well as regions in the United States and Canada have adopted the innovation ecosystem approach to inform the development of a mix of policy instruments that would stimulate demand of innovative products, support knowledge generation and the
development of human capital, encourage entrepreneurship and facilitate collaboration between various research and innovation actors. Using the innovation ecosystem approach as a guide, the following section discusses a set of principles for developing a strategic, integrated, place-based mix of policy instruments, i.e. “smart” innovation policy. The discussion below will also demonstrate that there is a great deal of overlap between these three components of smart innovation policy.

- Strategic

A jurisdiction’s mix of innovation policy instruments is strategic if it is aligned with clearly articulated priorities and objectives. According to Edler (2011), demand-side innovation policies may be established to address three priorities: the development of a culture of innovation; the modernization of industry and the building up of the business community; and the promotion of social welfare. A “culture of innovation” may be defined as an environment that is competitive, supportive of an entrepreneurial spirit and conducive to ongoing collaboration and learning across different sectors and disciplines. Demand-side innovation policies that support risk-taking, increase awareness of innovations, and enable the use of innovations, will facilitate the development of this kind of society (Edler, 2011: 200). The second priority is related to intensifying business innovation activity and may require the deployment of a combination of demand- and supply-side innovation instruments, as governments seek to facilitate the upgrading of equipment and organizational processes, provide industry with a range of incentives to engage with other research and innovation actors, as well as deliver the support necessary for enhancing industry’s capacity to absorb knowledge, technologies, and organizational innovations. The third priority is premised on the idea that innovation policy mixes should be developed with the intention of addressing societal goals and challenges (Edler, 2011; OECD, 2011b: 10).
Strategic innovation policy has also been described as government action that is targeted specifically towards building up a jurisdiction’s existing industrial base and institutional strengths in order to establish a strong comparative advantage and a competitive edge (Wolfe, 2011: 7). Given the limited resources a state has at its disposal, and in light of recent fiscal challenges, it is less practical to spread funding across a broad range of research areas and sectors. Alternatively, a number of decision-makers across various jurisdictions have opted to focus on making strategic investments in sectors and research initiatives that have already demonstrated high economic returns as well as those sectors and initiatives that have the potential to do so. Wolfe (2011) identifies this approach to policy development as “smart specialization,” and he points out the need to implement a mix of policy instruments to help governments isolate priority areas as well as mechanisms for “reflexive learning through coordinated policy reviews” (p. 7-8).

A mix of innovation policy instruments is also considered strategic if decision-makers recognize the link between the sectors they selected to invest in and the mix of instruments needed to support that particular sector given that industries differ significantly in terms of the dynamics of innovation and their market structure (OECD, 2011b). Essentially, policy-makers should be aware of the policy implications of choosing to promote innovation activity in certain sectors over others. Innovation theorists have noted that jurisdictions that concentrate on harnessing innovation in technology-push industries – i.e. sectors that tend to produce radical innovations and inventions – like pharmaceutical, chemical, biotechnology and other science-based industries develop an innovation policy mix that is more heavily oriented to supply-side support mechanisms, in light of the fact that innovation producers within these industries tend to run large in-house R&D programs or sponsor R&D activity in other research institutions (OECD, 2011b: 21). On the other hand, a
jurisdiction that is focused on stimulating innovative activity in “platform or standards-based
sectors” which tend to produce incremental innovations (i.e. these sectors include computer
operating systems, automobiles, machine tools or telecommunications), develop an
innovation policy mix of instruments that is more heavily oriented towards demand-side
support mechanisms (Ibid.). However, there are certain sectors, like the green economy, that
will require a more balanced mix of demand-side and supply-side innovation policies to
promote innovation activity (OECD, 2012a: 61-95). Moreover, decision-makers that choose
to focus their investments on one set of sectors over another must bear in mind that the rate of
return on investments made in different sectors will vary significantly. Investments in sectors
that are knowledge-driven (i.e. technology-push) will arguably take a longer time to realize a
return than investments in comparison to other sectors.

It is worth noting that in a discussion on linking innovation policies to clear priorities
and outcomes, students of the innovation ecosystem approach will emphasize the importance
of decision-makers acknowledging that priorities and objectives will shift over time as a
result of social, political and/or economic changes that occur at a global or local level which
may insight the development of a new or adapted innovation system. As such, from an
innovation ecosystem perspective, in order to support the transformation of a jurisdiction’s
innovation system, policy instruments must be developed that are responsive to these shifts
(Smits et al, 2010: 427). Indeed, decision-makers must consider the scale, timing and
duration of the policies that are implemented (OECD, 2011b:12).

- Integrated

A smart innovation policy mix is highly integrated in that it combines different policy
instruments to address a problem within the innovation ecosystem. This combination of
instruments may include different demand-side instruments. Alternatively, decision-makers
may combine demand-side and supply-side mechanisms to ensure that ecosystem actors have the support they need to conduct innovation activity (e.g. through the provision of funding for R&D) and to ensure that favourable conditions are present to drive private demand and ideally to diffuse innovations locally as well as into the international market (Edler, 2010: 284). Most notably, this mix of instruments should encourage collaboration and co-investment between research and innovation actors across different sectors and disciplines, facilitate linkages between these actors, and support working relationships locally and globally. From an innovation ecosystem perspective, the implementation of integrated policies is expected to help government address the unique needs of its dynamic, evolving innovation ecosystem partners. As new actors are introduced into the ecosystem, the structure of the innovation ecosystem is changed. Moreover, as the roles and needs of innovation ecosystem members change, the mix of innovation policy instruments should also change. Box 3.3 reviews the evolved roles of Ontario higher education institutions between the 1960s and present day. The mini-case study discusses the policy implications of these new roles and the degree of structural change the regional innovation ecosystem experienced due to the assumption of these new roles.
Box 3.3: The Evolved Role of Ontario Higher Education Institutions in a Regional Innovation Ecosystem

Universities

Traditionally, Ontario universities were primarily responsible for providing a comprehensive liberal education, and the attainment of a university education for its own sake was largely promoted. These institutions focused on teaching in a broad range of disciplines, nation building and national culture (Fallis, 2004: 13). By the 1960s, research productivity was boosted to the same level of importance as teaching (Clark et al, 2009: 11), and gradually, teaching and the production of basic research became core components of Ontario universities’ missions. To fulfill their missions, these institutions required public funding for R&D and increased support for research talent development. The federal and provincial governments deployed a list of supply-side innovation policy instruments to address these needs.

The economic slowdown of the 1970s and increased competition from other provinces and jurisdictions outside of Canada contributed to the state’s reassessment of its role in economic development as well as the role of other institutional players across the economy. Around this time, a number of university leaders encouraged the government to develop a strategy based on knowledge creation (Clark et al: 52), and the potential for harnessing the research strengths of Ontario universities rose onto the political agenda. In time, the pressure to compete in a knowledge-based, globalized economy intensified, and the Ontario government shifted its resources from supporting basic research exclusively toward funding applied research with the expectation that universities would prioritize the commercialization of their discoveries (Fallis: 52).

Before the turn of the century, the link between knowledge production, innovativeness and competitiveness had been established. In particular, the belief that “competitiveness in a global economy is dependent on the knowledge and innovation that derives from post-secondary education” (Clark et al: 51) largely influenced the evolution of the role of universities in Ontario’s innovation ecosystem. These ideas contributed to a renegotiation of the “social contract” between universities and society (Fallis: 5) which entailed the establishment of a new set of economic roles and priorities for these institutions. As contributors to economic development, innovation and competitiveness, universities assumed a prominent role in the training of highly qualified personnel.
Box 3.3: The Evolved Role of Ontario Higher Education Institutions in a Regional Innovation Ecosystem

Over time, universities also intensified their collaboration with industry which not only helped to enhance their ability to improve the balance between labour market supply and demand in knowledge-intensive industries, but also improved their potential for generating applied research in sectors the government had identified as crucial to regional growth. In their affiliation with innovative, private sector actors (e.g. technology-based SMEs), the university also became “knowledge poles for cluster development,” thereby attracting world-class talent, leading firms and investments to the region (Wolfe, 2005a: 185). Overall, university-based research became “a pillar of government economic strategies” (Clark et al, 52), and the universities themselves became “anchor institutions” of Ontario’s innovation ecosystem (Gertler and Vinodrai, 2005).

The increased engagement of universities in the innovation process since the 1960s has contributed to shifts in the structure of Ontario’s innovation ecosystems as these institutions draw in more resources, other actors and innovative ideas. Moreover, the needs of these universities have changed substantially overtime. Increased levels of support are now required to enhance knowledge flow and technology transfer between these institutions, other research institutes and industry. More support is also needed to provide academic entrepreneurs with the training and other resources they require to engage with industry and other researchers in Ontario and across the world; to continue to attract and nurture talented researchers; and to help cover the full cost of university research (i.e. direct and indirect costs). As universities establish more robust ties with other actors in the innovation ecosystem, their needs will continue to change. Likewise, changes in the innovation ecosystem due to the evolution of networks as well as the introduction of new actors and new markets, etc., will continue to influence the role of the university and its capabilities. Governments will have to deploy an integrated mix of innovation policy instruments that include demand-side and supply-side mechanisms to address the shifting needs of universities, support the wide range of activities these anchor institutions engage in, and ensure the sustainability of the innovation ecosystem within which these universities are located.
Box 3.3: The Evolved Role of Ontario Higher Education Institutions in a Regional Innovation Ecosystem

Colleges

Ontario’s colleges of applied arts and technology were established in the 1960s with a community-based mandate “to work closely with local employers to devise courses that would train their students for employment” (Rae, 2005: 5-6). Under a 1965 Act of the Legislature, it was determined that colleges would not have a role in the provision of baccalaureate credit activity (Clark et al: 9). Indeed there was a clear delineation between the roles of the universities and the colleges. However, in 2000 the Postsecondary Education Choice and Excellence Act was established, allowing colleges to apply to the ministry for degree-granting status in applied arts and technology (Clark et al: 2). The role of Ontario colleges was further expanded with the 2002 update of the Ontario Colleges of Applied Arts and Technology Act which recognized applied research as one of the activities these institutions could undertake (Service Ontario, e-Laws, 2002). Since then, many colleges have accelerated their applied research activities, and in turn, more deeply embedded themselves in Ontario’s innovation ecosystem by developing more robust linkages with industry and other private sector partners on research initiatives intended “to address real-world technical problems, adapt new technologies from the marketplace, and develop new and improved products, services, and processes” (Conference Board of Canada-CBC, 2010: 4).

Today, Ontario’s colleges continue to fulfill their primary objective of offering career-oriented education and training “to meet the needs of employers and the changing work environment and to support the economic and social development of their local and diverse communities” (Service Ontario, e-Laws, 2002). However, colleges have evolved into “strategically important partners for SMEs that need applied research to sustain productivity through innovation” (Colleges Ontario, 2004: 17). Most notably, between 2006 and 2009, the Colleges Ontario Network for Industry Innovation (CONII) – a consortia of 10 colleges with a built-up internal capacity to manage research programs – received 766 requests for research assistance from industry, started 270 applied research projects and completed 126 of them (CBC, 4; Colleges Ontario: 8). Between 2009 and 2010 alone, CONII members worked with 415 businesses on 143 projects, and an estimated 2,000 students were involved in applied research initiatives (CBC: 5).
Cont.) **Box 3.3: The Evolved Role of Ontario Higher Education Institutions in a Regional Innovation Ecosystem**

Overtime, CONII has expanded, and as of 2011 it includes 22 Ontario colleges as members (CONII, 2012). Overall, colleges have become attractive partners to other public and private sector innovation ecosystem actors who have acknowledged the breadth of applied research strengths, resources and capabilities Ontario’s colleges have built up, including industry relevant research expertise, facilities and equipment, and funding application and reporting assistance (CBC, 17-20). Additionally, in a few cases, some colleges’ lack of interest in retaining intellectual property has also been an attractive feature for private sector partners (Ibid: 20).

From an innovation ecosystem perspective, the implications of the evolved role of colleges are similar to those associated with Ontario universities. As these institutions continue to conduct innovative activity that will introduce other actors, new ideas and resources into the innovation space, the structure of Ontario’s innovation ecosystem will continue to change along with the range of needs and concerns that must be addressed if colleges are to have a greater impact vis-à-vis intensifying innovation intensity. Some of Ontario colleges’ needs and concerns to date include increasing awareness and understanding amongst potential business clients regarding the strengths and capabilities of Ontario’s colleges; ensuring that faculty, staff and students have the physical capital needed to conduct applied research; and, acquiring support necessary for building effective collaborations between other ecosystem actors and contributing to existing and emerging clusters (CBC, 36).

Like universities, the ever-evolving role of colleges in the innovation ecosystem will require decision-makers to develop a mix of innovation policies which includes demand-side and supply-side innovation policy instruments that can capably address the changing needs of these institutions and sustain Ontario’s dynamic innovation ecosystem.

Institutions will evolve in response to changes in society. That is not something to be feared…It is not possible to predict how these changes will unfold. The point is to create a structure that allows for evolution…

Rae, 2005: 15
A mix of innovation policy instruments is also deemed “integrated” if it promotes synergies across multiple policy instruments (OECD, 2011a: 97, 101 – 102; OECD, 2011b: 79). These instruments may be established and deployed by different governmental departments/ministries; however, they are premised on the shared objective of promoting innovation within a particular jurisdiction. Some of the most ubiquitous synergies exist between innovation policy, economic development policy, science and technology policy, higher education policy and labour policy. In many countries, including Canada, decision-makers also develop immigration policy instruments that have an impact on the innovation process within that jurisdiction. According to Globerman (2012), a “substantial percentage” of knowledge-workers including scientists and engineers are either immigrants or foreign students who elect to remain in their host countries after graduation (p. 4). It is suggested that an increased supply of these locally-trained individuals should also encourage an increase in the supply of knowledge that can be absorbed into the economy and contribute to the development of new innovations. Moreover, these foreign workers may create linkages with other firms and researchers from their country of origin which may lead to the emergence of new markets in the host country/region and the development of networks that facilitate the flow of knowledge and transfer of technologies between different locales.

Finally, other innovation scholars have discussed integrated innovation policy mixes in the context of synergies achieved between regional and national innovation policies to produce a vertical alignment of demand-side and supply-side innovation policies between different levels of government. A “whole-of government approach” (OECD, 2011b: 79) that cuts across regional boundaries (as well as ministerial boundaries) is deemed critical for realizing a level of cross-governmental coordination that will contribute to the growth and sustainability of a jurisdiction’s innovation ecosystem. In the absence of a government
coordinated effort, the realization of regional and national innovation goals may be substantively mitigated. To this point, Creutzberg (2011) discusses the implications of limited coordination between regional and national governments in Canada as it relates to the development of innovation policy instruments. The author draws attention to the myriad of “overlapping and confusing federal and provincial programs delivered by multiple departments with, at times, contradictory and/or overlapping objectives” (p. 1) He recommends a clearer division of policy roles, with the federal government focused on providing indirect and generic support for the innovation process while provincial governments should focus primarily on strategic investments.56 Similar to Creutzberg, Wintjes (2012) discusses the development of innovation policy in a multi-level governance context, though as it relates to the EU. He points out that the European level of governance appears to be the most appropriate for implementing supply-side R&D policies, while the national and regional levels seem to be most appropriate for the implementation of demand-side innovation policies (p. 12). Like Creutzberg, Wintjes underscores the value of lower levels of government implementing policies that are specific to a particular region’s needs and capabilities.

- Place-based

Smart innovation policy is place-based given that it is “tailored to the prevailing reality of regional contexts and based on the input, experience and local knowledge of key regional actors” (Bradford and Wolfe, 2010: 1). Decision-makers that develop policies using a place-based approach acknowledge the broad variation in regional priorities, local conditions and community capabilities, and demonstrate an acute sensitivity to the unique

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56 Creutzberg (2011) also suggests that the three levels of Canadian government (i.e. federal, provincial and municipal) should work together to determine which set of decision-makers have the authority, expertise and/or resources to resolve a particular public problem affecting cluster development (p. 11)
strengths and challenges of different locales. Similar to the neo-Schumpeterian approach to innovation, the innovation ecosystem approach promotes the development of these “territorially grounded” policies that are highly customized to meet the particular needs of a given region or city-region based (Ibid). It is worth noting that governments that employ a place-based approach to innovation policy development are advantaged by the myriad of perspectives innovation ecosystem actors at the local level can provide which can ultimately assist decision-makers in identifying problems that may mitigate innovation performance and opportunities that may encourage growth (Wolfe, 2011).

3.5 Conclusion

The innovation policy literature provides many perspectives on why government should adopt a strategic, integrated, place-based approach to innovation policy development. Decision-makers stand to benefit from applying a bottom-up approach for determining the best mix of innovation policy instruments that would foster the growth and sustainability of its innovation ecosystem. In particular, regional governments will be more successful in achieving this goal if they promote: (1) “strategic cooperation,” which encourages better alignment and coordination of available programs and policy instruments across the federal, provincial and local levels of government; and (2) high levels of civic engagement, where a broad range of societal actors with an interest in the economic well-being of their region actively participate in the design and implementation of this strategic collaboration (Wolfe, 2009b: 5). This approach to innovation policy development will ensure that the many perspectives of innovation ecosystem actors are considered; the shifting needs and concerns

57 The neo-Schumpeterian approach recognizes “the cross-country heterogeneity of existing national systems of innovation” (Kaderabkova and Radosevic, 2011: 1) Proponents of this approach promote the creation of innovation policies that is reflective of that jurisdiction’s traditions, aspirations and institutional needs (Ibid; Radosevic, 2011: 40).
of these actors are addressed; and the various components of the innovation ecosystem are collaborating effectively and efficiently.

It is important to note that many of the ideas and interests innovation ecosystem actors promote are highly variable. Indeed, there are many instances when the ideas and interests from one set of actors will complement those held by other actors. However, more often than not, these ideas and interests conflict and compete with one another. The following chapter provides an historical background to the development of research and innovation policy. The influence of ideas as well as policy network structure, agency and context will be discussed to show how these factors impacted the policy process between 1971 and 2003.
Chapter 4
Ontario’s Historical Experience Developing Policy to Advance Research, Innovation and Commercialization, 1971 – 2003

4.0  Introduction

In the 1970s, leading national and regional economies around the world were hit hard by two global oil price shocks and intensified international economic competition (Landau and Rosenberg, 1986). However, by the 1980s, the most competitive jurisdictions had established complex systems of technology, new production processes and industrial organization to generate economic and social change (Wolfe, 1999a). The magnitude of this change represented a technological revolution and the emergence of a new techno-economic paradigm (Ibid: 129). With the global diffusion of this new paradigm, decision-makers placed a premium on ensuring the necessary infrastructure and policy support were put in place to advance technological innovation and scientific knowledge production and innovation. The transition towards a new global economy was hastened with the emergence of high-technology and knowledge-intensive industries that provided their respective jurisdictions with a formidable competitive advantage.

A number of scholars have discussed the extent to which science, technology and commercialization contribute to economic growth (Stokes, 1997; Kline and Rosenberg, 1986; Landau and Rosenberg, 1986; Rosenberg, 1974; Schumpeter, 1961; Pavitt, 1991; Nelson, 2004). In particular, economists and science and technology (S&T) specialists like Keith Pavitt, Richard Nelson and Nathan Rosenberg explain how technology and science interact in complex, iterative ways and explore the extent to which advancements in research and technology enable firms and individuals to compete effectively and contribute to regional and/or national productivity. From the 1970s onward, this narrative helped to influence the
decision-making of political leaders across a number of leading economies and in turn impacted the development and deployment of national and regional economic plans and industrial policies aimed at supporting the generation and dissemination of science and technology. To this end, governments’ efforts to support R&D and innovation were integrated into its mix of industrial policies.

In line with global economic trends, in the 1970s, the Ontario government developed policy to facilitate technology transfer and leverage the province’s research strengths and commercialization capacity in order to drive competitiveness, increase productivity, and intensify job creation. Indeed, provincial decision-makers sought to establish industrial policy that linked S&T and innovation policies into the government’s plan for advancing regional economic development. However, as this chapter will show, between 1971 and 2003 the Liberal, Conservative and New Democratic Party leaders executed different approaches to achieving this goal. The purpose of this chapter is to examine the historical evolution of policy intended to advance knowledge-based economic development between 1971 and 2003. The first part of the chapter considers the breadth of political, economic and historical factors that impacted the policy process and influenced decision-making; this section is intended to highlight the set of variables that were particular to Ontario and brings to bear the extent to which changes in these variables influenced policy development overtime. The core section of this chapter reviews policy development during the Conservative, Liberal and NDP terms in office and draws attention to the key actors involved in the decision-making process.

58. A number of Canadian scholars raise attention to the Canadian government’s delayed development of policy to support science and technology relative to other economies during the 20th century. For instance, Evans (2005) compares Canada to the USA, pointing out that the Canadian government made significant contributions in information technology, telecommunications and aerospace, however Canada continued to lag behind the advanced industrialized countries and particularly far behind the United States (p. 273). Evans characterized Canada as a playing a “catch-up” role instead of “riding the crest of new waves of innovation” (Ibid).

59. Industrial policy is defined as “selective measures, adopted by the state, intended to alter patterns of investment and the structure of industrial organization to the long-term advantage of both workers and the owners of capital.” Atkinson and Coleman, 1989: 60.
the dominant ideas these actors promoted, and the context and structure of state-societal relations that existed – all of which impacted the policy process.

4.1 **Political, Economic and Historical Factors Mattered**

4.1.1 Political Factors

At a provincial level, partisan politics affected agenda-setting and policy formation. In particular, the ideology and leadership capacity of the party in power had a notable effect on policy direction and the selection of policy alternatives; changes in these political factors across time will be assessed. Moreover, the evolving relationship between the provincial government, industry and the post-secondary education sector played an integral role in shaping policy and as such, the power relations that emerged between these three groups of actors are analyzed. The impact of political priorities and ideological shifts at both the national and international levels on Ontario’s economic policy development will also be discussed. This chapter also considers the extent to which the federal government’s support for regional research and innovation activity had an impact on the Ontario’s research and innovation landscape and/or influenced provincial research and innovation policy development. Refer to Appendix 4.1 for an overview of major research and development (R&D) and science and technology (S&T) support programs and funding initiatives the federal government established and/or deployed before 2003.

Political culture also affected policy development. Ontario’s political culture is characterized by a variety of interrelated values, beliefs, orientations, expectations, and norms which makes it distinctive from other regions. John Wilson (1997) suggests that from the 19th century, Ontario’s political culture consisted of two core components that summed up the expectations Ontarians had about the elected government: (a) competent leadership and
efficient management and (b) the capacity to balance fairly the different claims of the principal interests in the province. The expectation of competent leadership and efficient management has persisted, and resonates with Ontario’s conservative orientation, while the expectation of fairness and reform resonates with the province’s progressive orientation. Furthermore, Ontario’s conservative and socialist orientations share a collectivist notion of the state which coexists with liberal values of individualism, liberty and a restricted role of the state.\textsuperscript{60} Graham White (1989) points out that moderation is a principal feature in Ontario’s political culture, and as such, the province’s political culture “is perhaps best understood as a blending of the more moderate elements of liberalism and conservatism with a tinge of socialism” (p. 17). Employing a different yet complementary approach for identifying Ontario’s distinctiveness, Sid Noel (1997a) suggests that Ontario’s political culture features a handful of operative norms: the imperative pursuit of economic success; the assumption of pre-eminence; the requirement of managerial efficiency; the expectation of reciprocity; and the balancing of interests (p. 54-65). To this end, this chapter will demonstrate the impact of Ontario’s political culture on the development of economic policy and the province’s research and innovation institutional assets over time.

4.1.2 Economic Factors

The shifts in economic activity between 1971 and 2003 produced a handful of recessions as well as periods of economic prosperity. In response to these dynamic economic conditions, international and national authorities created, realigned or terminated a number of political-economic policies. This chapter will discuss how the Ontario government weathered

\textsuperscript{60} The Hartz-Horowitz fragment theory underscores “the ideological triad of conservatism, liberalism and socialism” in Canadian political culture which accounts for patterns of national and provincial political behavior (Wiseman, 2007, 9)
these economic challenges and opportunities as well as the extent to which international and national economic factors impacted policy development.

4.1.3 Historical Factors

The historical context within which Ontario’s industrial policy was developed also affected the decision-making process of successive government regimes in Ontario. The early development of the province’s industrial policy is rooted in the Davis regime, and as the different political leaders assumed office, institutions to support economic development and technological innovation were created. These institutions became more deeply embedded in the organizational structure of Ontario’s polity which affected policy outcomes, political behavior and more specifically, political interaction, i.e. the relationship between individuals within the polity. This chapter will discuss the extent to which the “stickiness” or persistence of these institutions forced the policy process in particular directions, by eliminating or distorting the range of options the government might perceive as preferred (Pierson, 2000). The extent to which existing institutions caused political actors to adapt their strategies in ways that reflected and reinforced the predecessor government’s logic will also be considered in order to discern the degree of continuity that existed between government regimes (Thelen, 1999). While policy legacies and institutions persisted, this chapter will show how and why certain policies and institutional arrangements changed, and the extent to which this kind of institutional evolution was largely constrained by the past governments’ choices. To this end, this chapter will reinforce the idea that Ontario’s historical experience with policy development affected the policy trajectory of successive governments.

As we adapt to a very different economic structure, high value will be placed on the entrepreneurial skills of our citizens and their ability to innovate and adopt new technologies.

Ontario Budget 1984, p. 7

Before the 1970s, the Ontario government remained largely removed from industrial and technology policy-making. In terms of economic development, provincial governments were most concerned with improving the physical infrastructure of highways, generating electric power, building water and sewage systems, and expanding the post-secondary educational system (Wolfe, 1999b). Ontario and the other provinces depended on federal macroeconomic management and a positive trade policy to provide the ideal environment for economic development (Courchene and Telmer, 1998: 39; Wolfe, 1999a; Wolfe and Gertler, 2004; Clarkson, 1999). This reliance on the federal government was short-lived after the oil price hikes of the 1970s and the subsequent economic slowdown.

Inflation surged during the energy shocks of 1973-74 and 1979-80 (Courchene and Telmer, 1998: 23) and the provinces turned to the federal government for support. During this time, Ottawa was contending with constitutional issues, international trade policy and a national budgetary deficit. With such complex economic and political pressures of its own, the federal government was unwilling to implement substantive fiscal policy to reduce the economic strain that had befallen the provinces. Ontario’s economic troubles were perpetuated by increasing competition from Japanese manufacturers and pressure from domestic manufacturers for financial assistance (Wolfe, 1999a: 135). Under these fiscal constraints, the Davis administration focused its efforts on developing economic policy aimed at satisfying regional needs.
Global political and economic trends had a notable influence on the pre-decision stages of industrial policy development, bringing to bear a set of new economic ideas employed by leading economies. “Corporate capitalism” emerged in the 1970s and 1980s as a new paradigm that ushered in an economic system characterized by the dominance of a small number of firms in each sector of the economy; the ability of these firms to generate the capital needed for growth through internal savings, many without reliance on banks or share capital; and the management style of the corporation, with the rise of a new class of managers – the technical elite (Ontario Economic Council, 1972: 77-78). Proponents of this new paradigm considered the professional manager to be most powerful because of his/her utilization of tools of scientific management. Accordingly, the international community promulgated the importance of specialized knowledge – technical, managerial, financial and legal – and established policies and programs to support business activity and advance the development of specialized knowledge.

The Ontario Economic Council (OEC)\(^6^1\) – an advisory body established by the Conservative government in 1962 to isolate, examine and report on economic problems; recommend solutions; and, disseminate that information to industry and government – emphasized the significance of this international economic trend (Ontario Economic Council, 1972). The Council urged the government to develop an industrial framework that would modernize business in Ontario and recommended the development of policy initiatives that would encourage industry to make full use of specialized knowledge in its all of its operations. Overall, the OEC’s ideas afforded the Ontario government an interpretive framework of the existing political economy. Moreover, those new ideas helped to reduce the level of uncertainty associated with industrial restructuring, and provided a blueprint for

constructing the new institutions (Blyth, 2002) that were expected to resolve Ontario’s economic problems.

4.2.1 Encouraging Business Activity and Technology Transfer

The 1971 Ontario Budget announced the Davis administration’s commitment to address unemployment and restore full-economic growth in Ontario by encouraging the expansion of private sector activity. In this vein, the government rolled out the first stage of Ontario’s industrial policy which consisted primarily of tax reductions intended to encourage business investment, coupled with public restraint on expenditure growth (Ontario Budget 1971: 11). However, by the late 1970s, the government committed to targeting millions of dollars in direct public investments towards a range of projects intended to drive industrial development. For instance, in 1979 the provincial government created Small Business Development Corporations (SBDCs) aimed at investing in the growth and expansion of small businesses across Ontario; by 1981 over 140 SBDCs were registered to the province and had invested $40 million in small businesses (Ontario Budget, 1980; Ontario Budget, 1981). The SBDC program is one of the many initiatives the Davis administration developed to improve economic conditions in Ontario and support industrial activity.

During the early 80’s, the task of coordinating and implementing Ontario’s industrial strategy was principally shouldered by a cabinet committee of nine Ministers called the Board of Industrial Leadership and Development (BILD) (Ontario Budget 1981). During the early stages of developing this strategy, a number of stakeholders and municipalities provided the government with ideas and funding to invest, and between 1981 and 1982, BILD had provided about $157 million in new money to promote initiatives expected to enhance development (Ontario Budget, 1982; Ontario Budget 1981). In 1982, BILD commitments totaled $775 million, with funding expected to flow over a 5-year period to
support the development of initiatives across five sectors: human resources, natural resources, electricity, transportation, communities and technologies (Ontario Budget, 1982).

In particular, the Davis administration endeavoured to develop industrial policy that would drive technology transfer. As such, programs and initiatives were put in place to encourage the development of R&D partnerships between academia and industry, support the commercialization of research, as well as encourage private sector uptake of new technologies. For instance, the government created the Innovation Development for Employment Advancement (IDEA) Corporation, an organization intended “to bridge the gap between public and private sector research activity and to stimulate research and development in areas of critical importance to the Ontario economy, including auto parts technology, microelectronics, computer-aided design and manufacturing and robotics” (Ontario Budget 1981: 6). The Corporation was provided with $107 million over five years with the broad purpose of advancing the process of commercializing technology; major functions of IDEA Corporation included venture capital, technology brokerage and advising the government on issues related to technological innovation (Ministry of Industry and Trade, 1984: 167–169) However, the establishment of Ontario’s technology centres was one of the most significant policy innovations the Davis administration established in the effort to support the increased application of technology by businesses and in turn enhance the competitiveness of Ontario industry.

62 $65 million of IDEA Corporation’s funding was dedicated to five Technology Funds. These funds worked through joint ventures with private sector partners and invested in projects in five broad technological sectors: biological and medical technology; chemical and process technology; information technology; machine and automation technology; and microelectronics. These funds were deemed ideal mechanisms for fostering cooperation between the public sector (represented by IDEA Corporation) and the private sector (represented by investment from sources like pension funds and insurance companies.) IDEA Corporation functioned as an equity investor and expected to share in the financial returns of any project. The Corporation also incorporated two wholly owned subsidiary funds, the IDEA Research Investment Fund and the IDEA Innovation Fund (Ministry of Industry and Trade, 1984: 169-171).
63 The IDEA Corporation located commercial opportunities for new technologies in return for fees or royalties (Ministry of Industry and Trade, 1984: 172)
Between September and November 1982, seven technology centres were created: the Ontario Centre for Microelectronics (OCM) in Ottawa, the Ontario Centre for Advanced Manufacturing in three different locations, the Ontario Centre for Automotive Parts Technology (OCACT) in St. Catharines, the Ontario Centre for Resource Machinery Technology (OCRMT) in Chatham, and the Ontario Centre for Farm Machinery and Food Processing Technology (OCFM & FPT) in Sudbury (Ministry of Industry, Trade and Technology, 1991). These centres were mandated to improve the efficiency of the production process through the application of technology; encourage and aid in the development of high technology productions through advice, funding and prototype development; provide training programs in advanced technology to industry; provide information, seminars and technology awareness activities; and demonstrate technology hardware and software applications (Ministry of Industry, Trade and Technology, 1991: 8). BILD covered the capital and operating costs for the technology centres up to 1985, initially committing $100 million over five years (Ibid: 15). With this funding, each centre was responsible for delivering four major activities: consulting (35%); training (20%); information and awareness (20%); and financing (25%).

In March 1984 the Ministry of Treasury and Economics released the report, 


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64 This centre had three locations – Head Office in Rexdale, CAD/CAM (Computer-aided Design and Computer-aided manufacturing) in Cambridge and Robotics in Peterborough. A fourth location – Canada/Ontario Centre for Advanced Manufacturing – was established in Windsor in November 1984 (Ministry of Industry, Trade and Technology, 1991: 7).

65 At their peak period of operation, the operating budget, capital budget and number of staff for each Centre was as follows: Ontario Centre for Microelectronics staffed 41 employees and had an operating budget of $4.3 million and capital budget of $1.2 million; the Ontario Centre for Automotive Parts Technology had an operating budget of $5.6 and a staff of 33; the Ontario Centre for Advanced Manufacturing had a combined staff count of 100, an operating budget of $9.7 million and a capital budget of $1.5 million; the Ontario Centre for Farm Machinery and Food Processing Technology had 31 staff members, an operating budget of $2.1 million and a capital budget of $1.1 million; and the Ontario Centre for Resource Machinery Technology had 11 staff members, an operating budget of $1.6 million and an investment budget of $4.5 million (Ministry of Industry, Trade and Technology, 1991: 7 – 13).

66 The BILD program was terminated on July 12, 1985.
The document outlined the importance of innovation as well as the application and diffusion of new technologies in economic transformation. It discussed Canada’s innovation performance in an international context and reviewed the range of knowledge-intensive activities in Ontario with a focus on the high-tech manufacturing and service sectors. The report also underscored the significance of government policies in supporting innovation and encouraging established industries to adopt new technology. A short list of future policy directions the Ontario government should pursue in the context of the transformation of the Ontario economy was offered, and four policy areas were identified as emerging priorities: human resources, research and development, capital markets and industry policies to encourage both innovation and diffusion (1984: 33, 49-51). The report recognized that a number of programs to promote innovation and diffusion in these areas had already been established (See Table 4.1), and suggested that the continuing challenge was to adapt Ontario’s policies to changing political and economic circumstances.

Table 4.1: Programs to Promote Innovation and Diffusion, Davis Era

<table>
<thead>
<tr>
<th>Human Resources: Education and Training</th>
<th>R&amp;D Funding</th>
<th>Capital Markets</th>
<th>Industry Policies for Innovation and Diffusion</th>
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<tbody>
<tr>
<td>In fiscal year 1983-84, provincial funding for operating grants, capital grants and BILD programs to support PSE institutions totaled $2.5 billion</td>
<td>Ontario Research Foundation: specialized in industrial problem-solving through the provision of technical services, including R&amp;D, to small firms on a contractual basis ($4.1 million)</td>
<td>Small Business Development Corporations Program: introduced in the 1979 Budget, provided incentives to assist equity investment in small businesses. This program was not restricted to technology-based firms</td>
<td>Assisting Innovation: Targeted assistance for innovation projects was provided through BILD. These projects included: Ontario Centre for Remote Sensing; Telidon: Teliguide; Institute for Hydrogen Systems; Transit Information, Communication and Control Systems; Canadian Educational Microcomputer; and Exploration Technology Development Fund</td>
</tr>
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Human Resources: Education and Training

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<th>R&amp;D Funding</th>
<th>Capital Markets</th>
<th>Industry Policies for Innovation and Diffusion</th>
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<tbody>
<tr>
<td>Ontario Training Incentive Program: provided incentives to employers and employees to encourage long-term on-the-job training; provided unemployed workers with a combination of training and employment ($6.0 million)</td>
<td>The Ontario government R&amp;D expenditures: funded in-house initiatives as well as extramural contracts, grants and research fellowships. Non-governmental recipients included industry, universities, hospitals and health organizations, Ontario Research Foundation</td>
<td>Assisting Innovative Small Business: The Ministry of Industry and Trade provided programs to assist small businesses during various stages of innovative process.</td>
</tr>
<tr>
<td>Training in Business and Industry: assisted employers and employees in preparing for the implementation of advanced technology ($9.4 million)</td>
<td>BILD: provided matching grants to 11 universities for research contracts received from the private sector ($4.3 million)</td>
<td>IDEA Corporation: encouraged and financed technological innovation</td>
</tr>
<tr>
<td>Employer Sponsored Training: provided support funding for Community Industrial Training Committees to facilitate the involvement of government, employers, community colleges and unions in identifying skill requirements at the local level ($3.4 million)</td>
<td></td>
<td>Assisting Diffusion through Technology Centres: The Ontario Technology Program assisted the diffusion of technologies. Six industry-oriented technology transfer centres were created and dispersed throughout the province</td>
</tr>
</tbody>
</table>

Source: (modified) Economic Transformation: Technological Innovation and Diffusion in Ontario, March 1984

The 1984 Ontario Budget reaffirmed the government’s commitment to develop programs and policies that would address employment and training, support innovation enterprise and small business, and build university-industry R&D collaborations. Notably, the budget announced a $30 million University Research Incentive Fund to improve the research capacity of Ontario universities and strengthen their relationship with the private sector. Universities were expected to attract two dollars of investment from the private sector to match every dollar drawn from the fund. This initiative established a precedent in university research funding for Ontario, as not only was this the province’s first matching
funds program, but more fundamentally it was the first time the provincial government funded the direct costs of university research through a targeted program (Trick, 2009). The Davis government anticipated the program would generate $90 million in new resources over the next three years “to help Ontario universities and Ryerson acquire state-of-the-art equipment and to stimulate research activity most relevant to the innovative demands of the provincial economy” (1984 Ontario Budget, Budget Statement: 7).

4.2.2 Reflection

Altogether, a number of new institutes, tax incentives, grants and assistance programs were created to encourage R&D cooperative ventures and technology transfer between industry and universities (Strangway and Walmsley, 1985). Programs were also developed to engage industry investment at a regional level. These industry-oriented policies are particularly noteworthy given that over the four decades of Progressive Conservatives governance in Ontario, there were only meagre efforts made to develop strong political-industrial ties or social relations, especially when compared to the Quebec government and industry counterparts.

Despite these policy advances, the government’s performance received mixed reviews. For instance, the Davis administration recognized the capacity of the university sector to become “the basis for the growth of innovative firms” (Ontario Budget, 1984: 7). Indeed, the provision of funding aimed at supporting scientific discovery was integral to

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67 Ryerson was a polytechnical institute up until 1993, when it was granted full university status by the Ontario government.
68 In February 1985, Premier Davis resigned and Frank Miller became the leader of the PC party and Ontario’s nineteenth Premier. Even though Miller’s and Davis’ political philosophies diverged – Davis occupied the middle of the political spectrum while Miller leaned more to the right – industrial and technology policy direction in Ontario remained the same (February – June 1985) until the rise of the minority Liberal government later that year.
69 Clarkson (1999) suggests that during the Davis years, Queen’s Park had “never developed the same degree of direct government involvement in supplying credit, management expertise and public participation in the economy and never offered the same level of financial incentives to its entrepreneurs as had Quebec” p. 88. In turn, business had very little interest in liaising with the Ontario government on policy issues and opted to focus on federal policy.
evolving Ontario’s research and technological development capacity. However, the Ontario
government still had a long way to go in developing truly integrated policy that demonstrated
a robust linkage between post-secondary education policy, industrial policy and
governmental R&D policy goals and initiatives. This in turn mitigated the realization of the
province’s R&D capabilities and economic growth potential. Governmental efforts at
strengthening public-private partnerships aimed at advancing technological development
were also critically scrutinized. It was suggested that the IDEA Corporation was unable to
fully realize its mandate, and for some observers, IDEA was a failure (Wolfe, 1999a;
MacDermid and Albo, 2001). On the other hand, a number of analysts and stakeholders have
maintained that the province’s technology centres were successful at fulfilling their mandates
to the extent to which they were instrumental in supporting industry’s increased adoption of
new technology (Wolfe, 1999a) and generating significant public and private benefits.\footnote{In 1986, Data Resources of Canada released a report that measured the economic benefits this program accrued to the
client-firms it assisted (i.e. private benefits) as well as the impact it had on the Ontario economy (i.e. public benefits)
between 1984 and 1985 (Data Resources of Canada, 1986). The analysis concluded that in relation to private benefits
alone, the centres produced a present-value of $59.8 million in 1984/85 through increases in sales, cost savings, import
replacement, export activity and increases in profit (Ministry of Industry, Trade and Technology, 1991: 15). At a cost
of $14.1 million of public funding, the aggregate cost benefit ratio of these activities was 4.2 to 1 (Ministry of Industry,
Trade and Technology, 1991: 15; Data Resources of Canada, 1986: 3). In regards to public benefits, the study estimated
that the impact on the provincial economy vis-à-vis increased demand for labour, raw materials and equipment
generated a cost-benefit ratio of 19.7 to 1.}
However, despite these achievements, Ontario’s technology centres were relatively short-
lived. By the end of the Premier Peterson’s term in office, all of them had been privatized
and/or wound down (Ministry of Industry, Trade and Technology, 1991).
4.3  **Building up Ontario’s Industrial Strategy in order to compete in a New Global Economy, 1985 – 1990**

We are developing a fresh, comprehensive approach to industrial policy. It must involve all sectors of Ontario’s economy: government, business and labour. It will focus on science and technology to meet the challenges of the new international economy. It will be based on the fundamentals of economic progress – people and ideas.

*Ontario Budget 1985, p. 1*

Ontario’s economic performance was improving by the time the minority Liberal government assumed office in 1985 (Gagnon and Rath, 1992: 39; Courchene and Telmer, 1998). By the end of the 1987 fiscal year, the province achieved high growth rates at 6.8% (Ontario Economic Accounts, 1988: 1). The following year, real GDP rose 4.9%, making 1988 the sixth consecutive year of economic growth in the province. According to the Ministry of Treasury and Economics’ Office of Economic Policy, this growth was attributed to business investment, housing and consumer spending and moderated by a decline in the trade balance, as imports increased at a much faster pace than exports (Ontario Economic Accounts, May 1989: 1-2). Summarily, during the first few years of Liberal governance, policy development occurred at a time of economic growth which provided the government with the latitude to develop more policies and programs that were intended to further enhance provincial economic performance and improve Ontario’s competitive position in the new global economy.

While positive growth in the economy substantively affected the policy process in Ontario, arguably the political context had an even greater influence. At a national level, the federal government was increasingly concerned with macro-economic issues like debt reduction, and had more fully embraced a “neo-conservative belief in the invisible hand”

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71 The province’s economic performance was also tied to a number of external factors, namely economic growth in the USA, Western Europe and Japan; federal monetary policy; changes in interest rates and foreign exchange rates; and the price of oil and natural gases. See the Ontario government’s publication *Economic and Fiscal Review – 1986, p. 5*
Moreover, the pressure of continental integration and globalization further eroded federal powers, affording provincial governments greater political power and discretion to develop micro-economic policies that would make the region more internationally competitive (Ibid.) At the same time, leading jurisdictions around the world were developing technology and innovation policies that would facilitate the development of clusters in knowledge-intensive industries and support the establishment of research and innovation networks. As such, regional governments assumed a leadership role in setting policy direction and developing technology and innovation policy that would harness the strengths of their local innovation and technology actors.

Partisan politics also affected the development of industrial policy in Ontario, especially between 1985 and 1987. The minority Liberal government took office after the signing of the Liberal-NDP Accord, which came into effect on May 1985 and expired in June 1987 (Wolfe, 1999a: 137; Gagnon and Rath, 1992: 26). The Accord was an agenda-setting mechanism for the first two years of the minority Liberal government, outlining the social and economic reform measures both parties had reached a consensus on. Throughout the duration of the Accord, the Liberals did not face any substantive policy contestation from the opposition parties; for the most part, the government’s ideas regarding economic development and technology and innovation advancement were generally supported by the NDP and went largely unchallenged by the Progressive Conservatives (Gagnon and Rath, 1992: 83, 47). The minority Liberal government also maintained fairly good relations with the Queen’s Park press gallery during this time, which influenced to some degree the reduced level of scrutiny the governing party endured when compared to the predecessor government (Ibid., 30). In the absence of any “real opposition”, the Liberals forged ahead with setting
policy goals and developing the policy mix it deemed appropriate for improving the region’s technological and innovation capacity and bolstering Ontario’s global competitiveness.

4.3.1 Advancing Technological Innovation, Fostering Science and Technology, Investing in Entrepreneurship

The 1986 Ontario Budget laid out the Liberal government’s plans, which included strengthening the links between the private sector and Ontario’s universities in order to promote technological innovation; supporting new and growing companies which generate most of the new jobs; encouraging better training and retraining to build tomorrow’s skills in today’s workplace; promoting excellence in Ontario’s schools, colleges and universities; and supporting entrepreneurship (Ontario Budget, 1986: 3-4). These economic ideas and policy goals appeared to be somewhat of a seamless continuation of those held by the predecessor PC government. However, intent on developing “a fresh, comprehensive approach to industrial policy,” and in tune with the reformist orientation of Ontario’s political culture, the Peterson government dissolved the Ontario Economic Council and replaced it with the Premier’s Council.

- The Premier’s Council

The Premier’s Council was announced in the April 22, 1986 Speech from the Throne with a mandate to “steer Ontario into the forefront of economic leadership and technological innovation” (Premier’s Council, 1988a: 5). Premier Peterson chaired the council, which

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72 In 1984, the Davis government commissioned D. W. Stangway and M. F. Walmsley “to examine the need for mechanisms by which the Premier and/or Cabinet can receive science advice directly from a broad cross-section of the science and technology community in Ontario.” (Stangway and Walmsley, 1985: 2) In fulfillment of these terms of reference, Stangway and Walmsley produced a report in January 1985 that recommended the establishment of (a) an advisory council for science and technology reporting to cabinet; (b) a Ministry of Science and Technology; (c) a body similar to the Science Council of Canada; and (d) a cabinet committee. Moreover, the authors stressed the importance of the provincial government creating a Science and Technology Advisory Council for the coordination of Science and Technology policy in Ontario reporting to cabinet through the premier or his designate. Strangway and Walmsley recommended that the council should be comprised of representatives from industry, government, academic and the lay public. The creation of the Premier’s Council during the Peterson term reflected some degree of consensus with the recommendations of the Strangway and Walmsley report.
consisted of six Cabinet Ministers\(^\text{73}\) and leaders of the business, labour and academic communities (Premier’s Council, 1988a: 5; Courchene and Telmer, 1998: 109). The council was designed “as a testing ground for the creation of a broad consensus mechanism that represented the diverse but compatible interests of the Ontario economy” (Ibid., 34). Its assorted membership was meant to demonstrate the government’s willingness to include a range of interests and employ a “negotiated” approach for developing joint economic development strategies (Bradford, 2002: 229). This mode of policy development was completely new to Ontario, yet it resonated with the province’s tradition of consensus building and balancing of societal interests. Overall, the council was used to define Ontario’s economic challenges; articulate the ideas and interests of Ontario’s corporate, academic and governmental sectors; as well as propose a range of policy options for harnessing the province’s technological and innovation potential.

Before the Premier’s Council presented the results of its consultations and deliberations, the Ontario government established three noteworthy initiatives (Wolfe, 1999a: 138). The first was a ten-year $1 billion Technology Fund, announced in 1986. This fund was directed by the council and intended to support various initiatives and joint ventures, some of which involved partnerships with the federal government, universities and the private sector (Ontario Budget, 1986: 4; Wolfe 1999a). The second initiative – Innovation Ontario – was designed to provide venture capital assistance of up to $250,000 to new small technology-intensive businesses in the early stages of commercializing their first product (Premier’s Council, 1988b: 71). It was also intended to provide assistance for licensing and joint ventures, and for firms developing technology-intensive products purchased by all levels of

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\(^{73}\) The six Cabinet members serving on the council held the following ministerial portfolios: Industry, Trade and Technology; Treasury/Economics and Financial Institutions; Skills Development; Labour; Education; and Colleges and Universities.
government (Ibid). The funding program was managed by the Innovation Ontario Corporation; in its first year (1986-87), Innovation Ontario provided funding to fifty-five companies for under $7 million (Premier’s Council, 1988b: 71).

On June 1987, the government rolled out the third initiative, the seven Centres of Excellence (Wolfe, 1999a: 138-139; Ontario Budget, 1988: 30). The centres were financed by the Technology Fund and were designed to stimulate advanced scientific research, to train and develop world-class research talent and to encourage the transfer and diffusion of technology through collaborative research networks between universities and industry (Abbott and Jones, 1988: 1). See Appendix 4.2 for a brief review of the development of the original seven Centres of Excellence.

- Report of the Premier’s Council, 1988

In 1988 the Council released its report, *Competing in the New Global Economy*, and presented it to the government as Ontario’s “blueprint for competitiveness in the international marketplace and the trade regimes that are part of it” (Bradford, 2002: 229; Premier’s Council, 1988a: 34, 6). This publication formally articulated the set of ideas, beliefs and values that undergirded the Liberal government’s industrial strategy as well as the associated policies, programs and institutional assets that emerged between 1985 and 1987. According to the council, the industrial competitiveness of a jurisdiction is influenced by its capabilities in science and technology. In turn, the council supported a “major shift in public and private resources to greater sciences and technology investment” (p. 29). The council also promoted increased investment in “high-growth and emerging industries” and pointed out that while Ontario enjoyed high value-added per employee and a positive trade balance in a handful of

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high growth sectors such as aerospace and telecommunications equipment, the province was suffering major trade deficits and relatively low value-added per employee in sectors like computer hardware, software, medical instruments, pharmaceuticals and semiconductors (p. 121). Notably, the report acknowledged that Ontario could not afford to be exceptional in all high growth and emerging sectors, but instead, investments should be focused on building Ontario’s strengths in a smaller number of important new technologies (p. 30). This process of shifting production to higher value-added per employee activities was called “industrial restructuring” (Wolfe, 1999a: 138).

The council had definitive ideas regarding the government’s role in industrial restructuring. In line with one of the core norms of Ontario’s political culture – the requirement of efficient management – the council called for an activist government that would steer the Ontario economy towards fostering entrepreneurship based on technological innovation (Clarkson, 1999: 87). More specifically, it advised the government to support indigenous firms in internationally traded sectors with good prospects for building home-based, transnational corporations which concentrated their planning, product development, marketing and manufacturing in Canada (Ibid.)

Additionally, government was urged to consider the integral and interdependent roles industry and universities can play in advancing Ontario’s competitiveness. The council critically reviewed the state of Ontario’s industrial base, concluding that Ontario’s industrial weakness was attributed to a “low level of [R&D] spending in most industries, the dependence of too many sectors on undifferentiated commodity-type products, the presence of seriously uncompetitive plants in certain core industries, and the inadequate support climate for both entrepreneurial start-ups and larger, but not yet fully multinational threshold companies” (p. 12). Ontario’s educational and training systems were also reviewed and
compared to those of competitor jurisdictions. The council determined that Ontario had not yet achieved a comparable level of performance and hence its educational and training systems could not effectively contribute to resolving Ontario’s economic challenges. It was advised that the government should invest more in the “human infrastructure in Ontario” and find ways of focusing science and technology infrastructure in Ontario universities and government labs more on industrial priorities and world-class performance (Premier’s Council, 1988a: 12).

Altogether, the council made fourteen core recommendations, insisting on a substantive reform of the industrial and technology framework established during the Davis regime (Premier’s Council, 1988a: 15-34). While every recommendation was not addressed, the government developed a number of programs to advance some of the Premier’s Council’s ideas; most of these programs were announced in the 1988 Ontario Budget. For instance, the council recommended a stimulus to investment in industrial R&D. In response, the government established the Research and Development Super Allowance “to provide an incentive to innovation and productivity improvement in Ontario by offering an extra 25% deduction for large firms and 35% for small businesses for R&D expenditures” (Ontario Budget, 1988: 4). A five-year Technology Personnel Program was created to assist smaller manufacturing firms to hire staff that could purchase and deploy advanced technologies in their factories (Ontario Budget, 1988). The council also recommended that the government use its buying power to support high-tech companies. In turn, the Strategic Procurement Program was created (Ontario Budget, 1988). Additionally, a new Technicians and Technologists Skills Updating Program was announced which would offer training and skills upgrading for people employed in rapidly changing workplaces (Ontario Budget, 1988). Budget 1988 also committed approximately $200 million to fund the seven Centres of
Excellence under the Technology Fund over a five-year period (Ibid.; Premier’s Council, 1988a: 30; Wolfe, 1999a: 139). Finally, the Industry Research Program was established “to stimulate leading-edge industrial R&D in areas of strategic importance with a demonstrated potential for export or import replacement” (Wolfe, 1999a: 139). All of these initiatives supported the development of a robust supply-side innovation policy mix in Ontario.

The industrial policy framework the council presented was only partially implemented before the Liberal government’s electoral defeat in 1990 (Wolfe, 1999a: 139). One noteworthy recommendation that was not addressed during Peterson’s term was the establishment of a new Ontario Training Board; there were several political factors that precluded the development of this institutional innovation (Wolfe, 1997: 158-161). First it should be noted that the political and economic context for establishing a new board was ideal. In the Throne Speeches of 1987, the government acknowledged the need for more highly skilled workers in Ontario to enhance the province’s competitiveness in a globalized, technology-oriented economy (Ibid.) The council then set off to pen a report that would detail the government’s policy direction. The report offered recommendations to drive Ontario’s training agenda, and included the establishment of a new Ontario Training Board for delivering training. The first draft of the report infuriated labour representatives on the council; they believed that the overall approach did not reflect the perspectives of the labour movement, and threatened to resign if the report was not rewritten (Wolfe, 1997: 158). After six months of intense social bargaining, the council released its final report, People and Skills in the New Global Economy (1990). The publication emphasized the importance of the government investing in education, training, and skills development in order to mitigate the labour adjustment challenges that came along with economic restructuring and technological change (1990:3). Details regarding the mandate, structure and membership of the Ontario
Training and Adjustment Board (OTAB) were also provided. The board was envisioned as “a bipartite management and labour authority [that would provide] strategic direction for the funding and delivery of workplace training and adjustment activities in the province” (1990: 140). However, the council’s best laid plans came to naught. Protracted deliberations over the report had stolen the time necessary for implementing OTAB. After the 1990 election ushered in the NDP government, the probability of establishing OTAB as well as the other council recommendations was unknown.

4.3.2 Reflection

A comparison of the Peterson government’s development of industrial policy to support economic development and advance technological innovation with that of the Davis government reveals evidence of ideational overlap and policy continuity on the one hand, as well as ideational innovation, institutional innovation and displacement on the other hand (Streeck and Thelen, 2005; Thelen and Steinmo, 1992). There were a number of core ideas that the Davis and Peterson governments subscribed to and these ideas fed into the development of several institutions established between 1971 and 1990. Both premiers believed in “the fundamental primacy of the provincial market economy and the private sector” (White, 1998: 162). The Davis and the Peterson governments devised policies premised on the imperative to pursue economic success. To this end, both premiers acknowledged that regional economic development could be enhanced if the government developed policies and programs to support research and enterprise at universities, advance entrepreneurship, encourage industry-university collaborative ventures, and incentivize business investment in R&D.

However, the different political and economic contexts in which policy development took place during the Peterson and Davis eras substantively impacted the agency of the
provincial government. The Davis government was largely disadvantaged by fiscal constraints, while policy development during the Peterson years occurred at a time of economic growth, providing the government with an increased level of spending power. Another noteworthy difference between the two regimes was in their response to globalization pressures. Arguably, the Davis government had just begun to appreciate the impact globalization would have on the Ontario economy. As Courchene and Telmer (1998) point out, “the Peterson Liberals were the first Ontario government to attempt, conceptually at least, to come to grips with the implications of globalization and the knowledge/information revolution for human capital and industrial structure” (p. 109).

The impact of the Premier’s Council on the nature of state-societal relations across Ontario’s industrial policy sector is worth highlighting. Arguably, prior to the Peterson years, the formation of industrial policy was much more state-directed. However, the establishment of the Premier’s Council reflected the government’s decision to employ a more inclusive approach to policy development. The Peterson government further distinguished itself from its predecessors by rebranding, repurposing and/or terminating a number of initiatives established during the Davis era. As mentioned before, the Ontario Economic Council was wound down and succeeded by the Premier’s Council; Davis’ BILD and the IDEA Corporation were terminated; and the five technology centres from the Davis era were sold or privatized. While the Peterson government continued to finance the University Research Incentive Fund from Davis’ regime, it was eventually overhauled and brought under the Technology Fund\(^5\) (Wolfe, 1999a; Kwinter, 1987). A combination of ideational overlap,

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\(^5\) By 1992, nine programs were funded by the Technology Fund: the Centres of Excellence, the Industry Research Program, the Technical Personnel Program, the University Research Incentive Fund, the Technology Adjustment Research Program, Centres of Entrepreneurship, Radarsat, International Research and Development Agreements, and the Research and Development Super Allowance (Ministry of Industry, Trade and Technology, 1992). In 1993, Technology Ontario – a new branch of the Ontario Government’s Ministry of Economic Development and Trade – was established to administer the funds associated with the Ontario Technology Fund; Martin Walmsley was appointed the
policy continuity, and institutional/policy innovation and displacement is apparent when comparing the Davis and Peterson governments; it is also evident in a comparison between the Peterson and Rae governments.


Our economic strategy is based on social partnerships. Ontario's ability to increase productivity, adopt advanced technologies and managerial practices, enhance workers' skills and invest in emerging businesses depends on developing new working relationships. Government has a leadership role to play in creating the conditions which will allow labour, business and communities to work out cooperative responses to economic change.

*Ontario Budget Speech, 1991*

Near the end of the Peterson regime, economic growth had slowed. In the summer of 1990, real interest rates soared and the Canadian dollar reached a twelve-year high (Ministry of Treasury and Economics, 1990: 1). The province’s fiscal position was deteriorating. By the close of the fourth quarter of 1990, the economy recorded its third consecutive quarterly contraction and its sharpest decline since early 1982 (Ontario Economic Accounts, April 1991). Moreover, the unemployment rate was rising steadily, from an average of 5.1 per cent in 1989, to 6.3 per cent in 1990 to 9.9 per cent in March 1991. By the end of the 1990-1991 fiscal year, Ontario’s deficit had grown to $3.03 billion.

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Director of Technology Ontario (Ministry of Economic Development and Trade, 1994: 2; 4). The goals of Technology Ontario was to enhance the linkages between industry, labour, universities, and government in scientific areas of strategic importance to Ontario; to increase the development and export of advanced, high-value products and services’ to expand the market within Ontario industry and research community for people with advanced technical skills and research capabilities, while encouraging more students to pursue research careers; and to strengthen public awareness and understanding of the importance of science and technology in wealth creation and in turn the ability to support the social services important to Ontario’s standard of living (OCE, 1993: i). Technology Ontario continued to finance many of the other initiatives under the Technology Fund, though for 1992/93, funding ceased for the Centres of Entrepreneurship (Ministry of Economic Development and Trade, 1994: 20).

76 According to the Ministry of Treasury and Economics, “the high real interest rates engineered by the Bank of Canada in 1989 and 1990 were the major determining factor in the timing and severity of the recession.” See *Ontario Economic Outlook – Meeting the Challenges*. December, 1999.
A newly elected NDP government faced these daunting economic challenges upon assuming office on October 1, 1990.

Ontario’s economic woes were exacerbated by ongoing federal-provincial tensions. As a result of actions taken in the federal budgets of 1990 and 1991, federal transfers were reduced by $1.6 billion below previous commitments for the 1991-92 fiscal year (Laughren, 1991). The federal government’s decision to cap the Canada Assistance Plan (CAP) payments to Ontario worsened Ontario’s debt and created an even greater economic challenge for the newly elected NDP administration seeking to revive Ontario’s status of pre-eminence, demonstrate leadership acumen and managerial efficiency, and ultimately restore Ontario’s economic well-being.

Under the dual pressure of economic insecurity and the cultural expectation that government should pursue economic success and demonstrate managerial efficiency, the NDP government developed a plan for “economic renewal.” According to the Ministry of Treasury and Economics, economic renewal entailed restructuring Ontario’s industries so as to create high levels of employment in well-paying, high value-added jobs. Economic renewal also called for individuals and firms to adjust to economic restructuring; improved training programs and the promotion of life-long learning were expected to facilitate this process. Furthermore, economic renewal required the government to provide continuous support for innovation in products, processes and organizations.

Most notably, the Ontario government’s policy formation process was influenced by ideas that considered the province’s relationship to its “conditioning world context” (Clarkson, 1999: 82). Indeed, the global political economy had a noteworthy influence on the

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way the government interpreted Ontario’s economic challenge and the policy alternatives that were selected to address the challenge at hand. Premier Rae was aware that if the province were to become a competitive member in the global economy, when it came to developing an industrial strategy, Ontario would have to adjust its policies as a result of its membership in the North American Free Trade Agreement (NAFTA), the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (Rae, 1996: 288).78

Domestic political challenges also affected policy development. Wolfe (1999a) summarizes the NDP government’s concerns:

The first concern was to prevent a philosophical gap between the broader macroeconomic focus of the Ministry of Finance and the narrower emphasis on technology and innovation that framed the industrial and technology policy. The second concern was to overcome the internal divisions within the bureaucracy that had characterized the previous government’s efforts. The third concern was to devolve responsibility for economic development on to the broadest range of actors, both within and without the government…A final challenge for the NDP to cope with was the business hostility that quickly developed towards the broader equity and industrial relations agenda (p. 140-141)

The 1991 Ontario Budget conveyed how the NDP government would address these concerns, satisfy the electorate’s appetite for economic renewal and provide a new roadmap for industrial restructuring. Similar to the Peterson government, the Rae administration committed to support innovation in knowledge and technology-based industries, promote the

78 The NDP’s approach to industrial policy development was influenced by the work of a small group of intellectuals the party organized in 1988; these issue experts were asked to submit ideas regarding policy development on a range of issues including immigration, tax fairness and industrial strategy (Walkom, 1994: 92-94). This economic policy review was coordinated between 1988 and 1990 by the then Treasury critic for the party, Floyd Laughren with the intention of stimulating fresh, innovative thinking (Wolfe, 1999a: 140; Walkom, 1994: 92). On the issue of industrial strategy, one of the participants in this review, David Wolfe, underscored the link between provincial industrial policy, international competition and free trade. Wolfe argued that Ontario should develop policy that demonstrated an acceptance of the internationally competitive world of free trade rather than isolate itself from the globalized economy. He advised that “Ontario’s strategy should focus on restructuring the economy away from older industries and towards newer ones that produced high value-added commodities (and thus permitted high wages) able to compete internationally” (Walkom, 1994: 94). These ideas, along with those of the other participants in the economic policy review, contributed to the evolution of the NDP’s industrial and technology policies (Wolfe, 1999a: 140).
clustering of high-tech companies, encourage R&D and technology diffusion, and advance collaborative ventures between the post-secondary sector and industry (Clarkson, 1999: 93, 101). As such, the NDP government continued to fund the Centres of Excellence and the Technology Fund. In the ongoing effort to engage industry, $50 million was committed to R&D Super Allowance to provide tax incentives for private sector R&D. Additionally, funding for the Innovation Ontario Corporation and Innovation Ontario was increased to address the shortage of investment capital for high-tech firms.

4.4.1 Ontario’s Associative Governance Experiment

Even though the 1991 Ontario Budget contained elements of policy continuity, it also defined the new ideas the Rae administration had formulated and the scope of policy change the NDP government intended to introduce. The formative ideas undergirding the government’s new industrial strategy were largely influenced by its partisan worldview, social democracy. Social democracy welcomes a range of interests to contribute to the pool of strategic knowledge about the economy and its innovation potential, and it requires members of civil society to organize and cooperate in order to design governance structures or networking institutions that would improve the market (Bradford, 2002: 224). This approach to policy formation corresponded closely with the “associative model of governance” the Rae administration envisioned for Ontario.

Associative governance entails devolving responsibility for policy outcomes on participating members of civil society and it requires the state to facilitate negotiation and decision-making among these members (Wolfe, 2002a, 230; Bradford, 2002: 225) In the effort to drive associative governance, Premier Rae emphasized the government’s commitment to developing “social partnerships” consisting of representatives from business, labour and all interested sectors in the community, working together to design and implement
“Ontario’s strategy for sustainable prosperity” (Ontario Budget 1991: 101). The government’s focus on moving Ontario towards a knowledge-based, export-oriented economy while advancing the interests of a wide spectrum of groups was known by many as “progressive competitiveness” (Bradford, 2002: 231). To drive progressive competitiveness, the Rae government in turn established “an associative infrastructure” for designing and implementing policy at the level or scale of industrial sectors (Ibid.)

While Peterson used the Premier’s Council as a vehicle for providing expert advice to government, in re-launching the Council as part of Ontario’s associative infrastructure, Premier Rae hoped that its members would engage one another in dialogue about common challenges and action strategies (Bradford, 2002: 230). Developing trust ties and social capital amongst its members was a high priority. This exercise in establishing new goals and purposes for the council, or “institutional conversion,” provided the NDP government with the opportunity to foster social learning79 between and within leading sectors (Streeck and Thelen, 2005, Gertler and Wolfe, 2004: 107).

The Rae administration’s goal of developing strong social partnerships and transitioning Ontario to a more innovative and learning economy was complicated by the cultural and political-economic context within which these ideas for associative governance were being proposed (Bradford, 1998). Ontario’s economy was based in a market-oriented, liberal politics with relatively no historical experience in establishing networks and collaborative relationships between the public and private sectors; for the most part, those networks and working relationships are deemed the “lifeblood of associative governance” (Wolfe, 2002a: 228; Bradford, 1998: 540). Despite the challenges these historical and

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political-economic factors presented, the Rae administration successfully constructed a model of associative governance that reflected the NDP’s ideological stance, largely as a result of government agency.

The associative governance approach featured prominently in the Ministry of Industry, Trade and Technology’s policy document *An Industrial Policy Framework for Ontario*. The framework was at the centre of the economic renewal plan, and articulated the government’s intention to leverage the combined efforts of workers, businesses, governments and communities in order to focus support on sectors and firms with the capacity to generate higher wage, higher value-added and environmentally sustainable jobs (Wolfe, 1999a: 142; Wolfe, 2002a: 235). The framework focused on six “competitive fundamentals”: continuous innovation; raising skill levels; increasing technological capability; establishing companies’ home base activities in Ontario; developing linkages and networks; and, building international capabilities (Ontario Ministry of Treasury and Economics, 1992: 6.) It also discussed the government’s role in assisting private sector restructuring: the government proposed to invest in the “people and physical” infrastructure of Ontario’s new economy with an emphasis placed on worker skills and high technology (Bradford, 1998: 558).

A handful of new programs and institutional innovations were created to advance Ontario’s Industrial Policy Framework. To strengthen the province’s human capital reserve, the Rae government revisited some of the ideas articulated in the Premier’s Council’s 1990 publication, *People and Skills in the New Global Economy*. In particular, the Rae administration saw promise in creating the Ontario Training and Adjustment Board (OTAB) – a multipartite agency comprised of representatives from industry, labour, and community
groups, was established to ensure that skills training and labour adjustment programs were developed through partnership to support a skilled and flexible labour force (Jackman, 1992b; Jackman, 1991). Diverging from the original vision of the OTAB in 1990, this new model granted the agency control over both policy direction as well as program delivery, whereas in Peterson’s vision of the OTAB, program delivery remained under the purview of government ministries (Wolfe, 1997: 165).

In the 1992 Ontario Budget, the government also announced the establishment of a three-year (later extended to six years) $150 million Sector Partnership Fund (SPF) (Wolfe, 2002a; Jackman, 1992a). David Wolfe played a key role in the design and implementation of the SPF, which was intended “to provide assistance to cooperative sector projects based on an approved strategy fashioned by key players within the sector. Its overall objectives were to improve the competitiveness of sectors and foster their development by promoting the shift to higher value-added activities” (Wolfe, 2002a). Participating firms were enabled to develop strategic plans for their respective sectors and offer proposals to the government regarding the set of programs and initiatives that would be best suited to strengthen sector capabilities and enhance sectoral productivity levels (Gertler and Wolfe, 2004: 107; Bradford, 1998: 559). In turn, the Fund facilitated dialogue, negotiation and mutual learning in individual sectors and between the government and individual sectors (Gertler and Wolfe, 2004: 107).

The OTAB and the SPF promoted a partnership agenda. Compared to past governments, the NDP administration placed the greatest emphasis on including members of civil society – most notably labour and other community organizations – on the design and implementation of integral components of Ontario’s industrial strategy. By consulting and

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80 According to the Ministry of Treasury and Economics’ *Ontario Economic Outlook 1992*, OTAB was expected to bring together representatives from business, labour, organizations representing women, persons with disabilities, racial minorities and francophones, educators/trainers and aboriginal peoples to help design and deliver publicly-funded training and adjustment programs. (p. 17)
attempting to accommodate divergent interests, the government’s approach to policy
development aligned with Ontario’s norm of balancing of interests (Noel, 1997a: 65).

- Efforts to Support Business Activity

Similar to past governments, the NDP administration appreciated that business has a
vital role to play in advancing innovation and regional economic development. As such, a
handful of programs specifically intended to meet the needs of industry were implemented.
The Ontario Lead Investment Fund was established to provide new capital for innovative
growth firms. The Ontario Innovation and Productivity Service was designed to assist small
and medium-sized innovative firms in addressing technological, financial and export
challenges\footnote{Ontario Ministry of Treasury and Economics. \textit{Ontario Economic Outlook}. November 1993, Toronto: Queen’s Printer for Ontario, p. 75-76} and enable the full exploitation of new technology (Jackman, 1993). The
Labour-Sponsored Venture Capital Funds were established to encourage Ontarians to invest
in small and medium sized private firms. There were also a number of new advisory bodies
and initiatives the government developed to engender a working relationship with business,
and a few of these were led by several different Ontario ministries. For instance, the
Telecommunications Advisory Committee, established by the Minister of Culture and
Communications, was mandated “to help Ontario become a leader in the development and
application of telecommunications” (Ontario Budget 1992: 11). The Ministers of Energy,
Environment and Industry, Trade and Technology worked with private firms and
communities to support the manufacture of energy-efficient products and new environmental
control technologies. Additionally, the Minister of Industry, Trade and Technology worked
with the automotive industry to find the best way automotive parts producers could meet
restructuring challenges (Laughren, 1992). As Bradford (1998) points out, this internal
bureaucratic division of labour produced an unprecedented level of cross-ministerial coordination and private sector collaboration.

4.4.2 Reflection

The Rae administration’s industrial policy received mixed reviews from political scientists and pundits. Walkom (1994) suggests that the industrial strategy did not have a significant impact. In light of the state of the economy, the low level of industrial activity and the government’s reluctance to spend money to stimulate activity, Walkom maintained that an industrial strategy was of little use (1994: 107). Several other observers claim otherwise, pointing to the successes the Rae administration achieved at a time of political and economic uncertainty in Ontario. In particular, the government successfully facilitated cross-ministerial coordination and intersectoral cooperation in order to drive knowledge-based production and competitive success in high value-added activities. Ontario saw the development of several innovative programs – such as SPF – which financed a number of institutional innovations, including a handful of sector-based technology centres\(^{82}\) (Wolfe, 1999a: 145). Assuredly, the NDP government’s establishment of a distinctive industrial strategy and technology and innovation policy underscores the power governing parties have in initiating policy innovation that reflects their own ideological worldviews, even though these ideas and accompanying policy options conflict with existing cultural constraints and historical experiences with policy development (Bradford, 1998: 568).

The demise of the associative experiment brings to bear the irony of the Rae government’s interpretation of the operative norm, expectation of reciprocity. The NDP went to great lengths to establish a social partnership that broadened representation at the decision-making table to include the traditional supporters of the NDP, i.e. labour and historically-

\(^{82}\) For instance, the support from the SPF contributed to the creation of the Guelph Food Technology Centre, an Ontario Centre for Environmental Technology Advancement and Connect-IT. See Wolfe 1999a, p. 145-146 for more detail.
underrepresented members of civil society. In identifying these groups as partners, along with industry, the government more or less expected the reciprocation of support for its policy initiatives (Noel, 1997: 63). However, as Bradford (1998) asserts, business and labour had its own set of expectations that the government failed to meet. In turn, group interests trumped any inclination to keep the NDP in power, simultaneously revealing the weakness of the social partnership the government had tried hard to develop, and reinforcing the impact of electoral politics on policy development (Bradford, 1998: 567).


Research and development – R&D – is an investment in innovation, in economic growth and in job creation...The Province’s plan – cut taxes, invest wisely, and rely on the private sector for job creation and economic growth – will work for R&D just as it is working in other areas. Supporting R&D through tax cuts is one important way of creating good, long-lasting jobs. Encouraging the province’s leading companies, large and small, to partner with Ontario’s finest universities is another effective way to build the knowledge that will enable our companies to compete on a world scale and create jobs.

Ontario Budget 1997, p. 162

Between the 1990 and 1995 fiscal years, Ontario’s debt had more than doubled to $97 billion (Ministry of Finance, 1995: 32). The incoming Progressive Conservative government attributed Ontario’s fiscal crisis to the past government’s uncontrolled expenditures. One month after assuming office, the new government issued a statement detailing the “swift and decisive action” it needed to take in order to bring spending under control (Eves, 1995). In turn, the government announced a total of $1.9 billion in cuts across a range of programs and the cancellation of several initiatives; these actions were expected to reduce the deficit for 1995-96 to $8.7 billion (Ministry of Finance, 1995b; Eves, 1995).
Within the first year of the Progressive Conservative government’s mandate, the former government’s Sector Partnership Fund (SPF) and Premier’s Council were terminated. It was estimated that the elimination of the Premier’s Council would amount to $2 million in savings in 1995 and $4 million annually in future years, while the phasing out of the SPF would save $23 million in operating funds (Eves, 1995). The dissolution of these two associative governance initiatives early in the new government’s term signaled the end of the social partnership approach to policy development that was so prominently featured in the predecessor government’s mix of industrial policies. Additionally, by 2000 the Ontario Training and Adjustment Board Act was repealed.

The PC government’s approach to public expenditure stood in stark contrast to that of the predecessor Liberal and NDP regimes. Public sector spending restraint was an integral component of the Progressive Conservative election platform – the Common Sense Revolution (CSR) – which advanced corporate tax credits, spending cuts, and public-private partnerships for the purpose of reducing the deficit, creating jobs and enhancing economic growth. While the province’s deteriorating economic circumstances certainly influenced the Progressive Conservative government’s policy direction, the leadership’s ideas regarding the role of the government and how the economy worked significantly impacted its interpretation of the province’s economic problem as well as the set of policy options it deemed acceptable for addressing Ontario’s economic challenge (Clarkson, 1999: 99). The CSR captured the political worldview of the PC leadership and this programmatic agenda influenced the majority of the policies developed by the Ontario government between 1995 and 2002, including the province’s R&D policy and support programs.

As referenced in the CSR, the Harris caucus believed that the market – not the state – played the determining role in how the economy worked, and the government should focus
on creating an environment that would attract increased business investment (Clarkson, 1999: 97). Moreover, the analytical rhetoric of the governing party suggested that the Harris government firmly rejected past governments’ approach to industry policy which called for public intervention in the marketplace (Ibid., 98). To this end, millions of dollars in grants and loans to business were terminated. Many of the past government’s policy instruments were replaced by tax credits; tax credits were deemed effective policy instruments for supporting innovative businesses and incentivizing private sector R&D activity. Table 4.2 lists the seven new tax initiatives the Ontario government introduced in its 1997 Budget to encourage business to engage in R&D and innovation activities.

Table 4.2: Tax Initiatives to Support R&D and Innovation

<table>
<thead>
<tr>
<th>Tax Incentive/Credit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Business-Research Institute Tax Credit</td>
<td>The credit would provide a 20% refundable tax credit for qualifying business-sponsored R&amp;D performed by eligible Ontario universities, research hospitals and other non-profit research centres.</td>
</tr>
<tr>
<td>Ontario Computer Animation and Special Effects Tax Credit</td>
<td>The initiative would provide a 15% tax credit on qualifying labour costs relating to computer animation and special effects.</td>
</tr>
<tr>
<td>The Co-operative Education Tax Credit (CETC) Improvements</td>
<td>The credit was established to foster more opportunities for co-operation between businesses and PSE institutions in providing job experience for Ontario students enrolled in leading-edge technology programs.</td>
</tr>
<tr>
<td>Ontario New Technology Tax Incentive (ONTTI)</td>
<td>The credit would provide an immediate 100% deduction of the eligible cost of qualifying intellectual property that is acquired by a corporation from an unrelated person for the purpose of implementation in a business of the corporation that is carried on in Ontario.83</td>
</tr>
<tr>
<td>Retail Sales Tax Exemption for R&amp;D Equipment84</td>
<td>The retail sales tax exemption for R&amp;D equipment used by manufacturers was expanded to include qualifying equipment used exclusively for a combination of manufacturing and R&amp;D activities.</td>
</tr>
<tr>
<td>Tax Credits for Acquiring IP or foreign technology</td>
<td>This initiative eliminated the corporate income tax add-back rule on the acquisition of foreign technology in order to foster the adoption of new technology; to remove a barrier to technology transfer.</td>
</tr>
<tr>
<td>Ontario Innovation Tax Credit (OITC)</td>
<td>Eligible innovative growth firms would be provided with a 10% refundable tax credit for R&amp;D performed in Ontario.85</td>
</tr>
</tbody>
</table>

Source: Ontario Budget, 1997

84 To encourage medical research in Ontario, the government announced that it would extend the sales tax exemption for R&D equipment to non-profit medical research facilities. See Ontario Budget 1997, p. 15
85 According to Ontario Budget 1997, for business-sponsored R&D performed by universities, small firms would be eligible for both the 10% Ontario Innovation Tax Credit and the 20% Ontario Business-Research Institute Tax Credit, for a total of 30% for qualifying R&D expenditures.
The 1997 Ontario Budget Papers E “The R&D Opportunity: Cutting Taxes and Creating Jobs” was the government’s first articulation of its approach to developing R&D and innovation policy intended to drive economic growth and job creation. A great deal of emphasis was placed on supporting R&D-intensive companies in Ontario and attention was drawn to the capacity these firms have for “turning successful innovation into jobs” (p. 164). However, Budget Papers E also stressed that the government’s “major new policy direction in R&D [was] to provide greatly increased incentives for business and universities to build productive and mutually beneficial partnerships” (p. 170). Similar to its predecessors, the government promoted the virtues of fostering university-industry collaborations on advanced research to generate new products, services and processes. It also underscored the importance of developing highly skilled workers and ensuring a climate of innovation that would attract knowledge-intensive firms.

Despite the Harris administration’s “revolutionary” approach to policy development, evidence of continuity from the Peterson and Rae regimes is discernible. The mix of mostly supply-side innovation policies remained as each government continued to develop initiatives that aligned with the linear model of innovation (Refer to Chapter 3). In particular, the PC government retained a small number of industrial policies and institutional assets it had inherited. For instance, the Centres of Excellence were renewed in 1996, even though it incurred a reduced budget and a consolidation of seven centres into four (Gertler and Wolfe, 2004); the following four centres were established: the Communications and Information Technology Ontario (CITO), the Centre for Research in Earth and Space Technology (CRESTech), Materials and Manufacturing Ontario (MMO) and Photonics Research Ontario (PRO). (OCE, 2004: 2). According to Gertler and Wolfe (2004), under the PC government,
the centres’ mandate was “tied even more closely to the private sector in order to drive university-industry collaboration and provide business with better access to university research expertise” (p. 109). However, it is important to note that while the centres had undergone “institutional conversion” due to the government refocusing its goals to align with its neoconservative worldview, they remained a part of Ontario’s R&D and innovation landscape.

The decision to continue the Ontario R&D Super Allowance also demonstrated some degree of continuity, though it should be noted that this initiative readily aligned with the PC government’s preference for providing tax incentives to support R&D activity. Thirdly, the government’s establishment of the Ontario Telecommunications Access Partnership (TAP) was arguably another instance of policy continuity. This initiative committed the government “to work[ing] with entrepreneurs, sectors and communities to improve Ontario’s competitiveness through advanced telecommunications applications and infrastructure” (Ontario Budget, 1996: 24). Through TAP, the government committed $20 million in public funding to a sector that was prioritized by the Rae government. Moreover, the initiative itself reflected an interventionist approach to developing sectoral partnerships, similar to that employed by the Peterson and Rae governments. Along the lines of an interventionist approach to governance, in 1996 the PC government also committed up to $12 million towards creating a new world class Animation, Communications Design and Technology Centre at Sheridan College; the budget indicated that private-sector partners would match the government’s commitment (Eves, 1996: 16). It is worth noting that despite the survival of

86 Streeck and Thelen (2005) discuss the gradual but transformative change institutions may experience overtime. “Conversion” occurs when institutions are redirected to new goals, functions or purposes when traditional rules and institutions are reinterpreted and converted to new goals.
these programs, relatively small sums of funding was flowed through them. By and large, the Harris government’s preferred policy instrument was tax credits (Clarkson, 1999: 99).

From a political cultural standpoint, the decision to fund past government’s efforts may have been influenced by Ontario’s traditional political values of pragmatism, propriety and managerial efficiency. As Bradford (2002) points out, both the Harris and Rae administrations had endeavoured “to move Ontario toward the model of the learning economy, driven by knowledge-based production and competitive success in high value-added activities” (p. 219). Like its three predecessors, the Harris government recognized the important role it had to play in supporting R&D and facilitating collaborative partnerships between the public and private sectors in order to ensure a strong innovation system in Ontario (Ontario Budget Paper E, 1997; Wolfe and Gertler, 1999: 25). The decision to eliminate all of the R&D support programs developed by the past administrations counteracted the government’s efforts at demonstrating managerial efficiency. However, the government’s decision to eliminate the other programs that would have further advanced Ontario’s R&D and innovation capacity may also be attributed to the agency of a governing party, motivated by the aspirations of a party leader intent on bringing to bear policy changes that corresponded with his political mandate, the Common Sense Revolution.

4.5.1 Government Initiatives to Drive Knowledge-based Production and Economic Prosperity

Among the programs the Harris government initiated, the Research and Development Challenge Fund (ORDCF) stands out as one of the most noteworthy initiatives intended to drive university-industry collaborative ventures and research excellence. Announced in the 1997 Ontario Budget, this 10-year $500 million fund was designed to lever partnerships between business and universities or other research-oriented institutions, and support the
development of leading-edge, industrial relevant research (Stiller, 1998). By implementing this program, the government expected to generate $3 billion over ten years, with an investment of $1 billion from the private sector, $1 billion from universities and other research institutions, and the last $1 billion would be equally split between Ontario government investment and “other participants,” i.e. federal government granting agencies (p. 182).

Later that year the new Ministry of Energy, Science and Technology was established and Jim Wilson was appointed minister. A number of policy changes followed, however these initiatives were announced in the absence of a strategic plan for realizing one of Ontario’s most durable political norms: the imperative to pursue economic success. Similar to past governments, the Harris administration established an advisory body to develop the ideas and strategies that would enhance the province’s economic performance. In 1998, the Ontario Jobs and Investment Board (OJIB) convened and the following year it released the report *A Roadmap to Prosperity: An Economic Plan for Jobs in the 21st Century*. This “influential policy blueprint” envisioned Ontario becoming the best jurisdiction in North America to live, work and invest. As Wolfe and Gertler (1999) point out, the report demonstrated a degree of ideational overlap with the Rae and Peterson governments in that it underscored the importance of investing in human capital development in order to ensure a highly-qualified workforce (p. 26). Rae, Peterson and Harris also acknowledged the need to invest in R&D in order to develop an innovation culture (Ibid.). Similar to the Rae government, the Harris administration placed a great deal of value on strengthening the role

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87 The Ministry of Energy, Science and Technology’s mandate was “to ensure access to safe, reliable and environmentally sustainable energy supplies in competitive markets and to support innovation, and scientific and technological advancement.” Ministry of Finance, 2001.

88 Minister Wilson held this portfolio up until April 14th 2002. Source: Ontario Legislative Assembly website: http://www.ontla.on.ca/web/members/members_detail.do?locale=en&ID=100&detailPage=members_detail_career.

89 Bradford, 2002: 246.
of sectors and clusters. Wolfe and Gertler (1999) suggest that the main point of divergence is in the document’s emphasis on providing strong incentives for entrepreneurs and sound fiscal management – priorities that signal a continuation of industry tax credits and spending cuts.

To assist the OJIB in its work, three special advisory panels were struck. In 1998, the Special Advisory Panel on Innovation released the paper, *Creating an Innovation Culture.*90 The publication articulated the core ideas that fed into the innovation section of the 1999 report, though it provides more detail regarding the government’s conceptualization of innovation, the factors that drive innovation and the impact that Ontario’s culture – at a sectoral, organizational, regional, national and provincial level – has on innovation (p. 10-11). In particular, the document highlighted the government’s focus on addressing impediments to innovation, including: lack of skilled workers; lack of information on and access to technologies; lack of information on markets; lack of technological assessment and business support services; barriers to inter-firm cooperation; barriers to business, labour and government cooperation; barriers to university/college and business corporation; lack of access to financing; and lack of a corporate or community culture that values innovation (p. 20).

A third document relevant to the OJIB’s role in providing the government with ideas to enhance economic development was released in 1999, entitled *Growing Ontario’s Innovation System: The Strategic Role of University Research.* Drs. Heather Munroe-Blum, James Duderstadt and Sir Graeme Davis were asked by members of the OJIB to analyze and compare the state of Ontario’s university research policy against competitor jurisdictions and to recommend “strategic university research policy likely to enhance Ontario’s innovation capacity, success, and provide, especially in federal research competition, in North America

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90 The other two special advisory panels also produced papers: *Creating Infrastructure for Growth and Competitiveness* and *Preparing People for Tomorrow’s Jobs.*
and globally” (p. 2). The report detailed the important part universities play in generating knowledge and producing talented people, and it discussed the integral role of university research in advancing innovation growth (1999: 2-3). In particular, Munroe-Blum et al. acknowledged that while universities and university research were featured in the twenty one priorities enlisted in the OJIB Road Map, it was imperative for these institutions to work cooperatively with other innovation partners in order to advance progress. The report also highlighted the importance of the government supporting the training of university students, promoting university research and facilitating the development of partnerships and clusters of interconnected institutions within a sector in order to enhance Ontario’s innovation capacity as well as provincial competitiveness. The release of this report confirmed the continued development of policies and research programs aimed at strengthening university-industry R&D initiatives.

In line with the OJIB reports, the PC government rolled out more supply-side innovation policy initiatives including tax credits to support science and technology and industrial R&D activity as well as funding programs to advance university-industry R&D partnerships. Refer to Table 4.3 for a list of funding programs, tax incentives and special projects the provincial government committed to finance between 1998 and 2003.91

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91 For a list of total funding and funding commitments made by MEOI for Science and Technology programs between 1998 and 2003 see the 2003 Annual Report of the Office of the Provincial Auditor of Ontario, p. 164.
Table 4.3: Programs, Tax Incentives and Initiatives Funded Between 1998 and 2003

<table>
<thead>
<tr>
<th>Programs, Tax Incentives and Initiatives</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding Programs</strong></td>
<td></td>
</tr>
<tr>
<td>Ontario Centres of Excellence (OCE)</td>
<td>Established in 1987 to drive university-industry collaboration, the program’s new mandate linked university research more closely to market demands, and provided business with better access to university research expertise (Gertler and Wolfe, 2004)</td>
</tr>
<tr>
<td>Ontario Research and Development Challenge Fund (ORDCF)</td>
<td>This 10-year $500 million matching fund announced in the 1997 Budget was designed to lever partnerships between business and research-oriented institutions, and support the development of industrial relevant research.</td>
</tr>
<tr>
<td>Access to Opportunities Program, (ATOP)</td>
<td>The government committed $150 million over 3 years to implement this matching program which would provide up to 17,000 more students with the opportunity to enroll in computer science and high-demand engineering programs each year (Ontario Budget Speech, 1998:16).</td>
</tr>
<tr>
<td>Ontario Graduate Scholarships in Science and Technology (OGSST)</td>
<td>The government in partnership with the private sector committed $75 million over 10 years to reward excellence in graduate studies in science and technology through new graduate scholarships. (Ontario Budget Highlights 1998: 12-13)</td>
</tr>
<tr>
<td>Premier’s Research Excellence Awards (PREA)</td>
<td>This 10-year program was launched in 1998 to attract and retain research talent at universities, colleges, hospitals and research institutions. As of July 2002, the provincial government committed $85 million and an additional $42.5 million came from research institutions and private-sector partners (MEOI, 2002a)</td>
</tr>
<tr>
<td>Telecommunications Access Partnerships</td>
<td>This program committed the government “to work[ing] with entrepreneurs, sectors and communities to improve Ontario’s competitiveness through advanced telecommunications applications and infrastructure” (Ontario Budget, 1996: 24).</td>
</tr>
<tr>
<td>Strategic Skills Investment Program, (SSI)</td>
<td>This program was announced in the 1998 Ontario Budget with a commitment of $30 million to assist in providing advanced training for Ontarians in sectors of strategic importance. By 2000, funding for the SSI program had grown to $130 million (Wettlaufer, 2000) and investments continued to be made to provide start-up funding for business-led training partnerships.</td>
</tr>
<tr>
<td>Ontario Innovation Trust (OIT)</td>
<td>The government created an endowment, committing $750 million between 1999 and 2003 to afford Ontario colleges, universities, hospitals and research institutes that had secured funding from a CFI competition with matching funds for state-of-the-art equipment and other research infrastructure. Ontario Provincial Auditor, 2003: 164)</td>
</tr>
<tr>
<td>Ontario Research Performance Fund</td>
<td>The government announced that $30 million would be afforded annually to colleges, universities and research institutes in order to cover overhead costs associated with Ontario-funded research. (Ontario Budget Speech 2000:24)</td>
</tr>
<tr>
<td>Premier’s Platinum Award</td>
<td>The 2001 Ontario Budget announced that the government would provide $10 million over 6 years to reward the best senior researchers in Ontario (p. 54).</td>
</tr>
<tr>
<td>Biotechnology Commercialization Centre Fund</td>
<td>In 1999, the Ontario government announced the 4-year $20 million Fund to help build regional centres for start-up biotechnology companies spun off from research institutes in Ottawa, London and Toronto (Western News, 2000; Voyer, 2003).</td>
</tr>
<tr>
<td>Biotechnology Cluster Innovation Program</td>
<td>In the 2002 Ontario Budget, the government announced that it would commit $30 million to provide grants to develop regional innovation plans and support the development of commercialization centres, research parks and innovation networks across Ontario.</td>
</tr>
</tbody>
</table>
**Tax Credits, Incentives and Exemptions**

<table>
<thead>
<tr>
<th><strong>Ontario Interactive Digital Media Tax Credit, enhanced</strong></th>
<th>Ontario Budget 1999 announced that the existing tax credit would be enhanced to include freelance labour costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educational Technology Tax Incentive</strong></td>
<td>This tax incentive was proposed in the 2000 Ontario Budget to encourage businesses to support Ontario’s community colleges and universities in acquiring new teaching equipment and learning technologies.</td>
</tr>
<tr>
<td><strong>Ontario Research Employee Stock Option Deduction</strong></td>
<td>This incentive was proposed to help Ontario’s R&amp;D-intensive companies to provide competitive compensation packages to their employees. The first $100,000 of taxable employee benefits and capital gains earned on designated stock options granted by eligible R&amp;D firms in Ontario would be exempt. (Ontario Budget 2000: 70, 164)</td>
</tr>
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</table>

**Funding for Special Projects**

<table>
<thead>
<tr>
<th><strong>Connect Ontario</strong></th>
<th>The government committed up to $82 million to this SuperBuild Growth Fund initiative to develop a network of 50 “smart” (connected by high-tech IT infrastructure) communities across Ontario by 2005 (Wolfe, 2002c: 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community and school-based programs to raise youth awareness of science and technology</strong></td>
<td>$5 million over 5 years was committed (Ontario Budget Speech 2000: 24)</td>
</tr>
<tr>
<td><strong>Training for women in the information technology sector</strong></td>
<td>$2 million over 3 years was committed to undertake training for women in the information technology sector (Ontario Budget Speech 2000: 24)</td>
</tr>
<tr>
<td><strong>Ontario Cancer Research Network (OCRN)</strong></td>
<td>The government committed $100 million over four years to OCRN to accelerate research on promising new cancer therapies (Ministry of Economic Development, 2002)</td>
</tr>
<tr>
<td><strong>Ontario Research and Innovation Optical Network, ORION</strong></td>
<td>This five-year $32.3 million SuperBuild initiative was designed to create a province-wide, high-speed, fibre optic research network to link Ontario's 43 post-secondary institutions and more than 50 publicly funded research institutions and organizations through 21 network connection points.</td>
</tr>
<tr>
<td><strong>Cancer Research Institute of Ontario</strong></td>
<td>The 2003 Ontario Budget announced $1 billion in support over the following decade to establish a new Cancer Research Institute of Ontario</td>
</tr>
<tr>
<td><strong>Perimeter Institute for Theoretical Physics</strong></td>
<td>In January 2002, the government provided the Institute with $5.6 million through the OIT to match funding awarded by the CFI; in June 2002, the Ontario government pledged a further $15 million in direct support</td>
</tr>
<tr>
<td><strong>Ontario Institute of Technology</strong></td>
<td>The government committed to provide $60 million in capital funding to establish this university in the Durham Region (Ontario Budget 2001: 54)</td>
</tr>
<tr>
<td><strong>MaRS Discovery District</strong></td>
<td>On June 7, 2002, Premier Ernie Eves announced that the government would invest $20 million in the MaRS Discovery District (MaRS, 2002: 7)</td>
</tr>
</tbody>
</table>

Most notably, a number of the research funding programs operating during this time required matching funds from corporate partners or private donors; the Ontario Research and Development Challenge Fund (ORDCF), the Access to Opportunities fund (ATOP), and public research dollars distributed by the Ontario Innovation Trust (OIT) were amongst these initiatives (Doucet, 2004; Robertson et al, 2003). Several postsecondary education stakeholders were critical of this matching requirement, arguing that those particular
programs were “privileging technology and science disciplines over the liberal arts” and social science programs (Robertson et al, 2003: 3). Nonetheless, the Harris government remained resolute in its decision to promote university-industry R&D collaborative ventures through these funding programs.

The unique administration of two of the province’s core research funding initiatives – the OIT and the ORDCF – is also worth highlighting. Indeed, no other government before (and after) the Harris era employed a similar model which entailed entrusting the management of millions of dollars in public funding to officials outside of the government apparatus and empowering them to make decisions regarding the allocation of Ontario’s research dollars. The OIT was established in 1999 as an arm’s length organization intended to support universities, colleges, hospitals and not-for-profit research institutions in acquiring the research infrastructure they needed; the trust was created primarily to leverage federal government funding these institutions received through the Canada Foundation for Innovation (CFI) (McTiernan, 2004). In July 2000, the Ministry single-sourced the administration of the Ontario Research and Development Challenge Fund (ORDCF) to the Innovation Institute of Ontario (IIO), a subsidiary of the Ontario Innovation Trust (Ontario Provincial Auditor, 2003: 167). The government committed to paying OIT more than $1 billion to assist Ontario’s research institutes, though records show that as of March 2003, the Trust received $750 million (Ibid: 168). There were a number of issues associated with the creation and function of the OIT which did not come to light until the Auditor General’s 2003 report\(^\text{92}\); the implications of these policy actions are discussed in more detail in Chapter 5.

This brief overview of the administration of the OIT funds and ORDCF provides an

\(^{92}\) The 2003 Auditor General’s report raised concern regarding the fact that the OIT was created by an agreement between the Minister of Energy, Science and Technology and a private-sector corporation without a submission to cabinet. The report also points out that the ministry allowed the IIO to administer the ORDCF without a request for proposal (RFP) which ultimately excluded the participation of other potential bidders. It was stated that this single-sourcing “contradict[ed] the basic principles of government procurement” (Ibid: 191).
important background to the McGuinty government’s decision to revamp the delivery model of the province’s core research funding programs post-2003 and establish the Ontario Research Fund (ORF).

- The Impact of National and International Policy Development

Since 1993, the federal Liberal government had underscored the importance of providing increased support for R&D. However, between 1993 and 1997, investments in knowledge generation and development were truncated, and the effort to reduce the national deficit was prioritized. It was only until 1997 that Ottawa initiated policy that would substantively contribute to the provinces’ research and innovation capacity. The Canada Foundation for Innovation (CFI) was established that year “to strengthen Canadian capability for research” by ensuring that the research infrastructure of the nation’s universities and hospitals were internationally competitive (Wolfe, 2002c: 28). An initial allocation of $800 million over five years was to be apportioned to the provinces and universities on a competitive basis “for the modernization of research facilities in the natural sciences, engineering, and health sciences at universities, colleges, research hospitals and non-profit research organizations” across Canada (Wolfe, 2002b: 143). The CFI would provide up to 40% of a project’s infrastructure costs, the provinces were expected to provide the next 40%, while the remaining funds were to be provided by eligible institutions and their funding partners from the public, private and voluntary sectors (COU, 2008: 27). In response to CFI’s funding conditions, the Ontario government created the ORDCF (1997) and the OIT (1999) to match the funds committed to successful research applicants from Ontario.

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93 The 1993 Red Book was the Liberal party’s platform in the 1993 election, and articulated the party’s ideas for supporting the development of strong regional economies. The Red Book suggested that the key means for realizing regional development would be by supporting an entrepreneurial spirit and developing forums for economic cooperation and networking at the local and regional level. (Wolfe, 2002b: 139). For a detailed account of the federal government’s efforts at developing policies to support R&D and S&T before 1997, refer to Wolfe, 2002b, pp. 137 – 142.
International innovation policy trends also had an influence on the policy options the provincial government chose to support R&D growth and innovation in Ontario. Increasingly, European and American governments were establishing economic development policy premised on the idea that regional variation and local agglomerations could be leveraged to advance innovation and enhance competitiveness (Holbrook and Wolfe, 2002: 3). More than ever, governments around the world were determined to create the conditions necessary for developing and sustaining industrial clusters and strong regional systems of innovation (Ibid., 4). The literature on clusters and regional innovation systems emphasized the significance of geographical proximity for enabling cooperation, coordination, knowledge transfer and learning between research and innovation partners “engaged in related fields of economic activity” (Wolfe, 2002d: 22). In turn, provincial policy makers determined that in order for Ontario to compete effectively in the global market, public investments should be targeted towards reinforcing or building on established and emerging clusters (Wolfe, 2002d: 32). Investments were made to support the development of a number of industrial clusters, including electronics in Toronto, auto in Windsor, and ICT in the Greater Toronto Area, Ottawa and Kitchener/Waterloo regions. Additionally, along the lines of the broader regional innovation systems approach, the provincial government developed policies and targeted investments towards strengthening relationships between firms and between university and industry partners so as to improve the flow of knowledge, skills and resources. Matching programs and corporate tax incentives were the main policy instruments the provincial government implemented to achieve these goals.  

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94 For a more detailed account of the similarities and differences between the regional innovation systems and cluster development approaches, refer to Wolfe, 2002d.
A Focus on Biotechnology

In line with leading economies’ promotion of their biotechnology industries, the Conservative government held consultations with stakeholders in the biotech community and targeted investments towards building up Ontario’s R&D strengths in this sector. In 1998, a community-based Ontario Biotechnology Task Force was assembled to provide the Ontario government with feedback on what was needed to stimulate a biotechnology industry in Ontario (BioscienceWorld). The following year the Task Force released its report and the government responded with the creation of the Biotechnology Commercialization Centre Fund in 1999 (Ibid.) In September 2001, the Ministry of Energy, Science and Technology assembled the new BIOCouncil to provide advice on how the government could achieve its goal of making Ontario the third-largest home of the biotechnology industry in North America (BIOCouncil, 2002: 4). The Council was chaired by Joseph L. Rotman\(^5\) and was comprised of representatives from government as well as various sectors, including business, financial investment, universities, hospitals and research institutions. The council made eight recommendations: accelerate the development of biotechnology innovation clusters; leverage $1 billion in new early stage venture capital by 2005; integrate health care with science and the economy; brand/market Ontario’s biotechnology strengths; unleash investment from the Ontario pharmaceutical industry; become a global leader in bioproducts, R&D and manufacturing; create a globally competitive environment for regulation and intellectual property protection and enforcement; and, increased the public understanding and acceptance of biotechnology.

\(^5\) Joseph Rotman is a Canadian philanthropist and businessman who has, since 1961, established a number of private and public companies active in oil trading, petroleum distribution, oil and gas exploration merchant banking, real estate and venture capital. Rotman also spent over a decade applying his business experience to advance Canadian life sciences research, Canada’s innovation and commercialization capacity and related federal and provincial public policy initiatives. Source: Grand Challenges Canada website [http://www.grandchallenges.ca/wp-content/uploads/JosephLRotman_EN.pdf](http://www.grandchallenges.ca/wp-content/uploads/JosephLRotman_EN.pdf)
On June 7, 2002, Premier Eves announced a $51 million Biotechnology Strategy intended to “enhance commercialization of new research discoveries and new company creation; create receptor capacity to support diffusion of biotechnologies into other knowledge-based industries and traditional industry sectors [e.g., Photonics, fuels, chemicals, plastics and auto parts]; and create a globally competitive biomedical and bioproduct cluster along the Ontario Technology Corridor aligned with provincial priorities and networked provincially, nationally and internationally” (Mantel, 2004: 7). The Strategy consisted of two core components: $20 million in funding for the Medical and Related Sciences (MaRS) Discovery District to further develop Ontario’s biotechnology strengths and a $30 million Biotechnology Cluster Innovation Program (BCIP)96 “to provide grants to develop regional innovation plans and support the development of commercialization centres, research parks and innovation networks across Ontario” (MEOI, 2003b; MaRS Discovery District, 2002: 7; Ontario Budget, 2002; MEOI, 2002b). Refer to Appendix 4.3 and 4.4 for more detail regarding the early developmental stages of BCIP and MaRS – two initiatives that evolved during the McGuinty era to become key contributors to Ontario’s research and innovation economy, as discussed in chapters 5, 7 and 8.

4.4.2 Reflection

As evidenced above, the PC administration developed a range of policies and programs to support university-industry R&D collaborations and commercialization across Ontario’s science enterprise. Most notably, officials from the Ministry of Enterprise, Opportunity and Innovation credit the government with making significant investments in

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96 The Biotechnology Cluster Innovation Program is the precursor to the McGuinty government’s Regional Innovation Networks (RIN) program. The RIN program was announced in the 2005 Ontario Budget and fed into the development of three successive commercialization networks established up to 2011: the Ontario Commercialization Network (OCN) in 2005, the Ontario Network of Excellence (ONE) in 2008 and the Ontario Network of Entrepreneurs (ONE) in 2013. Chapter 5 discusses the evolution from BCIP to the Ontario Network of Excellence in more detail. Chapter 9 reviews the transition from the Ontario Network of Excellence to the Ontario Network of Entrepreneurs.
science and technology through the OIT, ORDCF, the Ontario Centres of Excellence, the Ontario Cancer Research Network, the MaRS Discovery District and the Ontario Biotechnology Strategy (MEOI, 2003a). Indeed, similar to its predecessors, the PC government targeted public investment towards building up Ontario’s R&D capacity and advancing technology transfer in a select set of sectors.

Despite a comparable approach to deploying a supply-side innovation policy mix, the Harris administration differed substantially from the others, particularly in regards to state-societal relations that existed and influenced policy development. In comparing the Rae and Harris administrations, there is a stark difference in terms of the government’s willingness to consult, liaise and collaborate with non-governmental actors. To this end, the Harris government was much less inclusive than the Rae government, placing labour at the periphery of the policy decision-making circle, prioritizing the ideas of a few societal actors from the business sector and research community.

Most notably, the Harris government further differentiated itself from its predecessors by initiating and publicly disclosing the results of an evaluation exercise for benchmarking the province’s innovation performance. The evaluation was led by the Ontario Science and Innovation Council (OSIC), an advisory body formed in 1999 chaired by Dr. Suzanne Fortier97 and comprised of representatives from the academic and the private sectors.98 The government commissioned OSIC to determine whether the province’s investments in science and technology “were paying dividends in terms of new products and services and higher value-added jobs for Ontarians” (Ibid.) The Ministry of Enterprise, Opportunity and

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97 Suzanne Fortier is successful academic researcher with expertise in protein crystallography. She has held numerous senior administrative roles in the university, including Vice-Principal Research (1995 – 2000) and Vice Principal Academic (2000 to 2005) at Queen’s University in Kingston Ontario. Dr. Fortier has also served as the President of the Natural Sciences and Engineering Research Council (NSERC) (2006 – 2013) and as of 2014, she is the Principal of McGill University. Source: McGill University website https://www.mcgill.ca/principal/meet/about
98 OSIC’s broader mandate was to provide the provincial government with long-term strategic advice on science and technology issues (OSIC, 2002: 8)
Innovation (MEOI) had already begun to develop innovation indicators that were relevant to OSIC’s evaluation exercise, and these indicators were used to assist the Council in evaluating the return on government investment in science and technology as well as benchmarking the performance of Ontario’s innovation system against competitor jurisdictions. In 2002, OSIC released its report *Ontario Innovation Index 2002*, which consisted of 30 indicators. While the Index was deemed to be “a work in progress” by the council members, OSIC “hoped that it [would be] viewed as a credible first step [towards] an ongoing attempt to better understand how Ontario is doing and where [improvements must be made]” (Ibid., 7).

4.6 Conclusion

Between 1971 and 2003, each administration’s conception of the innovation process and understanding of the roles of Ontario’s research and innovation ecosystem actors influenced how, when and why government intervened, and more specifically, the design and implementation of policy instruments aimed at supporting the development of Ontario’s research and innovation landscape. Based on this review of Ontario’s historical experience with developing policy to support R&D and commercialization, arguably all of Ontario’s past premiers intervened in Ontario’s research and innovation sector to address “market failure.”

Despite different contextual circumstances and political philosophical predilections, ultimately each government developed policies intended to improve the

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100 According to one interviewee – a former senior civil servant at MEOI – the first OSIC mandate was not renewed and the Council subsequently “fizzled out.”

101 See Chapter 3 for a more detailed discussion on market failure as a justification for government intervention.
distribution of technology and market information to firms in order to incentivize private
investment in research; to encourage industry-driven R&D activity; and to provide direct
support to universities and other research institutions. As such, the mix of policies developed
over time was notably supply-side innovation biased.

Additionally, government intervention was largely undergirded by the linear model of
innovation which presupposed that innovation occurred as a result of the sequential transfer
of basic research (i.e. discoveries by universities) into commercializable products. To this
end, decision-makers demonstrated an oversimplified understanding of the innovation
process and a lack of appreciation for the complexity involved vis-à-vis knowledge transfer
between universities and industry. 102 In turn, each administration continued to promote
“technology-push” policies. 103 Despite the fact that the shortcomings of the linear model had
become increasingly apparent by the late 1980s, the prospect of shifting policy making away
from a linear perspective to one guided by a systemic perspective to innovation was
challenged by the embeddedness of institutions, policies and programs that were already
established. Overall, policy legacies challenged the development of new, truly integrated
policies and enabled the expansion of a supply-side innovation policy mix in Ontario.

This chapter has confirmed that a broad range of factors influenced the development
of Ontario policy and institutional assets between 1971 and 2003. The chapter that follows
will discuss the growth of Ontario’s research and innovation landscape between 2003 and
2011.

102 Wolfe, D. 2009. “Universities and Knowledge Transfer: Powering Local Economic and Cluster Development”, in
Toronto: University of Toronto Press.
103 Chapter 3 discusses the link between supply-push policies (i.e. supply-side innovation policies) and the linear model
of commercialization.
Chapter 5
Ontario’s Research and Innovation Policy Environment,
2003-2011

5.0 Introduction

This chapter conveys the story of the Liberal government’s development of policy intended to harness the province’s research and innovation strengths in order to advance economic growth and job creation in Ontario. It reviews the expansion, rebranding, repurposing and/or termination of the bundle of funding programs and initiatives the Liberal government inherited from its predecessors; the creation of a number of supply-side innovation policies during the government’s first mandate; and the introduction of more demand-side innovation policies during the second mandate. This account of research and innovation policy development is organized into three timeframes to show how shifts in Ontario’s political-economic conditions influenced the prioritization and rationalization processes of policy development and impacted the selection of policy alternatives government officials deemed appropriate for bolstering innovation and regional economic development.

Between 2003 and 2004, the newly elected Liberal government set out to establish a research and commercialization approach that was distinct from its predecessors. However, efforts at reducing the structural deficit had an adverse impact on investments in research and entrepreneurial activity. The first section of this chapter will review the development of Ontario’s research and commercialization policies and discuss how government action was not only constrained by fiscal challenges, but also by the stickiness of the research and innovation institutional assets and ideas that had been established during the Harris era.
From 2005 to 2007, Ontario had a budgetary surplus. Under these conditions, research and innovation rose to the top of the government’s agenda and more resources were targeted towards enhancing the province’s competitiveness in a knowledge-based economy. An unprecedented amount of funding was committed to improve the bureaucracy’s research and innovation policy-making capabilities with the creation of the Ministry of Research and Innovation, its agencies and advisory bodies. Moreover, an increased level of funding was dedicated to build Ontario’s research and innovation capacity. This section of the chapter outlines the development of the administrative apparatus, the expansion of Ontario’s suite of research and innovation funding programs and the government’s efforts to rationalize its actions.

The last section of the chapter focuses on the activities of the provincial government between 2008 and 2011. The global economic downturn of 2008 brought a new fiscal reality with increased pressure placed on both the Ministry of Research and Innovation and Ontario’s research and innovation actors to demonstrate a return on public investments. Intent on finding a more innovative way of leveraging the province’s research and innovation strengths in order to drive regional economic recovery, the Ministry of Research and Innovation officials initiated a new round of policy design that featured a relatively more focused approach to developing demand-side innovation policies. The last part of this chapter reviews the set of policy alternatives the ministry developed in order to contribute to Ontario’s economic recovery, and it pays attention to the split between supply-side and demand-side innovation policies.

This chronological account of research and innovation policy development illustrates the messy nature of the policy process in general, and more specifically, it highlights the difficulty the provincial government faced in translating policy goals into effective policy
instruments. Indeed, in several instances, policy announcements were made that proposed one course of action, only to be followed up months later with an alternative policy solution and another round of rationalizing. In turn, this chapter demonstrates how this seemingly disjointed process of policy development has manifested itself as research and innovation strategy constantly trying to “catch up” with program development.

The chapter ends with an overview of key science and technology policy initiatives developed by the federal government to demonstrate the extent to which both levels of government held a number of ideas in common regarding knowledge generation, diffusion and application. Indeed, like the Ontario government, Ottawa developed a number of policies aimed at investing in research talent; providing funding for state-of-the-art research infrastructure and enabling technology; and, supporting local and international partnerships between research institutions and business.

5.1 Cutting, Rationalizing, Prioritizing: 2003-2004

When the McGuinty administration came to power in 2003, it inherited a $5.5 billion deficit. Despite this fiscal challenge, the government articulated an optimistic view of the province’s economic future:

The Ontario economy is in an enviable situation. It has an ideal geographic location in the heart of one of the most prosperous markets in the world. It has an excellent physical environment. It has one of the best-educated and healthiest populations in the world. With proper government stewardship, these fundamentals will allow Ontario to regain its status as one of the most prosperous jurisdictions in North America and the world.

Ontario Budget 2004: 95

At the beginning of its first term in office, the new administration focused on reducing the deficit by increasing revenue, identifying efficiencies and restraining discretionary spending (Office of the Premier, 2003). Budget 2004 presented a medium-term
deficit reduction plan which included the government’s commitment to transform public programs and services to make them more “accountable, affordable and results based” (Ministry of Finance, 2004: 10). The budget also announced that program spending growth would be held to less than the rate of growth in tax revenues over the medium term to ensure a balanced budget “without putting priorities at risk” (Ibid).

Ontario’s bureaucracy was not immune to the government’s demonstration of managerial efficiency; the process of cutting, rationalizing and prioritizing also affected the civil service. The Ministry of Enterprise, Opportunity and Innovation, led by Minister Joseph Cordiano and Deputy Minister Don Black, was rolled into the Ministry of Economic Development and Trade (MEDT).\footnote{One senior bureaucrat working at the Ministry during that time described the restructuring as an attempt at “artificially or forcefully combining economic development and industry policy with science and tech policy.”} All matters pertaining to innovation were assigned to MEDT’s new Life Sciences and Technology Division which was led by then ADM Dr. Tim McTiernan. One of the first challenges the new division faced was to respond to the Auditor General’s report on the science and technology programs operating between April 1998 and March 2003 under the purview of the former Ministry of Enterprise, Opportunity and Innovation (McTiernan, 2004; Ontario Provincial Auditor, 2003: 163). The Auditor concluded that public funding had not been administered with “due regard for the economy and efficiency\footnote{2003 Annual Report of the Office of the Provincial Auditor of Ontario, p. 165.},” and in turn, the province’s resource allocation problem rose swiftly onto the government’s agenda.

The Auditor’s report specified that the ministry had committed $4.3 billion to spend without having established “an overall strategic plan to set parameters and consistent policies for existing programs or to guide the development of new programs to meet the objectives of
promoting innovation, economic growth and job creation” (p. 166). Other significant concerns were summarized as follows (p. 166-167):

Contrary to government directives on alternative service delivery, the Ontario Innovation Trust was set up through a trust agreement between the former Ministry of Energy, Science and Technology and a trust corporation without a business case justifying its creation. As noted in our previous annual reports (1999–2002), the Ministry did not implement the mandatory accountability controls to ensure that more than $1 billion in public funding, provided or committed to the Trust, is being spent for the purposes intended. The Ministry receives virtually no information from the Trust and does not have the required monitoring processes in place to ensure compliance with the Trust agreement. Therefore, neither the Legislature nor the Ministry [has] any control over spending by the Trust.

The contract between the Ministry and the Innovation Institute of Ontario (IIO) regarding the administration of the Ontario Research and Development Challenge Fund states that no documentation is to be destroyed without ministry approval. But the IIO did not retain panel reviewers’ assessments of research proposals and often disposed of these assessments without the Ministry’s consent. Therefore, management could not demonstrate that appropriate practices were followed in the decisions made to fund specific projects.

The Division often did not have the supporting documentation that was necessary to properly calculate Ontario Research Performance Fund grants. We obtained documentation from other sources for a sample of 2001/02 recipients, recalculated the grants, and found that one institution was underpaid by $277,000 and another was overpaid by $147,000. We notified the Ministry of these errors, and the errors were subsequently corrected.

We reviewed in detail the summary score sheets for one round of competition for the Premier’s Research Excellence Awards and found that the marks on the reviewers’ individual score sheets did not match the marks on the Ministry’s summary score sheet, and the marks on the summary score sheet did not match the summary of scores on the short list of recipients recommended for funding. Such findings limit the Ministry’s ability to demonstrate the fairness and transparency of the selection process.

The Ministry does not have adequate procedures in place to monitor potential conflicts of interest. For example, a review of advisory board minutes revealed occasions on which a conflict of interest should have been declared, but there was no indication in the minutes that a conflict had been declared.

In July 2000, the Ministry single-sourced the administration of the Ontario Research and Development Challenge Fund to the Innovation Institute of Ontario, a subsidiary of the Ontario Innovation Trust. According to ministry documentation, a request for proposals (RFP) was not issued because once an RFP is out, anyone who is eligible must be treated fairly in the process, and problems could arise if a bidder was not
dealt with fairly after an investment of time and resources in the preparation of a proposal. Single-sourcing, especially for such a reason, contradicts the basic principles of government procurement.

Although the Ministry has spent hundreds of millions of dollars on science and technology research, it has made little effort to ensure that intellectual property rights arising from funded research ultimately benefit the province.

The Ministry did not have a process in place for measuring and reporting on the achievement of its overall goals of promoting innovation, economic growth, and job creation. The Ministry measured its performance in terms of growth in the value of non-government-sponsored research over the next five years. This measure is a future-oriented target or benchmark and does not reflect the ongoing impact of the Ministry’s expenditures to date.

MEDT’s Life Sciences and Technology Division made about thirty commitments to address the recommendations made by the Ontario Provincial Auditor. In a meeting of the Standing Committee on Public Accounts, Dr. McTiernan provided a detailed account of the ministry’s approach to resolving the issues raised in the auditor’s report, and concluded his presentation with a short statement regarding the government’s proposed actions (McTiernan, 2004):

…[W]e've taken immediate action to address governance and accountability issues…We've dedicated resources to enhance and update procedures, administrative practices, project tracking and monitoring. We're updating or developing policy frameworks regarding intellectual property, conflict of interest and performance measurement.

The Ministry’s response to the Auditor’s report also included plans for restructuring the governance of the Ontario Centres of Excellence. This restructuring entailed establishing a single organization - Ontario Centres of Excellence Inc. - through which the four existing centres would operate106 (Ibid.) The Ministry maintained that this initiative would “enhance

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106 These four centres included the Communications and Information Technology Ontario (CITO), the Centre for Research in Earth and Space Technology (CRESTech), Materials and Manufacturing Ontario (MMO) and Photonics Research Ontario (PRO). (OCE, 2004: 2). The OCE Inc. promoted the merger of the centres as advantageous for “leverage[ing] shared resources, expertise and collaborative opportunities to provide more value to clients and partners and bring greater growth to Ontario” (OCE, 2004: 3) Moreover, the merger was deemed to provide OCE Inc. with a single more effective brand identity which could be leveraged provincially, nationally and internationally to ensure “a
the strategic alignment of the centres’ programs to government economic and innovation policies” (Ibid.) On March 31st, 2004, the contract between the new corporate entity and the Ministry of Economic Development and Trade was signed and the following day, the four centres were officially joined under the OCE Inc.\(^{107}\) (OCE, 2004: 2) The Ministry’s new contract with the OCE Inc. also considered the auditor’s recommendations to ensure that appropriate reporting, program monitoring and accountability measures were implemented and operationalized (Ibid.)

In addition to responding to the 2003 Auditor’s Report, Minister Cordiano was charged with establishing a mandate for the new ministry as well as an advanced manufacturing strategy, an automotive investment strategy and an S&T strategy\(^{108}\). Within months, the Life Sciences and Technology Division developed the S&T Strategy, which served to “define the relationship between research and development activities and the ministry’s overall economic development mandate” (Ibid.) Its goals were to improve Ontario’s performance in commercializing research, sustain research excellence, and leverage funding from private-sector partners (Auditor General of Ontario, 2009: 241). The Strategy was useful for rationalizing existing funding programs by bringing them under a single platform premised on the importance of supporting research and advancing the transfer of scientific discoveries from publicly funded research institutions to market. It also provided the ministry with a framework for developing future programs. According to a senior bureaucrat working in the Science and Technology Division at the time, the bureaucracy

\(^{107}\) OCE also received an $8 million investment from the Ontario government to support the creation of a new Centre for Energy. On January 2005, the Centre was launched to develop and commercialize new energy technologies (OCE, 2005: 3, 8, 11). As part of the OCE’s rebranding exercise, the names of the other four centres were altered: Centre for Communications and Information Technology, Centre for Earth and Environmental Technologies, Centre for Materials and Manufacturing and Centre for Photonics.

\(^{108}\) Interview, a former senior bureaucrat at MEDT.
consulted widely with post-secondary education researchers and members from the OCE. MaRS – though still in its infancy stages – was involved from a medical and related sciences point of view.

Soon after the submission of the Science and Technology Strategy, Budget 2004 announced the government’s intentions to “refocus [existing] innovation programs towards commercialization” (p. 105). The plan proposed the development of two programs: the Ontario Research Commercialization Program (ORCP) and the Ontario Commercialization Investment Fund (OCIF). According to Budget 2004, the new ORCP\textsuperscript{109} would provide $27 million over four years in “proof of principle funding” to help public research institutions attract pre-seed investment (Ibid.) The new $36 million OCIF was intended to strengthen the ability of research institutions to access private capital at the very earliest stages of high-risk technology company development. This program was expected to leverage up to $120 million in new seed capital for spinoff technology companies created by faculty, staff and students (Ibid.).\textsuperscript{110} Later that year, the government rationalized the ORCP and OCIF as initiatives meant to drive the province’s new plan, which was framed as a “Commercialization Strategy” (MEDT, 2004). To support the new $63 million Commercialization Strategy, the government announced that it would create an Ontario Commercialization Advisory Committee\textsuperscript{111} to advise the Minister on commercialization opportunities and use the expertise of the Roger Martin Task Force On Competitiveness,

\textsuperscript{109} The ORCP was launched in 2005, and by 2006 the MRI provided details on the program’s much broader purpose. Refer to Section 5.2.5 of this chapter for more details regarding this program after it was launched.

\textsuperscript{110} The OCIF eventually became a legislated program under the Community Small Business Investment Funds Act; the Act is under the purview of the Ministry of Finance. According to the Ministry of Finance’s Public Accounts of Ontario, Ministry Statements and Schedules, Vol 1, the MRI funded the OCIF up to fiscal year 2009-10.

\textsuperscript{111} According to the Provincial Auditor’s 2009 Annual Report, the Ministry established a Commercial Advisory Council that was tasked with “reviewing intellectual property barriers to commercialization, with the expectation that a consistent policy for science and technology programs would result.” However, this council only met once as a result of “a realignment of government ministries,” and in turn, nothing ever materialized from this initiative. (p. 243).
Prosperity and Economic Progress to provide feedback on the most effective ways of creating more leading-edge companies (Ibid.)

During the early existence of MEDT, Ministry officials also had to contend with a significant budget cut. The funds from the Biotechnology Cluster Innovation Program (BCIP) introduced under the Harris government were clawed back, leaving policy makers with less funding to continue this initiative. Before the Liberal government took office, regionally-based partnerships between research and innovation actors across Ontario had already formed and conducted empirical SWOT analyses\textsuperscript{112} as part of the BCIP funding application requirements. This exercise in asset mapping was ultimately used to assist the Liberal government in determining how to allocate its now limited resources to advance regional economic development. Moreover, according to several senior bureaucrats working in the Life Sciences Division at that time, policy-makers were paying closer attention to the literature on regional innovation systems and gaining an appreciation for the impact of this new model. In light of the results received from the SWOT analyses, the influence of literature on the innovation systems approach, as well as evidence of successful clustering, the provincial government made plans to develop a technology-based institutional infrastructure to advance regional economic growth. Funding was set aside for a new Regional Innovation Networks (RIN) Program – a four year agreement that would fund multiple Regional Innovation Networks (RINs) across a wider spectrum of technology areas,

\textsuperscript{112}SWOT stands for Strengths, Weaknesses, Opportunities and Threats. This four-part approach is typically used to analyze a business company or department’s position in the market in relation to its competitors (Collett, 1999). A SWOT analysis is intended to identify all the major factors affective competitiveness before the development of a business strategy. In the case of a Ontario’s consortia, SWOT analyses included information on the strengths and weaknesses of their regions, opportunities for accelerating commercialization in the biotechnology sector and any possible threats to that region capacity for advancing innovation in biotechnology.
as opposed to BCIP which targeted its focus on biotechnology. According to the Ministry of Finance’s *Public Accounts of Ontario 2005-06*, $1.8 million was committed to the new Regional Innovation Network Program (p. 2-155).

### 5.2 Building Research and Innovation Capacity in Ontario: 2005-2007

Between 2005 and 2007, policy development was premised on moving research from the lab bench to the market (MRI, 2006a: 2). In 2005, the government committed to invest $1.8 billion in research and commercialization over four years to realize this goal (MEDT, 2005a). The majority of the programs and initiatives that were developed supported the continuance of a supply-side innovation model but also reflected the Liberal administration’s desire to rebrand and/or repurpose the province’s existing suite of research and commercialization programs and activities. Indeed, this government was intent on distinguishing itself from its predecessor and conveying to stakeholder groups a different approach to leveraging Ontario’s economic development resources. Most notably, the government no longer referred to “science and technology” policy; economic growth was attributed to “research and innovation” (Ministry of Finance, 2005a:109). In turn, provincial budgets, government press releases, ministerial statements and Liberal MPPs’ speeches emphasized the value of research and innovation, and commentary was framed around the importance of developing research and innovation policy to support idea generation and commercialization. The Ministry of Research and Innovation (MRI) and its advisory bodies were instrumental in driving these programmatic ideas, which were more clearly articulated in the government’s *Ideas-to-Market Strategy* (2006) and reinforced in MRI’s *Strategic Plan* (2006).

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113 According to an informant in the research community, funding for the RINs was committed in 2004. However, the RINs were formally announced in Budget 2005 as part of a larger initiative called Ontario Commercialization Network (OCN) Program. See section 5.2.3 of this chapter for more details regarding the launch of this new program.
5.2.1 Ministry of Research and Innovation

The provincial government acknowledged that before 2004, “the province’s investments in innovation were spread over numerous ministries, with numerous agendas – vision and strategy were lacking” (MRI, 2006a: 1). The Ministry of Research and Innovation was established in 2005 to help promote innovation as a driver of economic growth across all sectors of the knowledge-based economy; lead the transformation of Ontario’s economy to one focused on innovation; and coordinate, strategically innovation programs that previously were scattered across nine different ministries (MRI, 2006l: 1: MRI, 2010c). Budget 2006 announced that through the new ministry, the government would invest nearly $1.7 billion in research and commercialization over five years up to 2009–10 (p. 125). Premier McGuinty appointed himself the inaugural Minister of Research and Innovation and under his leadership, the ministry’s mandate was to:

- Develop an integrated innovation strategy and lead in its delivery;
- Align and coordinate Ontario Government investments in both policies and programs to deliver on the innovation strategy;
- Foster a culture of innovation and showcase Ontario, nationally and internationally, as an innovation culture

MRI Strategic Plan, 2006

In fulfillment of its mandate, the ministry created and administered funding programs to support excellence in fundamental and applied research in order to advance knowledge generation, facilitate industrial application and help to create, attract and retain world-class researchers (MRI, 2006l: 6). To this end, MRI supported research partnerships and collaboration (1) across different disciplines, among Ontario’s research institutions, as well as with other institutions across the country and across the world; (2) between academia and local and international industries; as well as (3) with the federal government and the other
provinces.\textsuperscript{114} (Ibid: 7-8). MRI also assumed a leadership role amongst the other ministries, encouraging and assisting them in building innovation-based policies and programs into their mandates.\textsuperscript{115} (Ibid: 18-21; MRI, 2006a:1). Inter-ministerial alignment, coordination and dialogue was facilitated with the creation of the Innovation Deputy Ministers’ Committee (IDC) and supported by Assistant Deputy Minister and Director Working Committees (MRI, 2006l: 21; MRI, 2006a:2).

Notably, MRI officials continuously consulted with non-governmental research and innovation stakeholders on a number of issues, including defining areas of focus in which to make research and commercialization investments, identifying areas of opportunity where Ontario could become a global leader, and identifying where Ontario faces significant challenges in harnessing its existing innovation potential (Ibid: 15). According to non-government interviewees, the establishment of a stand-alone ministry dedicated to research and innovation signaled that the government was making a concerted effort at developing effective policy to harness the province’s research and innovation capacity. These informants acknowledged the positive impact the Ministry had on supporting research and promoting innovation across the province as well as within and between different sectors of the economy. Several of them commented on the advantages of creating the MRI and the significance of Premier McGuinty assuming a leadership role in the Ministry:

\textsuperscript{114} The Ministry represented Ontario at the federal-provincial-territorial table that focused on research and innovation. A former senior MRI bureaucrat commented on the leadership role that the ministry maintained at the provincial-territorial innovation table in the effort to facilitate information exchange, learning and collaboration between Ontario and its provincial counterparts.

\textsuperscript{115} The Ministry of Research and Innovation worked in close partnership with the Ministry of Health and Long-Term Care; Ministry of Agriculture and Food; Ministry of Training, Colleges and Universities; Ministry of Culture; Ministry of Finance; Ministry of Environment; Ministry of Natural Resources; Ministry of Transportation; Ministry of Economic Development and Trade; Ministry of Northern Development and Mines; Ministry of Intergovernmental Affairs; Ministry of Public Infrastructure Renewal; Ministry of Energy; and Ministry of Education (MRI, 2006a:1)
RIC member:
[The prioritization of research and innovation] was demonstrated by developing MRI and the Premier assuming the ministerial portfolio – a visible commitment from the Premier. This move was important given that the innovation debate can get very easily squashed when economic troubles arise.

University President:
There was a very clear signal sent when the Premier took on the post as Minister of MRI. And a particularly important signal sent when MRI was separated from MEDT. That structural change in addition to the symbolism of the Premier taking the Cabinet post really put a clear priority on the importance of research and innovation agenda.

University Professor, Innovation Expert:
What I liked a lot was that the MRI was created as a standalone ministry and the Premier became the minister. That sent a message to all sorts of people that that was important… the symbolic value of the Premier acting as the minister of that ministry was very high.

The Premier received support from two Parliamentary Assistants, Tony Wong (June 30, 2005—September 20, 2006) and John Wilkinson (September 20, 2006—September 10, 2007), and in 2006 Premier McGuinty announced the appointment of the Ministry’s first Deputy Minister, Dr. Alastair Glass. Glass was supported by a relatively small staff complement, which consisted mostly of persons from the former Science and Technology Division in MEDT. By 2007, the Ministry had a staff strength of 126 people and had developed five separate divisions/branches: Outreach, Promotion and Business Development; Innovation Policy; Research; Commercialization; and Communications (MRI, 2007a: 13, 9). The Directors of these divisions reported to Assistant Deputy Minister and Chief Operating Officer, George Ross (Ibid: 9).

116 Before coming to MRI, DM Glass had earned international recognition in photonics research and innovation (OCN Review Report, 2009: 11). He worked in Ireland as the first Director of Information and Communications Sciences at Science Foundation of Ireland. There, he played a role in growing research and development programs and helping to build effective government-industry-academia partnerships. Glass was also well known for the senior leadership positions he held at Bell Laboratories (Ibid.)
5.2.2 The Ideas-to-Market-Strategy

In mid-2006, the ministry announced the Ideas-to-Market Strategy, a $160 million platform outlining the province’s principal beliefs and values regarding the link between entrepreneurship, innovation and economic prosperity. The Strategy was designed “to encourage early investment and management expertise for promising ‘born in Ontario’ entrepreneurs” in order to facilitate their efforts at attracting the later stage investments needed for their innovations to succeed (MRI, 2006f). With a sharp focus on intensifying the commercialization of technologies, it communicated the government’s commitment to assist companies – particularly innovative start-ups in the high-tech sector – to turn research and ideas into new products and services for the global marketplace (MRI, 2006d). The Ontario government maintained that these innovations would “strengthen Ontario economic advantage and provide high-value jobs for the future” (MRI, 2006e). A senior bureaucrat interviewee described the Ideas to Market Strategy as the Liberal government’s chosen model for “fill[ing] gaps to traverse the valley of death.”

Largely, the strategy was undergirded by the outdated linear model of innovation, and Ontario’s mix of research and innovation support programs, the work of MRI’s supporting agencies, and the ministry’s policy statement – MRI’s Strategic Plan, released later that year – reflected this bias. To this end, a great deal of emphasis was on ensuring that initiatives were in place to support the generation of new knowledge or innovations, by

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117 “Valley of death” is a term used to describe the precarious stage between discovery/research and innovation. It represents the translation gap that occurs in the innovation process, where the transformation of an idea generated by research into a marketable product or service is challenged by any number of factors, including lack of funding, ineffectual market intelligence, risk avoidance, etc. (Hudson and Khazragui, 2013; Branscomb and Auerswald, 2002).

118 As discussed in Chapter 3, according to the linear model of innovation, innovation occurs sequentially from basic research/invention to applied research and development and ends with production and diffusion (Godin, 2006; Kline and Rosenberg, 1986).
funding entrepreneurs and public research institutions to undertake research and/or participate in the R&D process.

5.2.3 MRI Advisory Agencies

Two advisory agencies were established to provide advice to the Minister of Research and Innovation on research and commercialization issues: the Ontario Research Fund Advisory Board (ORFAB) and the Ontario Research and Innovation Council (ORIC). Both agencies were comprised of representatives from the research community and business and innovation sectors. ORFAB’s twelve members were charged with reviewing and assessing Ontario’s research excellence and talent programs such as the Ontario Research Fund, Early Researcher Awards, the Premier’s Discovery Awards Program and the Premier's Catalyst Awards Program (MRI, 2006b; MRI, 2008a: 13; MRI, 2006j).

ORIC’s mandate was to help Ontario develop a long-term vision for research and innovation (Ibid.) In turn, the Council focused its efforts on defining innovation; identifying effective ways of building a culture of innovation in Ontario and cultivating a commerce-friendly environment; defining strengths and weaknesses in Ontario’s innovation system; and developing a plan to promote research and innovation, which included outlining the leadership role MRI would play (MRI, 2006i; MRI, 2006a). A small number of MRI staff provided ORIC with the policy and administrative support it needed to address its mandate. Consultants from various knowledge-based industries across Ontario made presentations to ORIC members on a range of research and development issues. ORIC’s recommendations to the provincial government were informed by a distillation of these consultations and deliberations between ORIC members, and in turn fed into the development of MRI’s Strategic Plan.
5.2.4 MRI’s Strategic Plan

The Strategic Plan, released November 2006, outlined “the fundamental goals, values and policy foundations for a government-wide innovation strategy” (MRI, 2006: 3). The document emphasized the value of basic and applied research and the importance of ensuring ongoing investments in research excellence (p. 5). It maintained that economic and social value from these investments depended on moving creative ideas to the marketplace (p. 9). A thriving entrepreneurial culture; awareness of market opportunities; close industry-academic partnerships; risk-capital; effective intellectual property policies; and entrepreneurial, business management and commerce skills to support the growth of companies were deemed imperative for ensuring ideas-to-market transfer (p. 9-13). The Strategic Plan recommended that sectors and institutions that would build global research and innovation strength, realize a significant economic and social return, and “give Ontario a comparative advantage over competitors” should be prioritized (p. 14). The value of developing “an innovation culture” and the means of realizing this culture through the development of high quality personnel and skills were outlined (16-18). The strategy also emphasized the significance of investing in human capital development, building collaborative relations and developing a marketing and outreach strategy was underscored (p. 18-20). Additionally, the importance of ensuring the coordination and integration of an innovation vision, goals and strategies across ministries and across jurisdictions was discussed (p. 21-22). The Strategic Plan highlighted the value of measuring Ontario’s innovation process, and intentions to develop an innovation “scorecard” for the province consisting of “a robust database of performance indicators and results metrics” was mentioned (p. 23-24). Finally, the Strategic Plan discussed the need to develop

119 An “innovation culture” is “built on understanding the value of all new ideas, recognizing the benefits they provide to society as a whole, and rewarding those who create knowledge and those who put it to use to achieve growth and prosperity. An innovation society has both respect for the education and research that drive the creation of new ideas, and the nimbleness to act on opportunities to achieve their full value” (Strategic Plan, 2006: p. 1).
a “sustainable, predictable funding and governance strategy to support focused investments” in Ontario (p. 25).

After the release of the Strategic Plan, Deputy Minister Glass, senior MRI bureaucrats and Parliamentary Assistant John Wilkinson held consultation meetings with research and innovation actors across the province to solicit feedback. Some individuals and groups of actors met with MRI staff on a one-on-one basis, while others took part in multiple-group (i.e. open) consultation meetings. Written submissions were also made by academic and research institutions, the business community, and a number of MRI-funded organizations including MaRS Discovery District and the Ontario Centres of Excellence (MRI, 2007a: 6). MRI announced that as a follow up to the Strategic Plan, it would develop “a comprehensive Ontario Innovation Strategy” by the spring of 2007. The follow-up document to the Strategic Plan was not released until April 2008. Meanwhile, new research and innovation funding programs were established to support research talent, bring ideas to market and boost entrepreneurial activity.

5.2.5 New and Expanded Research and Innovation Funding Programs

A number of supply-side and demand-side innovation programs were established and expanded between 2005 and 2007. Table 5.1 provides an overview of the new and expanded supply-side innovation programs the government delivered during this time; a brief description of each program is provided along with funding details.
Table 5.1 New and Expanded Research and Innovation Funding Programs: Supply-side Innovation

<table>
<thead>
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<th>Program</th>
<th>Description</th>
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| Ontario Research Fund (ORF) – Research Infrastructure (RI) and Research Excellence (RE) | The Ontario Research Fund (ORF) was a matching program to advance scientific excellence by supporting research that can be developed into innovative goods and services. Eligible recipients: publicly funded universities, colleges, hospitals. The ORF was a competitive program with a rigorous adjudication process that ensured that all proposals met a minimum threshold of excellence in the quality of research and was “of strategic value to Ontario” (Gabriel and Freeman, 2005; MRI, 2008g).

The fund is made up of 2 streams: (1) the Research Excellence (ORF-RE) program supports project operating costs and (2) the Research Infrastructure (ORF-RI) program supports the acquisition of new research infrastructure.

The ORF-RE provided funding to cover the direct and indirect cost of research. The province provided one third of the funding, one third came from the institution and the final one-third was provided by a private-sector partner. The ORF-RI supported “the modernization, development and/or acquisition of new research infrastructure at Ontario’s universities, colleges and hospitals by matching funds to projects that have been awarded [funding] by the Canada Foundation for Innovation (CFI)” (COU, 2008: 31). CFI provided up to 40% of the project cost, while the institutional recipient had to raise the remaining 60% from the provincial government, private funding partners and/or the universities’ own resources. The Ontario government provided up to 40% of the total eligible costs.

Research conducted in a number of “key economic areas” was prioritized, including automotive, agriculture, advanced manufacturing technologies, biotechnology, information and communications, alternate energy/fuel cells, environmental technologies and nanotechnology (Ministry of Finance 2005a:109). Funding was also set aside to support efforts to connect youth to researchers, and attract, develop and retain top researchers (Ibid).

According to the MRI Results-based Plan Briefing Book 2011-12, since 2004-05, MRI committed approximately $593.8 million to cover the infrastructure costs of 1,264 leading-edge research projects across the province and $368.6 million invested in operating costs associated with cutting edge research projects. |

| Ontario Research Commercialization Program (ORCP) | This $31.4 million program was designed to facilitate collaboration between innovators in research institutions and the non-profit sector with private sector partners in order to drive knowledge and technology transfer in medicine, the environment, energy and other technologies, build receptor capacity and help these actors commercialize their innovations (MRI, 2006g; MRI, 2006k). This program was separated into 3 parts.

Component A was focused on accelerating the transfer of knowledge and technology from public universities and research institutions to the private sector (Defoe and Prokopiev, 2007). Component B provided proof of principle (PoP) funding guided by private sector input. Component C supported working partnerships between companies and researchers in Ontario and primarily focused on building industry receptor capacity (Gabriel and Freeman, 2005). |
### Youth Science and Technology Outreach Program (YSTOP)

YSTOP was designed to connect youth with researchers from across the province. The program provided funds to a number of non-profit, Ontario-based organizations to enable young people – particularly from high school – to interact face-to-face with Ontario’s leading-edge researchers and technologists. This mentoring program included workshops and demonstrations, student competitions, expert in residence, lab mentorship, field excursions and speaking opportunities.

According to the MRI 2010-11 Results-based Briefing Plan, since 2005-06, the ministry invested $5 million in 42 Youth Science and Technology Outreach Program projects to help youth discover science. YSTOP was discontinued before the end of 2011.

### Teachers’ Science and Technology Outreach Program (TSTOP)

TSTOP provided elementary and secondary science and technology teachers the opportunity to participate in research in a publicly funded institution, and then share their knowledge and research with their students. TSTOP was a voluntary program. Funds were provided to support “Teacher Research Experience” expenses, such as daily commuting costs, and “Student Outreach Experience” costs, like travel costs to visit the host institution during the school year. TSTOP was discontinued before the end of 2011.

### Early Researcher Awards (ERA)

The ERA program helped promising, recently-appointed Ontario researchers build their research teams of undergraduates, graduate students, post-doctoral fellows, research assistants, associates, and technicians (MRI, 2007a). The goal of the program was to improve Ontario’s ability to attract and retain the best and brightest research talent. The Early Researcher Awards (ERA) program encouraged applications from all disciplines.

According to MRI’s 2010-11 Results-based Briefing Plan, through ERA, MRI provided $58.7 million to 419 newly appointed researchers to help them build their teams and support them early in their careers.

### Premier’s Awards Program: Catalyst, Discovery, Summit

The Premier Catalyst Awards recognized excellence and leadership in innovation. Eligibility: companies that have championed a new, or significantly improved, product or service based on a breakthrough technology (MRI, 2008d). Innovations must be commercially successful and have the potential for positive impact on Ontario's economy, society and sustainable development. MRI funding commitment: $1 million for 5 annual awards (Ministry of Finance, 2006a)

The Premier Discovery Awards celebrated Ontario’s most accomplished researchers by recognizing excellence in research for either a single discovery or a body of work on both domestic and international fronts in life sciences and medicine, natural sciences and engineering, social sciences and humanities and innovation leadership (MRI, 2007a; COU, 2008: 31; MRI 2008c). MRI funding commitment: $1.5 million for four annual awards (Ministry of Finance, 2006a)

The Premier Summit Awards recognized Ontario’s most outstanding medical researchers. The Premier’s Summit Award program was administered by MaRS to support researchers who have made a substantial and distinguished contribution to medical research in Ontario, and show promise to do even more (MRI, 2008b). MRI funding commitment: $25 million (Ministry of Finance, 2006a)

Program was discontinued for 2011

### Innovation Demonstration Fund (IDF)

The 4-year $24 million program was launched to help companies “develop promising new technologies by supporting them at the pilot or demonstration project stage” (MRI, 2006d). The fund prioritized the development of new bio-based products (made from biological or renewable materials), environmental and alternative energy technologies that would lead to a globally competitive business and market opportunity. The IDF covered financial support up to 50% of eligible costs for projects with a commercialization goal.

The IDF was a key program aimed at driving MRI’s Ideas-to-Market Strategy
<table>
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<tr>
<th>Program</th>
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<tr>
<td><strong>Post-Doctoral Fellowship Program</strong></td>
<td>The Post-Doctoral Fellowship (PDF) program will provide outstanding scientists with two-year fellowships at Ontario’s research institutions. The Program assists in the support of a Post-Doctoral Fellow selected and appointed solely and independently by the Institution, to conduct research activities at the Institution’s premises as the PDF prepares for a full-time academic and/or research career.</td>
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<tr>
<td><strong>Market Readiness Program: the Investment Accelerator Fund (IAF) and the Business Mentorship and Entrepreneurship Program (BMEP)</strong></td>
<td>This 4-year program $46 million was intended to provide high-potential innovative companies in Ontario with early-stage financial support and management expertise to help them get off the ground, and attract investment from other sources. The Program was divided into two components: the Investment Accelerator Fund (IAF) and the Business Mentorship and Entrepreneurship Program (BMEP).&lt;br&gt;&lt;br&gt;<strong>The Investment Accelerator Fund</strong> was a $29 million early-stage venture capital fund aimed at helping eligible start-up companies develop their technology and gain entrepreneurial expertise to bring their product or service to market (MRI, 2006i). IAF investments ranged from $250,000 to $500,000 (Ibid; Rosiello and Mastroeni, 2010). The Ontario Centres of Excellence was primarily responsible for delivering the IAF.&lt;br&gt;&lt;br&gt;The $17 million <strong>Business Mentorship and Entrepreneurship Program</strong> was designed to help entrepreneurs to acquire the necessary management skills to take their new high-tech product or service through to the marketplace (MRI, 2006f). The program was delivered by MaRS (OCE, 2007) and had four components:&lt;br&gt;&lt;ol&gt;&lt;li&gt;Entrepreneur Training — offered peer-to-peer mentoring and training courses for entrepreneurs with varying levels of experience.&lt;/li&gt;&lt;li&gt;Business Mentorship — helped business managers in new, innovative companies to understand and solve specific business and technology development problems to take the company to the next stage of product development.&lt;/li&gt;&lt;li&gt;Serial Entrepreneur/Business Executive Program — strengthened the network of entrepreneurs and investors in Ontario, supported activities that engage Ontario entrepreneurs and attract entrepreneurial talent back to Ontario.&lt;/li&gt;&lt;li&gt;Angel Network — connected high-potential entrepreneurs with &quot;angel investors&quot;, who provide capital and business expertise at the toughest stage of a company's growth. The program was also aimed at supporting the development of angel networks across Ontario.&lt;/li&gt;&lt;/ol&gt;The Market Readiness Program was a key initiative aimed at driving MRI’s <em>Ideas-to-Market Strategy</em>.</td>
</tr>
<tr>
<td><strong>International Strategic Opportunities Program (ISOP)</strong></td>
<td>ISOP provided funding for strategic international collaboration between Ontario research institutions and the global research community. The goal of the program is to attract and retain the best research talent.</td>
</tr>
<tr>
<td><strong>Angel Network Program (ANP)</strong></td>
<td>The Angel Network Program was one of the six programs that supported organizations included in the Ontario Commercialization Network. The program was designed to create new Angel Groups in Ontario and to “foster their success with initiatives and information and educational tools to transfer the best practices of successful Angels” (NAO-Ontario, 2012).</td>
</tr>
<tr>
<td><strong>Ontario Venture Capital Funding (OVCF)</strong></td>
<td>The OVCF is a co-investment fund — “a limited partnership between the Ontario government and leading institutional investors [designed] to invest primarily in Ontario-focused venture capital and growth funds that support innovative, high growth companies” (OCCG, 2009a: 6). In 2008, the Fund closed with lead investors committing $205 million; these investors included TD Bank, OMERS Strategic Investments, RBC, the Business Development Bank of Canada and Manulife Financial (MRI, 2007b). The Ontario government committed $90 million.&lt;br&gt;&lt;br&gt;OVCF was launched in lieu of the Early Stage Venture Capital Fund, which was announced in 2006 as a key program aimed at driving MRI’s <em>Ideas-to-Market Strategy</em>.</td>
</tr>
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In addition to these supply-side innovation policies, the ministry developed two demand-side innovation programs in support of building clusters and ecosystems: the Ontario Commercialization Network and the Ontario Fuel Cell Innovation Program.

In January 2005, the Ontario government committed $3 million through to 2007-08 to establish the Ontario Fuel Cell Innovation Program (OFCIP), an initiative that was expected to build networks and advancing commercialization in Ontario’s green sector (MEDT, 2005b). To this end, OFCIP funding was intended “to link small and medium-sized businesses in Ontario with researchers, business expertise and venture capital [and allow] new and existing fuel cell technologies to be applied to existing manufacturing and commercial applications, so that new technologies...[could] be developed” (Ibid.). The Ontario government also anticipated that the OFCIP would “increase public, consumer and investor awareness and acceptance of fuel cell technologies” (MRI, 2006i). MRI promoted the program as part of the government’s strategy “to help turn research and ideas into new products and services for the marketplace” (MRI, 2007c). The OFCIP covered up to 50% of eligible costs (up to 33% if federal funding is included) with a maximum support of $500,000 per project (MRI, 2006i).

The Ontario Commercialization Network (OCN) incorporated the Regional Innovation Networks program and ultimately built on the BCIP program. In 2005, the Ministry of Research and Innovation invested just over $13 million to create Ontario’s Regional Innovation Networks (RINs) as a pilot project aimed at advancing commercialization and technology transfer across businesses in Ontario (Ministry of Finance, 2005a: 110; ORIN, 2007). The RINs were regionally based, multi-stakeholder, not-for-profit organizations driven by the private sector to identify a region’s comparative advantages and establish a regional-focused vision and mission for the future (Ministry of Finance 2005a:
110) RINs acted as a single entry point for its clients – i.e. small firms, researchers and entrepreneurs – to access commercialization programs, services and other resources available at the regional, provincial and federal levels, including the Ontario Centres of Excellence, the new MaRS, the Ottawa Centre for Research and Innovation (OCRI) and Communitech (Ibid.) It is also worth noting that the RINs were not as narrowly focused on biotechnology or life sciences as was the case with the Biotechnology Cluster Innovation Program (BCIP). Instead, the networks “expanded into other areas of innovation excellence such as information technology, energy conservation, and advanced materials – depending on their local strengths and opportunities” (Ibid.) Eleven regional innovation networks were announced in Budget 2005 (p. 110). Figure 5.2 shows the distribution of RINs across the province.

Figure 5.2


Collectively, the Ontario Regional Innovation Networks (ORIN), which was more commonly known as the Ontario Commercialization Network (OCN), “provide[ed] the
infrastructure for a significantly enhanced provincial network through which to channel the
growth of the innovation economy across the province” (ORIN, 2007: 3).

Between 2005 and 2007, the commercialization framework structure changed and the
Network was expanded. By 2007, the OCN was comprised of twelve RINs:

1. Accelerator Centre
2. BioDiscovery Toronto
3. Eastern Lake Ontario Regional Innovation Network (elorin)
4. Golden Horseshoe Biosciences Network (GHBN)
5. Greater Peterborough Regional DNA Cluster
6. Guelph Partnership for Innovation
7. Innovation Initiatives Ontario North (IION)
8. OCRI Life Sciences
9. Southwestern Ontario Bioproducts Innovation Network
10. Stiller Centre for Technology Commercialization
11. Western Greater Toronto Area Accelerator Centre (WGTAAC)
12. YORKbiotech

The OCN grew to include three other organizations that worked together to support
commercialization:

- **Provincial Innovation Networks (PINs):** considered to be the “hubs” of the OCN as
they provided linkages to provincial programs and served as a gateway to global
business, science, and investment resources. [The PINs included the Innovation
Synergy Centre in Markham, MaRS and the Ontario Centres of Excellence.]

- **Sector Innovation Networks (SINs):** not-for-profit organizations that had a strong
sector focus with provincial scope and the capacity to deliver commercialization and
other expertise. [Before the 2008 OCN review, there were five SINs: BioEnterprise
Corporation, Health Technology Exchange (HTX), Ontario BioAuto Council, the
Ontario Centre for Environmental Technology Advancement and the Ontario Institute
for Cancer Research (OICR)].

- **Incubators:** organizations that cultivated technological entrepreneurship by promoting
commercialization of research and technology from, and to, academic institutions.
[These organizations promoted technological entrepreneurship by facilitating research
commercialization and technology transfer from and to universities and colleges.]

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120 The collection of RINs eventually grew to include twelve organizations by 2008. Additionally, between the time the
OCN was established and its review in 2008, the composition of the RIN membership had changed, with some
members leaving the network, others joined, while some other RINs had their mandates changed over time.


122 Ibid.
The range of sectors represented within the Ontario RIN client base also expanded over time. By 2007, RINs were providing services to advance commercialization in alternative energy, energy conservation, bioenergy; biotechnology; forestry; information and communications technologies; medical diagnostics, devices and assistive technologies; mining/remediation; nanotechnology and pharmaceuticals (ORIN, 2007: 11). As such, the network developed multiple linkages with other actors at the provincial, national and international levels. Local commercialization organizations, municipal and regional economic development organizations and several university/colleges technology transfer offices were linked into the OCN to enable the flow of knowledge, technology as well as human and risk capital between these agents. Moreover, the OCN clients – local entrepreneurs, start-ups, investors, SMEs and MNEs – that linked into the OCN were provided with the resources needed to advance their innovations, including networking opportunities, mentorship and market intelligence. According to MRI, in 2006-07, the Ontario Commercialization Network connected with nearly 3,000 researchers and 6,500 private sector innovators, and supported the creation of 76 new companies employing over 300 people (MRI, 2009b). The government provided funding to the OCN through six MRI-sponsored initiatives: the Angel Network Program, the Ontario Research Commercialization Program (ORCP), the Market Readiness Program (MRP), the Ontario Institute for Cancer Research (OICR), the Ontario Centres of Excellence (OCE) and the RIN Program. These were some of the initiatives that were expected to address Ontario’s “pre-commercialization finance, skills and technology gaps” (MRI, 2006h).

5.2.5 Other Funding Initiatives

In addition to the aforementioned funding programs, a number of intermediary innovation organizations and research institutes received funding to support research
excellence; strengthen linkages between researchers, technology producers and intermediary users; and support lead market initiatives:

- $142 million over four years was committed to create the Ontario Institute for Cancer Research (OICR)\(^{123}\), “the first collaborative research institute in Canada to focus efforts on the entire spectrum of cancer issues – from preventive right through to treatments” (MRI, 2005b)

- $100 million was committed to the Perimeter Institute for Theoretical Physics and the Institute for Quantum Computing in Waterloo, announced in Budget 2006 (MRI, 2006a: 3)

- $171 million over five years to the Ontario Centres of Excellence Inc., announced in 2006 Budget (p. 128). With the government’s support, the OCE built up the commercialization capacity of its associated industry organizations and extended its network to more fully engage with research and innovation actors across Ontario (OCE, 2006)

- $18 million was invested in the Canadian Institute for Advanced Research to strengthen Canada’s and Ontario’s reputation for collaborative international research, announced in Budget 2007

- $2 million investment was made in the Northern Centre for Advanced Technology to assist in the commercialization efforts of northern Ontario companies, announced in Budget 2007

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\(^{123}\) In 2005, it was announced that the Ontario Cancer Research Network (OCRN), a provincially funded not-for-profit organization, would consolidate its programs within the OICR to better coordinate cancer research and development. (MRI, 2005a)
- $15 million was announced in Budget 2007 to support the OCE Energy Centre (MRI, 2007a: 7).

- $16.2 million was committed to support the construction of Phase II of MaRS Discovery District, announced in Budget 2006 (MaRS 2011)

- $45 million investment was announced in Budget 2007 to support the R&D activities of individual research-intensive universities. Queen’s University received $21 million to support the creation of an advanced research and innovation centre specializing in bioprocessing and biomaterials (MRI, 2007a: 7; Ministry of Finance, 2007a: 2-347). A $15 million funding envelope was dedicated to the University of Toronto to advance research in structural genomics (MRI, 2007a: 7; Ministry of Finance, 2007a: 2-347). Lakehead University received $6 million to create Research Chairs in order to facilitate research and innovation initiatives relevant to the northern economy as well as to support the sustainable development of Ontario’s boreal forest (MRI, 2007a: 7, Ministry of Finance, 2007a: 2-346). $3 million was committed to the University of Ontario Institute of Technology (UOIT) to fund a Research Chair in order to enhance the institution’s R&D activity in hydrogen technology (MRI, 2007a: 7; Ministry of Finance, 2007a: 2-347).

5.3 Chasing a Return on Investments in Research and Innovation: 2008-2011

With the onset of the global recession in 2008, Ontario government ministries were expected to drive initiatives that would contribute to economic recovery and advance the province’s goal of stimulating economic growth and job creation. The MRI in particular had come under increased pressure to demonstrate value-added for public expenditure on research and innovation. In turn, the Ministry introduced a small number of demand-side
innovation policy instruments and maintained and/or expanded some of the multi-year supply-side innovation policies that were established before the economic downturn with the intention of providing research and innovation actors the support they needed to realize a return on public investments made up to that point. The section that follows discusses the policies developed as well as the funding programs introduced or impacted between 2008 and 2011, and draws attention to the stickiness of supply-side innovation programmatic ideas despite the decisive shift in the economic climate.

5.3.1 Ontario Innovation Agenda (OIA)

In 2008, the Ministry of Research and Innovation released *Seizing Global Opportunities: Ontario’s Innovation Agenda*, the follow-up document to the *Strategic Plan* (2006).\(^{124}\) ORIC members played a central role in shaping the agenda; in particular, they provided “an in-depth understanding of how innovation creates prosperity” (MRI, 2008d: 5). The Council held several rounds of discussion with MRI staff\(^{125}\), research and innovation stakeholders, and senior bureaucratic representatives from other provincial ministries, and these discussions informed the development of the Ontario Innovation Agenda (OIA).\(^{126}\)

The agenda articulated the Liberal administration’s commitment to act as a catalyst for innovation and commercialization; invest in peer-reviewed research excellence that will create jobs, a cleaner environment and better healthcare; invest in research and industry collaborations where Ontario has a global comparative advantage, streamline government

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\(^{124}\) After the release of the Strategic Plan in 2006, the government announced that it would release the Ontario Innovation Strategy in the Spring of 2007. A former MRI bureaucrat commented that the timing of the production of the report post-dated the launch of a number of research and innovation programs, and so it was deemed difficult to label the second document a strategy after the fact when “the programs that were rolled out de facto represented an operational strategy by default.”

\(^{125}\) MRI staff also provided ORIC members with the research the members needed to fulfill their mandate.

\(^{126}\) After the Ontario Innovation Agenda was released, the Ontario Research and Innovation Council came under review (MRI, 2008a: 13). ORIC was dissolved before the end of 2008 on the basis that it had met its mandate. On September 24 2008, during a meeting of the Standing Committee on Estimates, Minister John Wilkinson explained that the Council had successfully provided advice to the Premier through the Ontario Innovation Agenda. As such, ORIC’s work was complete and the government had moved on to “the implementation stage” (Wilkinson, 2008a).
programs to ensure a business-friendly climate; and invest in, generate and attract a workforce with world-class skills in science, engineering, creative arts, business and entrepreneurship (MRI, 2008d; MRI, 2009a: 2; MRI, 2010a: 5). The OIA was supported by close to $3 billion in spending over eight years “to support innovation and help Ontario seize opportunities for global leadership” (MRI, 2008d: 6). Several sectors of the economy were identified as “areas of focus” for strategic government investment including bio-economy and clean technologies; advanced health technologies; pharmaceutical research and manufacturing; and digital media and information and communications technologies (Ibid: 12).

The Ontario Innovation Agenda (OIA) has been critically described as “a motherhood statement.” It indicated to Ontarians that the provincial government had prioritized efforts at advancing regional research and innovation strengths, and it articulated the government’s belief that investments in research excellence and innovation could make Ontario a global leader in targeted areas of strength, drive economic growth, and ultimately contribute to the achievement of a sustainable level of prosperity (MRI, 2008d: 1). Moreover, the OIA aimed at ensuring that all research and innovation community members could identify their interests within the document. To this end, no one could argue with the principles included therein. However, many stakeholders were left with important questions regarding the implementation of the agenda. In particular, details regarding the mix of policy levers the government would employ to achieve the OIA’s high-level goal of “align[ing] all provincial activities with the needs of an innovative culture and economy” (MRI, 2008d: 4) were missing.

127 Comment from an interviewee, a former MRI official. When asked what a motherhood statement was, the interviewee explained: “You know, ‘we believe in’...It is nothing negative. ‘We think these things are important – research, talent, commercialization, culture of innovation capital’...put it all together. It’s a nice rosy picture showing that we believe in innovation, and we understand what innovation is...”
MRI issued a number of press releases announcing the provision of funds through existing programs as part of actualizing the Ontario Innovation Agenda. MRI maintained that investments in these programs were being made to address the following priorities (MRI, 2009a: 3):

- Tackling climate change through bio-based, environmental, alternative energy and clean technologies
- Making the world a smaller, better, more creative (and more connected) place – through breakthroughs in digital media and information and communications technologies
- Conquering disease through the life sciences, biotechnology, advanced health technologies and pharmaceutical research

Over the years that followed, the Premier’s Innovation Awards (Summit, Discovery and Catalyst), the ORF, the IDF, the Market Readiness Program (i.e. IAF, BMEP) and the ERA were all framed as initiatives to advance the OIA and the Ontario government’s 5-point economic plan (MRI, 2008e; MRI, 2008f). A number of these supply-side programs were expanded and evolved to include demand-side components, making them better funded “demand led supply-side policies.” For instance, since its launch, ORF has expanded significantly. During the 2008-09 fiscal year, an additional $250 million over five years was committed to the program to boost its Research Infrastructure component (MRI 2009a: 16).

By 2011, the Ontario Research Fund had allocated more than $600 million in operating and capital support to transformative research at Ontario’s universities, colleges, hospitals and not-for-profit research institutes (Ministry of Finance, 2011a: 137). An additional demand-side component was added to the ORF with the introduction of two one-time single-themed

128 By 2009, the Postdoctoral Fellowship Program was also was associated with the OIA; applications from all disciplines were accepted, but according to the PDF guidelines and application instructions issued by various research universities, the MRI encouraged alignment of research activity with the focus areas identified in the OIA.
129 In 2008, the Ontario government launched this five-point economic to strengthen the economy and enable long-term growth (Ministry of Finance, 2008a). The Plan included government investments in skills and knowledge, infrastructure, efforts to lower business costs, initiatives to strengthen the environment for innovation and efforts to strengthen Key partnerships across Ontario as well as between the province and the international community (Ibid).
130 Izsak and Edler, 2011: 37.
rounds of competition. A Leadership Round in Genomics and Life Sciences along with a Research Excellence Water Round were launched to promote the generation of applied research, encourage and research-industry collaboration in an effort to influence the development of those particular sectors within Ontario’s innovation system and promote innovation and subsequent take-up. The introduction of a narrowly defined theme-specific stream of funding implies a demand-side innovation orientation (Wintjes, 2011: 5).

To add to the Ministry’s suite of supply-side innovation policies, the Ontario Tax Exemption for Commercialization (OTEC) was announced in 2008 as an R&D tax credit intended to encourage business start-ups to engage with Canadian universities and colleges in order to facilitate the commercialization of intellectual property developed by these post-secondary education institutions. Eligible OTEC applicants were newly established corporations, incorporated after March 24, 2008 and before March 25, 2012, that would (a) commercialize intellectual property in one or more of Ontario’s priority areas and (b) sell a product where the key component is based on eligible intellectual property or license a computer program based on eligible intellectual property. OTEC in turn offered a refund of corporate income tax and corporate minimum tax paid for a qualifying corporation’s first ten taxation years (MRI, 2010a: 8; Ministry of Finance, 2008b). The OTEC program was to be jointly administered by the Minister of Research and Innovation and the Minister of Revenue (MRI, 2009h: 2).

132 Priority areas for economic growth: advanced health, bioeconomy (including clean energy technologies), telecommunications, computer of digital media technologies and other new technologies that may be prescribed. See Ministry of Finance, 2008a.
133 Eligible intellectual property included patented property and copyrighted computer programs that constitute a technological advancement. Eligible IP had to be developed by an employee or a student of a qualifying Canadian research institution. See Ministry of Finance, 2008a.
134 OTEC was one of a number of R&D tax credit initiatives the Ontario government maintained between 2008 and 2012. Other programs included the Ontario Innovation Tax Credit (OITC), the Ontario Research and Development Tax Credit (ORDTC), the Ontario Business-Research Institute Tax Credit, the Ontario Computer Animation and Special
Finally, in 2009 equity support in the form of mixed venture funds was provided with the development of another supply-side innovation policy called the Ontario Emerging Technologies Fund (OETF) in 2009. This $250 million program co-invested with qualified venture capital funds and other private investors directly into companies working within the focus areas defined by the OIA. OETF committed a maximum of $50-million per year for five years. The Ontario Capital Growth Corporation (OCGC), an agency of the MRI, was also launched that year to administer the OETF and “to manage the interest of the Government of Ontario” in the OVCF.

While the government continued to fund supply-side innovation programs, it also launched a number of demand-side innovation policies between 2008 and 2011. The section that follows discusses the Liberal administration’s expansion of its demand-side innovation policies in the absence of a formal demand-side strategy and agenda to replace the MRI Innovation Strategy (2006) and the Ontario Innovation Agenda (2008).

5.3.2 Expanding Ontario’s Demand-side Innovation Policies

In the effort to implement a demand-side innovation approach for leveraging public investments made in research and innovation, the government launched a number of new funding programs. These initiatives were designed to strengthen linkages between public research, technology producers and technology users in sectors the government had identified as integral to Ontario’s competitiveness. These programs are grouped into three categories: support for the emergence of a lead market; support for suppliers of innovations; and, support for building clusters/ecosystems.

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Effects Tax Credit and the Ontario Interactive Digital Media Tax Credit. It is worth noting that none of these programs were administered by the Ministry of Research and Innovation between 2008 and 2011.

136 Ontario Capital Growth Corporation website, homepage: http://www.ocgc.gov.on.ca/site/en

• Lead Market Support

The Biopharmaceutical Investment Program (BIP) – one of the three program streams associated with the five-year Next Generation of Jobs Fund\(^{137}\) – was launched in 2008 and administered by MRI (Duncan, 2008a). BIP was a $150 million matching fund intended to increase the level of biopharmaceutical R&D and advanced manufacturing in Ontario, to enhance biopharmaceutical investments in Ontario, and to intensify knowledge and resource exchanges within Ontario’s biotech cluster (MRI, 2008a; MRI website, archived). BIP was designed to be a continuous flow program with no discreet funding rounds and through BIP, the government committed to fund up to 20% of total eligible project costs.\(^{138}\) BIP participants included companies with projects situated at one or more facilities in Ontario and these projects had to be related to R&D and/or advanced manufacturing of innovative drugs.\(^{139}\) By 2010, five projects were launched with BIP funding. These initiatives generated 195 new permanent jobs and 400 short-term construction positions at five global companies: Therapure, Merck, Pfizer, Purdue Pharma and Sanofi-Pasteur (MRI, 2010a).

The Business Ecosystem Support Fund is another lead market initiative implemented by the Ministry to encourage private sector R&D activity. The Fund supports industry-academic partnerships that would accelerate product development in a number of emerging global markets (MRI, 2010a: 9). Funding was provided to launch four new innovation centres with potential for generating products and services in green technology, digital media and health technology sectors. Funding allocations were divided as follows (Ibid.):

\(^{137}\) The Next Generation of Jobs Fund had three program streams: Biopharmaceutical Program (BIP), the Strategic Opportunities Program (SOP), and the Jobs and Investment Program (JIP). SOP also came under the purview of MRI. SOP was designed as a grant program that supported industry-led projects in the focus areas included in the OIA, deemed to have international market growth potential. However, there is no public record of MRI allocating funding through this program.

\(^{138}\) MRI website, archived source.

\(^{139}\) Ibid.
- $13.6 million to GreenCentre Canada to develop the next generation of green industrial products;
- $9.3 million to Coral CEA to help Ontario companies compete in the global Communications Enabled Applications market
- $26.4 million to The Communitech Hub: Digital Media and Mobile Accelerator to ensure Ontario maintains a leadership position in the rapidly growing market for digital media and mobile computing applications
- $21 million in The Health Technology Exchange (HTX), which will help HTX partner with innovative companies, research institutions and health providers to develop cutting-edge medical and assistive technologies that can be marketed to the world.

The Water Technology Acceleration Project (WaterTAP) was the third lead market initiative, launched in 2010-11 to promote the development of Ontario’s water and wastewater sectors (MRI, 2011a). The organization was created under the Water Opportunities and Water Conservation Act (2010) which set the framework to “make Ontario a North American leader in developing water technologies and services” (MRI, 2010g). The Ontario government committed $5 million over three years to “capitalize on the momentum in Ontario’s water sector” and support the growth of water technology companies and the exportation of their ‘made-in-Ontario’ expertise (MRI, 2011a) The funding was used to create a corporation called WaterTAP, designed to connect local entrepreneurs with the local and international capital they need; allow companies to connect easily with the research community and potential customers; and encourage partnerships between municipalities, industry, business and academia (MRI, 2010d; InvestinOntario, 2011; WaterTAP, 2012).

- Public Procurement in Support of Innovation Suppliers

The Ministry of Research and Innovation supported two procurement programs: The Green Focus on Innovation and Technology (GreenFIT) and Green Schools Pilot Initiative (GSPI). GreenFIT enabled the provincial government to use its buying power to adopt and showcase innovative clean technologies. Through this program, public sector end-users became the key reference customer for companies to demonstrate the viability of these green
innovations and assist these companies in introducing new green innovative solutions into the
local and global marketplaces.\footnote{Presentation made on behalf of the Ministry of Research and Innovation and the Ministry of Government Services, “Green Focus on Innovation and Technology (GreenFIT) Strategy” 2010, http://www.doingbusiness.mgs.gov.on.ca/mbs/psb/psb.nsf/Attachments/GreenFIT-OCE-Presentation/$FILE/GreenFIT-OCE-Presentation-05-10-2010.pdf} Before the development of GreenFIT program, the GSPI was launched to identify, demonstrate and test green innovations that had limited or no exposure in the Ontario school system.\footnote{MRI website: http://www.mri.gov.on.ca/english/programs/gspi/program.asp} MRI worked in collaboration with the Ministry of Education to invest over $20 million to pilot a variety of these innovative products, technologies and processes in over 150 Ontario schools and 40 boards.\footnote{Ministry of Education website: http://www.edu.gov.on.ca/eng/parents/greenSchools.html} Examples of these green innovations include electric energy conservation, hybrid electric/thermal energy generation, sewage and water treatment, and wind energy generation.\footnote{Ibid.} The GSPI was framed as an initiative that supported the OIA as per the government’s commitment to prioritize efforts at building research and innovation strength in bio-economy and clean technologies.\footnote{Ibid.}

- Systemic Policies to Build Clusters and Ecosystems

The Ontario Network of Excellence (ONE) is a unique systemic innovation policy instrument and the final product in the evolution of Ontario’s innovation and technology commercialization ecosystem, starting from BCIP (2002). Launched in 2009, the ONE functions as a collaborative, client-focused network of organizations designed to streamline the delivery of flexible programs and services that support technology-based entrepreneurs, companies (including start-ups, emerging growth companies, SMEs and large domestic and multi-national enterprises) and researchers from sector-specific institutes, colleges and universities who wish to commercialize an innovative idea into “globally competitive
products and services.”\textsuperscript{145} ONE offers educational programs to enhance entrepreneurial skills/talent development; advisory services to provide clients with coaching and mentorship opportunities; industry-academic programs to encourage knowledge exchange and resource sharing; customer development opportunities to provide clients the opportunity to engage with users; and, leads to financing programs and opportunities with potential investors.\textsuperscript{146} The ONE clients can access these programs and services through one of fourteen not-for-profit organizations called Regional Innovation Centres (RICs). RICs are located all across the province and their programs are tailored to meet the unique needs of their clients and align with the economic conditions and local capacities of the regional innovation landscape. Figure 5.3 shows the distribution of fourteen RICs. (See Appendix 5.1 for a description of the RICs).

Figure 5.3: Ontario Network of Excellence: Regional Innovation Centres

1. We-Tech Alliance (Windsor)
2. Innovation Guelph (Guelph)
3. Communitech (Waterloo)
4. Innovation Factory (Hamilton)
5. HalTech Innovation Centre (Oakville)
6. Tech Alliance (London)
7. MaRS Discovery District (Toronto)
8. ventureLAB (Markham)
9. Spark Centre (Durham)
10. Launch Lab (Kingston)
11. Invest Ottawa (Ottawa)
12. Northern Technology Alliance
13. RIC Centre (Mississauga)
14. nGen (Niagara)

Source: Innovation Initiatives Ontario North website: \url{http://iion.ca/regional-innovation-centres/}

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\textsuperscript{145} MRI website: \url{http://www.mri.gov.on.ca/english/programs/one/program.asp}
\textsuperscript{146} ONE website: \url{http://www.oneinnovation.ca/en/ServicesPrograms.aspx}
In 2008-09 alone, the RICs provided services and programs that helped 1,400 companies and entrepreneurs to create or retain over 3,400 jobs and bring more than 700 innovations to market (Ministry of Finance, 2011a: 137). These RICs receive program funding from two Provincial Innovation Coordinators (PICs) – MaRS and OCE. In its capacity as a PIC, MaRS coordinates the government’s Business Acceleration Program (BAP)\(^{147}\) which funds programs and services delivered by the RICs that strengthen entrepreneurial talent, accelerate the growth of globally-competitive high-tech companies, and support entrepreneurs in building an innovative enterprise. In turn, RICs are enabled to create a number of advisory programs and services (i.e. Entrepreneurs-in-Residence programs, Embedded Executive programs, Volunteer Mentor Networks, Market Intelligence services, etc.) educational programs (i.e. Introductory Entrepreneurial Training Courses, Advanced Entrepreneurial Training Courses, Online Entrepreneurial Education, etc.) and capital programs and services (i.e. Capital Network Events, the Angel Network Program, Beta Customer Demonstration, etc.) for companies to address a range of business related issues. The OCE administers MRI’s Industry-Academic Collaboration Program (IACP) which addresses technology issues that partner companies and research institutions face. As such, OCE coordinates with the technology transfer networks and research institutions across the province to provide funding to endorse initiatives that support technology transfer partnerships, encourage collaborative commercialization and support the development of research and entrepreneurial talent.

The ONE also includes a group of sector-based not-for-profit corporations – Sector Innovation Centres (SICs) – that deliver sector specific programs and services to ONE

\(^{147}\) The BMEP was brought under the umbrella of the BAP
The government positioned the review of the OCN as a means to “better align the network with Ontario’s Innovation Agenda.”

While the ONE is a systemic policy designed to stimulate demand, it is important to note that this policy initiative also incorporates a mix of supply-side innovation policies – i.e. funding programs like BAP and the IACP – which provide research and innovation actors with the resources (i.e. human capital, financial capital, infrastructure funding, etc.) they need to advance R&D.

5.3.3 Other Funding Initiatives

MRI continued to provide direct funding outside of established programs to research institutions and innovation intermediary organizations in order to increase R&D levels in Ontario and build up the province’s research and innovation infrastructure. Some of these funding initiatives included:

- $10 million to the Colleges Ontario Network for Industry Innovation (CONII), announced in Budget 2009
- $5 million towards Ontario Genomics Institute to support research excellence in genomics, announced in Budget 2009
- $1.2 million to the Toronto Region Research Alliance (TRRA), a non-profit “working to strengthen Toronto’s ability to attract and grow innovative, research-intensive companies” (Ministry of Finance, 2009b: 30).
- $40 million to create an Ontario research hub for the International Cancer Genome Consortium at the Ontario Institute for Cancer Research (MRI: 2009a: 16).

In 2010, the $161 million Ontario Life Sciences Commercialization Strategy was launched to advance collaboration between government, academia and industry in the life sciences sector; to attract and nurture scientific excellence and talent; raise venture capital to address financing challenges within the sector; and improve international marketing and

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148 Ibid.
149 See MRI website: http://www.mri.gov.on.ca/english/programs/one/program.asp NB. The Ontario Innovation Agenda briefly mentions the importance of supporting clusters and convergence (MRI, 2008d).
promotion in order establish Ontario as the go-to place for innovative pharmaceutical and advanced health technologies MNEs to invest in (MRI, 2010b: 11-16). Several new demand-side innovation and supply-side policy initiatives were bundled under this Strategy. For instance, to support the commercialization of genomics research, the government committed $114.6 million through the Ontario Research Fund’s one-time Global Leadership Round in Genomics and Life Sciences (GL2). Additionally, to improve the clinical trials environment in Ontario, the Ontario government committed up to $17 million to fund the establishment of new infrastructure that would streamline administrative processes related to clinical trials and research (Rx&D, 2010). The government also employed a demand-side innovation policy approach by committing $21.4 million towards strengthening Ontario’s Medtech cluster and advancing the development of a Medical and Assistive Technology (MAT) ecosystem; funds for this initiative were provided to the Health Technology Exchange (HTX) Inc. to administer on behalf of the Ministry. Moreover, investments were made directly to different organizations to support the creation and/or development of a number of institutional assets in the traditional life sciences, agri-bio industry and, forestry and bio-fuels sector, including the Sarnia-Lambton Bioindustrial Innovation Centre, the Centre for Research and Innovation in Bio-Economy (CRIBE) in Thunder Bay, the Ontario Genomics Institute, and the Agri-Tech Commercialization Centre (ATCC) (Ibid: 18; Ministry of Finance 2009b: 28).

The Ontario government also invested in building collaborative R&D ties with Quebec. In 2011, MRI announced a new initiative called the Quebec-Ontario Life Sciences

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152 Approximately $14 million was allocated to program disbursements targeted at strengthening Ontario’s Medtech cluster and about $7 million is dedicated for HTX MAT Ecosystem Support Services (which includes operational costs; commercialization and market development services; and educational workshops and online resources.) See HTX PowerPoint Presentation “Health Technology Commercialization Program Information Session.” June 8, 2010: [https://www.htx.ca/Library/health_technology_commercialization_program_htcp.htm](https://www.htx.ca/Library/health_technology_commercialization_program_htcp.htm)
153 Ibid. Also see HTX website: [https://www.htx.ca/HTX/history.htm](https://www.htx.ca/HTX/history.htm)
Corridor, designed “to help the two provinces become one of the largest life sciences economic regions in the world…This new partnership [was expected to]…improve economic growth in life sciences research, innovation and commercialization” (MRI, 2011b). The corridor is supported under the Ontario-Quebec Trade and Cooperation Agreement, signed in 2009 to create “a common business space” between the two provinces that would reduce trade barriers and improve long-term economic development (PwC, 2011: 4). As of 2011, the corridor produced the majority of Canadian sales and exports and included 1,139 companies that employed 66,000 people (PwC, 2011: 5). Organizations associated with this initiative include biotechnology companies, pharmaceutical companies, medical devices companies, contract research organizations, contract manufacturing organizations and academic research institutions (PwC, 2011: 33). These organizations have access to a range of funding from the federal and provincial governments, and the corridor itself is supported by Quebec’s Biopharmaceutical Strategy, Research and Innovation Strategy and Ontario’s Life Sciences Commercialization Strategy (Ibid: 5).

On another note, the Ministry of Research and Innovation also demonstrated support for social innovation. Social innovation may be defined as “the development and application of new or improved activities, initiatives, services, processes, or products designed to address social and economic challenges faced by individuals and communities” (Goldenberg, 2004:1). While a detailed discussion on social innovation is outside of the purview of this dissertation, the following funding aimed at supporting social innovation initiatives led by MaRS and OCE are worth mentioning:

- MaRS established the Social Innovation Generation (SIG)\textsuperscript{154} – a national collaborative that has developed educational initiatives to advance public

\textsuperscript{154} The plan to establish a Social Innovation Generation Program was announced in the Ontario Innovation Agenda.
understanding of social innovations and the social innovation process in Canada. The organization uses online and offline media, public events, networking and marketing opportunities to facilitate dialogue between stakeholders with the intention of discerning the most effective solutions to the most wicked social challenges. SIG also engages with government decision makers to discuss the importance of social innovation and advocate for legislative changes that would enable the acceleration of social entrepreneurship in Canada. In support of social entrepreneurs, SIG@MaRS has provided advisory services, education and networking opportunities. The organization has also established initiatives that will facilitate the development of a more robust social finance sector (Ibid.) MRI provided SIG@MaRS with funding to achieve its objectives: $1.2 million in 2008-09, and $1.3 million in 2009-10, and $1.4 million in 2010-11 (Ministry of Finance, 2009e: 2-328; Ministry of Finance, 2010b: 2-340; Ministry of Finance, 2011c: 2-326).

- In 2008, the government announced its intention to create a Social Venture Capital Fund at MaRS (MRI, 2008a:6). The potential for establishing this fund was also mentioned in the Ontario Innovation Agenda (2008) (p. 26). The program was expected to support the creation of social enterprises, social entrepreneurship and build on the work of SIG@MaRS (Ibid.) While the fund was not publicly announced, according to the Ministry of Finance’s Public Accounts of Ontario 2008-09, the government committed $225,000 to this program (p. 2-328).

- The government also supported the OCE’s Social Innovation Program, launched near the end of the McGuinty administration’s second term in office; the Ministry of Research and Innovation provided the OCE with $1 million to advance this
initiative. The Social Innovation Program had two main objectives: to create and enhance partnerships between Ontario’s not-for-profit, social enterprise sectors and industry and academic communities; and to advance innovative products, services and business models that meet social and environmental needs (OCE, 2011: 9).

5.4 Policy Development at the Federal Level – Highlights, 2003 – 2011

From 2003 and 2011, the federal government established and/or continued to support a number of initiatives aimed at advancing science, technology and innovation across the country. See Table 5.2 for a list of some of Ottawa’s key funding programs; tax incentives/benefits; government-commissioned reviews and consultations; and policy papers developed. Many of Ontario’s research and innovation actors benefitted from these initiatives.

Table 5.2 A Sample of Federal Policies and Initiatives

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<th>Government-sponsored reviews and consultations</th>
<th>Policy Papers</th>
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<td><em>Expert Panel on Commercialization, 2006:</em> to provide advice on what government, business and the research sector could do to improve commercialization in every sector of the economy (Industry Canada, 2006). In 2006, the Expert Panel, led by Joseph Rotman, released the report <em>People and Excellence: The Heart of Successful Commercialization</em>; notable recommendations: Increase business demand for talent, through the development of a new Canada Commercialization Fellowships Program; incentivize private sector hiring of highly qualified personnel with commercialization talents; create a Commercialization Superfund to address key commercialization challenges; expand federal programs that support seed and start-up firms in proving their business ideas; develop a Canadian SME partnership initiative to increase commercialization activity of small and medium-sized enterprises; and improve access to early-stage angel financing and expertise.</td>
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<td><em>Advantage Canada: Building a Strong Economy for Canadians, 2006:</em> – the Harper government’s new economic plan for improving the national economy and creating “the right conditions and opportunities for families and businesses to succeed.” The Plan announced the government’s intentions to increase commercialization levels by incentivizing business innovation and strengthening links between universities, colleges and the private sector (Canada. Department of Finance: 2006c: p. 62). Emphasis was placed on supporting research and excellence “to better align Canada’s post-secondary research capacity with the needs of businesses” (Ibid.)</td>
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<td>In 2007, the federal government established the <em>Science, Technology and Innovation Council (STIC)</em> to provide external policy advice on science and technology issues and measure Canada’s science and technology performance against international standards. STIC developed two <em>State of the Nation</em> publications which offered a detailed account of the innovation opportunities and challenges Canada faced in 2008 and 2010.</td>
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<td><em>Mobilizing Science and Technology to Canada’s Advantage, 2007,</em> a multi-year science and technology strategy: featured the Entrepreneurial Advantage, the Knowledge Advantage and the People Advantage. The Entrepreneurial Advantage was based on Canada translating knowledge into practical applications to improve wealth, wellness and well-being. The Knowledge Advantage entailed Canada building on its research and engineering strengths, generating new ideas and innovation and achieving excellence by global standards. Thirdly, the People Advantage included Canada growing its base of knowledge workers by developing, attracting and retaining the highly skilled people needed to thrive in the modern global economy (Industry Canada, 2007: 12). Through the S&amp;T Strategy, the federal government once again announced its commitment to promote world-class scientific and technological excellence; focus on strategic areas where Canada could be a world leader (i.e. environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communications technologies); foster local and international partnerships involving business, academic and public sectors; and enhance accountability by implementing stronger governance and reporting practices (p. 46-47, 95). In 2009, the federal government released <em>Mobilizing Science and Technology to Canada’s Advantage: Progress Report 2009</em> detailing the progress the government had made in implementing the S&amp;T Strategy.</td>
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The *Innovation and Business Strategy* report was commissioned by Industry Canada and developed by the Council of Canadian Academies’ Expert Panel on Business Innovation (CCA, 2009: iv). In response to the government’s request to assess the innovation performance of Canadian business, the report found that Canada’s productivity problem is actually a business innovation problem and underscored the importance of Canadian firms adopting an innovation-based business strategies (CCA, 2009: 210).

The *Innovation Canada: A Call to Action* publication was intended to build on the evidence and recommendations presented in Council of Canadian Academies’ 2009 report as well as the first *State of the Nation* report. A six-member expert panel, chaired by Tom Jenkins, was convened to provide recommendations on improving the effectiveness of federal research and development programs in support of business and commercially oriented R&D including tax incentive programs; programs that support innovative business R&D, including general support, sector support and regional support; and, programs that support business-focused R&D through federal granting councils and other departments and agencies (Canada. Industry Canada, 2011: 1-3 – 1-4).
Funding

Federal granting agencies and the Canada Foundation for Innovation received increased funding annually.

The Indirect Cost of Research Program was established in 2003 as a permanent initiative administered through the granting councils to provide researchers with support.

In Budget 2004, the government set aside $250 million for the Business Development Bank of Canada to invest in innovative start-up and early stage companies.

To encourage business activity and investment in S&T, the government increased the capital cost allowance rate for computer equipment to 45% from 30 per cent, and the rate for broadband, Internet and other data network infrastructure equipment to 30 per cent from 20 per cent (Canada. Department of Finance, 2004: p. 160, 150, 13).

Multi-year funding commitments were made to the Canada Research Chairs, Genome Canada, the Networks of Centres of Excellence, the Centres of Excellence in Commercialization and Research (CECR), the CA*net high-speed research network, the tri-council Intellectual Property Management Program and the Networks of Centres of Excellence. Funding was also allocated to support Canada Graduate Scholarships as well as scholarships, fellowships, Chairs and awards from the granting councils.

The government committed $9.2 billion in total S&T investments in 2007-08 to fund research in public hospitals, universities and colleges; leading-edge science infrastructure; advanced skills and training; and industry-led commercialization and business R&D (Canada. Department of Finance, 2007: 197).

2010 FedDev Ontario launched a $15 million program called the Applied Research and Commercialization Initiative (ARC) to encourage collaboration between small and medium-sized enterprises and post-secondary institutions across the region in order to accelerate innovation and improve productivity and competitiveness for business in southern Ontario, specializing in mobile, biotechnology, clean energy, materials and manufacturing, food processing and digital media.

Budget 2010 introduced Canadian Innovation Commercialization Program (CICP) to help companies cross the pre-commercialization gap in four areas: environment, safety and security, health and enabling technologies.

Tax Incentives/Benefits

R&D Tax credit programs to intensify business R&D activity in Ontario were administered by the Canada Revenue Agency (or jointly with other provincial government ministries), including: Ontario Innovation Tax Credit (OITC), a refundable tax credit available to small and medium-sized corporations that carry on scientific research and experimental development (SR&ED) in Ontario; Ontario Interactive Digital Media Tax Credit (OIDMTC), a refundable tax credit available to Ontario corporations for the creation, marketing and distribution of interactive digital media products; Ontario Research and Development Tax Credit (ORDTC), a non-refundable tax credit available to corporations that carry out scientific research & experimental development (SR&ED) work in Ontario; the Ontario Business-Research Institute Tax Credit, a refundable tax credit available to a corporation that performs scientific research and experimental development (SR&ED) in Ontario under a contract with an eligible research institute (ERI); and the Ontario Computer Animation and Special Effects Tax Credit, a refundable tax credit based on eligible Ontario labour expenditures incurred by a qualifying corporation during a taxation year with respect to eligible computer animation and special effects activities.

During the 2008 pre-Budget consultations, the federal government staged consultations with stakeholders to determine how to make Canada’s scientific research and experimental development (SR&ED) tax incentive program more effective for Canadian businesses (Canada. Department of Finance, 2008: 85). Pre-budget consultations highlighted the range of administrative problems associated with the SR&ED, including the refusal of CRA staff to follow the Agency’s historic policies on what is eligible for the tax credits; lack of objectivity, consistency and timelines of the Agency’s reviews; and the inadequacy of the Agency’s redress processes for the program (CATAAlliance, 2008: 3).

In Budget 2008, the government also committed to easing the tax compliance burden of SMEs by reducing the record-keeping requirements for automobile expense deductions and taxable benefits.

Sources: Canada. Department of Finance, 2003; Canada. Department of Finance, 2004; Canada. Department of Finance, 2005; Canada. Department of Finance: 2006a; Canada. Department of Finance: 2006b; Canada; CCA, 2009;

156 The Federal Economic Development Agency for Southern Ontario (FedDev Ontario) was created in 2009 to deliver federal government economic development programs “tailored to the specific priorities of workers, businesses and communities in Southern Ontario.” (FedDev Ontario)
Despite the range of goals both governments held in common and complementarity in their programmatic ideas on research and commercialization, all of the provincial government officials interviewed maintained that the federal government did not have any bearing on Ontario’s R&I policy direction and programmatic ideas. Some interviewees speculated on whether a contentious history of federal-provincial relations may have actually precluded the development of more coordinated government intervention to promote innovation in Ontario as well as across Canada. However, all interviewees acknowledged that the CFI program with its provincial government matching requirements necessitated some level of funding program alignment between the two levels of government.

This chapter has provided a broad overview of research and innovation policy development in Ontario from 2003-2011 and included highlights of S&T policy development at the federal level. The next chapter introduces the actors within Ontario’s research and innovation policy community that sought to influence the pre-decision-making process from 2003 to 2011.
Chapter 6
Ontario’s Research and Innovation Policy Community

6.0 Introduction

The province’s research and innovation policy community is comprised of many actors from different parts of Ontario’s economy:

- Research Community
- Private Investors
- Private Firms
- Innovation Intermediary Organizations
- Individual Innovation Entrepreneurs
- Individual Policy Entrepreneurs
- The Provincial Government
- The Federal Government

These actors all had a direct or indirect interest in the development of research and innovation policy, and in varying degrees, they influenced policy outcomes over time. This chapter will describe each group of the policy community and delineate between the sub-government and the attentive public. The following sections will also review the philosophical ideas these actors shared as well as the perpetuation of disparate ideas about the innovation process which ultimately complicated the dynamics of the pre-decision making stages of policy development.

6.1 The Actors

The research community consists of the province’s academic hospitals¹⁵⁷, universities, colleges¹⁵⁸ and sector-specific research institutes. These organizations generate

¹⁵⁷ These hospitals are affiliated with a university medical or health sciences faculty (CAHO, 2008). They provide health care, teach health care providers and “foster health care innovation through research and discovery.” CAHO website: http://www.caho-hospitals.com/about-us
cutting-edge, transformative basic and applied research within and across a range of disciplines. Moreover, members of the research community have an important role to play generating, attracting and retaining the research and creative talent that is necessary for building up Ontario’s innovation culture.

*Private investors* are local and international venture capitalists, angels, pension funds, industry/business development offices/corporations, banks and insurance companies that provide researchers and innovative entrepreneurs with the risk-capital and business services needed to advance their activities.

Ontario’s *private firms* are locally-based SMEs, LMEs and MNCs that operate across multiple sectors. Firms associated with Ontario’s research and innovation policy community include technology-based organizations, high growth businesses and main street firms.

*Innovation intermediary organizations* (IIOs) are “organizations or groups within organizations that work to enable innovation, either directly by enabling the innovativeness of one or more firms, or indirectly by enhancing the innovative capacity of regions, nations or sectors” (Dalziel, 2010: 1). IIOs include college and university technology transfer offices (TTOs), technology licensing offices (TLOs), and industry liaison offices; venture development organizations that invest in high-growth ventures and provide entrepreneurs with business support; and enabling organizations which include not-for-profit and social enterprises that provide leadership in a specific industry, coordinate the activities of various research and innovation partners and encourage the growth of innovation clusters (Communitech, 2011). To this end, chambers of commerce, industry associations, boards of trade, technology parks, research consortia, business parks, science parks, business

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158 Under the Colleges of Applied Arts and Technology Act (2003) the mandates of Ontario colleges were extended to include applied research activities. Since then, colleges have dramatically expanded their research, commercialization and innovation capabilities. See Fisher, 2008.
incubators, and economic development organizations/offices (EDOs) are all included in this group (Dalziel, 2010: 2, 4). A number of IIOs may also be described as “knowledge brokers”, i.e. firms that acquire, recombine, and transfer knowledge about a given market/problem to other people, organizations and industries in order to facilitate the development of innovative products and processes/solutions (Cillo, 2005: 404; Hargadon and Sutton, 1997: 716; Howells, 2006: 718).

*Individual innovation entrepreneurs* are not affiliated with a private sector firm or research institute, yet they retain a vested interest in the development of policy that affects their entrepreneurial activities within a given innovation-oriented sector. Many of these individuals have access to limited resources, particularly during the early stage development of their innovations. Hence, resource allocation decision-making and policies is of particular concern to these persons.

*Individual policy entrepreneurs* include experienced experts in the research areas and/or innovation sectors that were prioritized by the province as well as academics with research expertise in innovation systems and (regional) economic development. On an ongoing basis, many of these individuals provide decision-makers with strategic advice regarding policy development.

As discussed in Chapter 3, the government plays a critical role in supporting R&D and innovation. Policy makers develop programs and initiatives that advance research excellence and skills development; encourage university-industry partnerships; build innovation networks; and strengthen collaboration with international research and innovation

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159 Andrew Hargadon (1998) provides a list of activities knowledge brokers perform to facilitate innovation, including exposing firms to a range of industries and their valuable knowledge (access); bringing knowledge of an industry’s existing problems and solutions into the organization for use at a later time (learning); enabling development teams in one industry to recognize its similarity to other problems – and their solutions – in different industries (linking); and turning innovative concepts from outside industries into products and solutions by combining them with existing ideas from within the industry (implementation) (p. 214).
actors (Creutzberg, 2011). Moreover, the government has an important part to play in fostering business innovation through the deployment of “marketplace policy and regulatory frameworks that structure the climate for private-sector competition and investment, [and support] business and commercially oriented R&D” (Expert Review Panel on Research and Development, 2010: 14). Notably, the federal government delivers a number of federal-led policies and programs that have impacted Ontario’s research and innovation capacity and in varying degrees, influenced policy formation and decision-making at the provincial level. These policies and programs are affiliated with a number of federal agencies and national assistance programs including the Canada Research Tri-council (SSHRC, NSERC and CIHR), the Industrial Research Assistance Program (IRAP), the Business Development Bank of Canada (BDC), Department of Foreign Affairs and International Trade Canada (DFAIT), FedDev, FedNor and CFI. Municipal government officials have also engaged in the discussion to develop more robust research and innovation policy development, providing input on the importance of developing initiatives that will meet the needs of local innovators and entrepreneurs.

The provincial government is represented by ministries with innovation embedded into their mandates as well as other elected members of the Legislative Assembly with an interest in research and innovation policy. Senior officials from the Ministry of Research and Innovation have been particularly influential in the policy community; these individuals include but are not limited to Ministers, Parliamentary Assistants, Deputy Ministers, Assistant Deputy Ministers, Directors, Managers, senior policy advisors, senior business advisors (from MEDT), and leadership from other government agencies (i.e. the Ontario Capital Growth Corporation). Over the years, the government has developed and deployed research and innovation policy in Ontario to assist local researchers and entrepreneurs in
generating cutting-edge ideas and bringing their innovations to the local and global markets. The Ontario government has also regularly consulted with other actors in an effort to establish a province-wide strategy for building research capacity and advancing innovation across different sectors of the economy in order to enhance economic growth and job creation.

6.2 Separating the Sub-government from the Attentive Public

Ontario’s research and innovation policy community is divided into two segments: the attentive public and the sub-government. Members of the attentive public have expertise in research and innovation and are aware of issues relevant to this policy area. They had from time to time made an effort to influence policy; however they did not participate in policy-making on a regular basis. The attentive public was comprised of a number of organizations, including some regional economic development agencies; chambers of commerce; some advocacy groups (e.g. Ontario Confederation of University Faculty Associations-OCUFA, the Association of Universities and Colleges of Canada-AUCC); organizational policy entrepreneurs (e.g. Impact Group, Conference Board of Canada); investors; industry associations; non-profits with expert knowledge in research and innovation (e.g. Institute for Competitiveness and Prosperity); public-private partnerships with an interest in research and innovation (e.g. Greater Toronto Marketing Alliance, Toronto Financial Services Alliance); sector-specific research institutes (e.g. Ontario Brain Institute, Perimeter Institute), some intermediary organizations depending on the issue, the Legislature and Officers of the Legislature (particularly the Office of the Auditor General of Ontario), and the federal government.

On the other hand, the sub-government consisted of the actors that took part in research and innovation policy-making. Members included the provincial government, the
research community, a select set of industry representatives (Ontario Network of Excellence members were represented in particular), a few intermediary organizations, and a small circle of individual policy entrepreneurs.

6.3 Philosophical Ideas of the Sub-government

Ontario’s research and innovation actors held a number of philosophical ideas in common regarding the value of research and innovation and the link between innovation and regional economic development. The Ontario government promoted innovation as a principal driver of growth, and according to the Liberal administration, “in a competitive global environment, Ontario’s future prosperity…increasingly depend[ed] on the economy’s ability to innovate” (Ministry of Finance, 2006a, p. 125). Policy makers believed that Ontario’s economic goals, which included heightened levels of GDP, job creation, productivity and competitiveness, could be achieved by strengthening the region’s innovation capacity. As such, investments in innovation was considered to be critical for developing the new products and services needed to create wealth, raise the standard of living and enhance Ontario’s shared quality of life (MRI, 2006m). The provincial government also acknowledged research as “a fundamental source of new ideas – the raw material of innovation” (Ministry of Finance, 2006a: 11). According to Statistics Canada, the Ontario government spent $3.6 billion on research and development between 2003-04 and 2010-11, with nearly 80% of this funding committed to supporting R&D performed by universities, colleges and hospitals – this represents an increase of 50% over the previous eight years, i.e. between 1995-96 to 2002-03 (Ministry of Finance, 2011a: 136). The provincial government made these investments based on the idea that excellence in basic and applied research is crucial for capturing innovation and invention opportunities, addressing complex social and economic problems, attracting foreign investment and supporting the development of new companies.
To this end, Ontario Budgets, ministerial statements, Ontario’s Strategic Plan (2006), various press releases, and the government’s Progress Reports articulated the inextricable link between research, innovation and prosperity.

In concert with the provincial government, other members of the sub-government promoted the importance of advancing world-class research and innovation in order to enhance regional social and economic development and bolster the province’s ability to compete in a knowledge-based global economy. They subscribed to developing a research and innovation system in Ontario with strong linkages between business, research and government to ensure the transfer of resources, the development of HQP, the dissemination of brilliant ideas, and the commercialization of these ideas into innovative products, processes and services. Non-governmental members of Ontario’s research and innovation sub-government agreed that the industry-research community interface provided vast innovation opportunities. These individuals suggested that once trust and mutual understanding of the strengths, demands and roles of actors have been established, industry and academic partners benefitted from interactive and social learning, shared expertise, public investment in specialized infrastructure, and joint training and research initiatives. Local firms that have built up an internal knowledge base and the capacity to evaluate and utilize knowledge from research partners have a high level of absorptive capacity, and in turn, are more likely to apply that knowledge towards the development of a new or improved product, process or service. Ongoing collaboration and open lines of communication must be maintained between industry and research partners to ensure that both sectors are well positioned to take advantage of existing and emerging innovation opportunities. An effective management cadre was deemed particularly important for identifying innovation opportunities and marshaling the resources needed to achieve innovation. Finally, a number
of sub-government actors discussed the importance of building up youth entrepreneurship and encouraging young people to start their own businesses in innovation and technology. In the same vein, respondents spoke about the value of teaching innovation to primary and secondary school children and instilling an entrepreneurial mindset from elementary school up to the post-secondary level.

6.3.1 Factors that Foster Innovation in Ontario

Members of the sub-government interviewed acknowledged the importance of establishing a dense network of partnerships that would sustain ongoing knowledge flows and technology transfer between public and private research and industry partners at a national and international level. However, interviewees maintained that a number of other factors were crucial for fostering innovation in Ontario.

Sub-government interviewees underscored the importance of Ontario developing an “entrepreneurial spirit” across its research and innovation system. Interviewees from industry, intermediary organizations and the research community explained that this kind of entrepreneurial spirit is demonstrated by the researcher working towards generating cutting-edge ideas, the entrepreneur focused on developing a groundbreaking innovation, and the venture capitalist willing to invest in new, small, fast-growing technology companies. From a research perspective, the entrepreneurial spirit may be fueled by a desire to produce best-in-class results and receive recognition from one’s peers. From an institutional and provincial perspective the entrepreneurial spirit may be driven by economic gain. The desire to maintain one’s position relative to other innovation partners and competitors can play a decisive role in the pursuit of innovation success. Necessity, driven by pressure from customers and competitors may also spur innovation (Institute for Competitiveness and Prosperity, 2004).
Moreover, when people are at their limits and faced with economic challenges, the pressure of hardships can inspire innovation.

Many of the non-governmental interviewees agreed that an entrepreneurial spirit thrives in an environment where research and innovation actors are open to taking calculated risks, willing to acknowledge the mistakes that may follow, and are disposed to learning from these mistakes. Moreover, an entrepreneurial spirit must have sufficient support to grow. The researcher must have access to the range of resources needed to undertake the process of research and discovery. Funding to cover the direct and indirect cost of research, to acquire state-of-the-art infrastructure, to develop research teams and forge collaborative working relationships with other research communities and industry partners is imperative. Innovators, both academic and non-academic, also need business support; risk capital, market intelligence, networking opportunities and mentorship are equally important for ensuring that innovative ideas reach the marketplace. Tax structures as well a regulatory system and legal infrastructure that encourage private sector investment in R&D and enable industry to take risks without risking the whole enterprise are all necessary assets. Favourable social and economic conditions are also necessary for supporting entrepreneurial activity. Additionally, innovation is supported by the activities of local intermediary organizations that facilitate the transference of ideas from knowledge generators for uptake and innovative application by entrepreneurial firms.

Research and innovation actors agreed that the provincial government has a significant role to play in fostering innovation in Ontario. Government-funded programs and strategies designed to encourage business investment in R&D and support the development of highly-qualified and skilled personnel are important policy initiatives the government should extend. Government must find an appropriate balance between investments that
ensure research excellence and investments that ensure the commercialization of excellent research. Furthermore, interviewees from the research community in particular emphasized that returns on investments in research may take a longer period of time than anticipated. It is also important for the government to provide long-term, predictable funding to support basic and applied research and entrepreneurial initiatives that require a longer gestation period.

According to one interviewee from the college sector, the government has a central role to play in encouraging “innovation literacy” across Ontario. Innovation literacy refers to a familiarity with innovation. It entails individuals having an entrepreneurial mindset, understanding what product and process development and improvement means to a particular industry, knowing what it means to work on project teams, having project management experience, etc. Innovation literacy is a translational skill or toolbox that is not specific to any one discipline, but rather applied to all disciplines in order to improve general innovation capacity across the economy. Finally, in its efforts to foster innovation, the provincial government must support and encourage educators from grade school to university/college to teach innovation in the classroom.

6.3.2 Factors that Hinder Innovation in Ontario

For decades, the Ontario and federal governments have endeavoured to isolate and address the range of factors that hinder innovation at a national and regional level. For instance, the 1988 Premier’s Council report, *Competing in the New Global Economy*, states that there were a number of weaknesses in Ontario’s economy that impeded industrial development and technological innovation (p 12). The council pointed out that a lack of indigenous multi-national companies in non-resource industries was a substantive structural weakness and a major reason for Ontario’s poor performance in most high-growth sectors (Ibid.). Other debilitating factors included low level of research and development spending in
most industries; the dependence of too many sectors on undifferentiated commodity-type products; the presence of uncompetitive plants in certain core industries; and the inadequate support climate for both entrepreneurial start-ups and larger, but not yet fully multinational companies (Ibid). Deficiencies in public infrastructure were also cited as competitiveness problems that affect industrial development, R&D advancement and technological innovation. Most notably, the Council criticized S&T infrastructure in universities and government labs as being inadequately focused on industrial priorities and world-class performance (Ibid: 12–13).

A report released by the Council of Canadian Academies (CCA) in 2009 focused on the factors that hinder business innovation in particular\textsuperscript{160}. It was determined that a large majority of Canadian businesses and entrepreneurs did not employ innovation-based strategies, and when firms choose not to place an emphasis on innovation, national innovation activity is stunted. The report identified five factors that influence Canadian businesses’ choice of innovation as a business strategy: (1) the structural characteristics of the Canadian economy, i.e. the effect of sector mix, foreign control and the distribution of firm size on R&D expenditure; (2) the state of competition; (3) the conditions that favour or inhibit the creation and growth of new innovative businesses; (4) public policies that have significant impact on innovation; and (5) business ambition, i.e. the extent to which business behavior in Canada is strongly growth-oriented. The CCA intended for the report to “spark a

\textsuperscript{160} In 2007, the Ministry of Industry requested the Council of Canadian Academies to identify and assess the core factors that influence innovation behavior, and as such, drive long-term productivity growth in Canada. The CCA convened an Expert Panel – consisting of members from the business, labour and academic sectors – to provide a deepened understanding of the factors that mitigated the innovation performance of Canadian firms. The Report makes the link between business innovation and productivity to underscore the idea that Canada’s productivity problem is ultimately a business innovation problem, and if Canada is to stimulate productivity growth, its firms must develop business strategies that place an emphasis on innovation.
fresh discussion on innovation in Canada, one that focuses on the factors that influence adoption of innovation-based business strategies” (CCA, 2009b).

Complementary to the findings of the Premier’s Council 1988 report and the CCA 2009 publication, members of Ontario’s research and innovation sub-government who were interviewed offered a number of factors that hinder innovation in Ontario. Among them are a list of dysfunctional attitudes held by actors from the private sector and research community. In alignment with the CCA report, several interviewees maintained that innovation success may be compromised when there is inadequate participation from business; this is signaled by comparatively low levels of business expenditure in R&D (BERD). Some research and innovation actors believe that the lack of business-led innovation in Ontario is due to low levels of business ambition, i.e. an entrepreneur may establish a start-up company that earns high dividends, and then sell that company for the highest market price, rather than work towards raising sales and reinvesting the gains in order to grow the enterprise. Innovation may also be hindered when researchers fail to work at moving their ideas beyond the initial stages of development. A false sense of security and a lack of urgency may exacerbate this attitude of complacency. Both business and researcher may also be criticized for hindering innovation by perpetuating low levels of customer engagement. In an ideal situation, industry-driven research streams are well informed by customer or supplier input and complemented with adequate market analysis to ensure the marketability of a new or improved product, process or service. Risk aversion is another dysfunctional attitude that stifles innovation.

When innovation actors are unable to access the human and financial capital they need, innovation success is also hindered. Executive talent with expertise in venture development is critical for ensuring innovation success. Entrepreneurs who fail to recruit
senior people with sales, marketing and management skills may not only stunt efforts at developing an innovative product, process or service and bringing it to market, but may also risk the growth and sustainability of the entire start-up enterprise (Barber and Crelinsten, 2009). Risk-capital is another much needed source of funding for start-ups, particularly in the high tech sector. However, if the venture capital community does not have sufficient information about the sector it is investing in, the development of trust ties between the entrepreneur and the venture capitalist community remains challenging. This dynamic can complicate venture capital risk assessment, engender risk-aversion and result in a reduced level of funding for the entrepreneur.

Finally, as indicated in Chapter 3, interviewees confirmed that public policy initiatives that are not strategic, integrated and place-based, can negatively impact innovation. For instance, several informants contended that policies which support research and innovation activity in one discipline and/or sector to the determent of another discipline and/or sector will often challenge innovation success, particularly in areas of emerging strength. Limited public funding, along with the pressure to fulfill rigid oversight conditions and meet overly-detailed administrative requirements associated with accessing public funding, will also frustrate innovators’ efforts at acquiring the critical resources they need to advance their innovative ideas.

Overall, between 2003 and 2011, the members of Ontario’s research and innovation sub-government agreed to work towards achieving the common goal of building up the province’s research and innovation capacity. Collaboration, the pursuit of sustainable economic development, the intensification of regional competitiveness, and a commitment to engage in social learning across multiple sectors and disciplines were some of the fundamental operative norms endorsed by all of these actors. However, there were a number
of issues members of the sub-government could not agree on. The sections that follow discuss the diffuse ideas that were provided to the following questions: What is innovation? Does Ontario have an innovation problem?

6.4 The Search for a Common Definition of Innovation

As evidenced above, members of the sub-government shared an appreciation for the importance of advancing research and innovation. However, when it came to defining the term innovation, these interviewees’ responses varied markedly. The OECD (2005a) defines innovation as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method or a new organizational method in business practices, workplace organization or external relations.” While many research and innovation actors in Ontario are aware of this definition, interviewees provided different perspectives and ideas on what is innovation and suggested a number of elements that are integral to advancing the innovation process.

First, when it comes to the innovation process, it was agreed that people matter. Innovation is a person-centered activity. It starts with and is driven by talented people. Persons from different sectors of the economy have important and mutually dependent roles to play in advancing the innovation process. Secondly, innovation is a new way that value is created. It is concerned with developing new concepts, finding new ways of doing things and realizing new ways of applying ideas. The innovative product, process or service does not have to be new to the world, but it should be new to the people involved in a value exchange. Thirdly, innovation has an element of practical application; it must be applicable to a real life situation. Fourth, innovation is a social process involving consumers and producers engaged in a mutually beneficial dialogue. The exchange of ideas and knowledge facilitates localized
learning within firms, between firms and between firms and research institutions. Fifthly, innovation must generate (incremental or disruptive) change that improves the quality of life for individuals. Sixth, innovation should not be confused with invention or discovery. An invention is a new product, service or process that may not have any bearing on a customer or population’s needs, on improving the world, or any kind of new value. An invention’s most distinctive quality is in its newness or uniqueness, while an innovation’s most distinctive quality is in value to a customer or population. All inventions will not become innovations, and only some innovations come from inventions. Seventh, innovation involves risk-taking which may entail exploring areas that might not have been explored before or doing something in a completely different way. Eighth, for many innovation actors, innovation must always have a customer or market. From this perspective, innovation is the provision of greater value to customers through more effective products, processes or services. The customer is the beneficiary of the innovation and should be willing to pay more to acquire that innovation and/or the provider of the innovative service, product or process should reap a cost savings that may or may not be passed on to the customer. Finally, innovation is inclusive. It involves many sectors, institutions and individuals, and requires a sustained collaborative effort from all innovation partners.

Aware of the many and varied definitions of innovation, the provincial government sought to build a working concept that it could use to develop policy and appeal to a wide spectrum of research and innovation actors in Ontario. Accordingly, the government defined innovation as:
…an openness on the part of people to new ways of thinking and doing that bring improvements, whether to an individual business, an industry, government, the economy or society as a whole. (p. 6)…Innovation is about the complex interplay of ideas and the market to create the products and services that the ‘customer’ wants and needs to achieve economic and social prosperity. Innovation often results from the translation of new research discoveries and new technologies through commercialization and is most effective when the process is customer or market-driven…

Ontario Innovation Agenda, 2008

6.5 The Challenge of Defining Ontario’s “Problem”

Almost all research and innovation actors interviewed concurred that Ontario has not yet reached its full innovation potential. However, those actors did not agree on what exactly was the province’s problem. Many of the non-governmental informants maintained that the province was suffering from an innovation problem. On the other hand, interviewees from MRI suggested that Ontario had a productivity problem.

The Council of Canadian Academies 2009 report, Innovation and Business Strategy: Why Canada Falls Short bridges this dichotomy at a national level. The report confirms that Canada “has a serious productivity growth problem” (p. 11) and skillfully explains the linkage between (business) innovation and productivity. The CCA points out that over the last twenty-five years, Canada’s productivity level has fallen further behind the US$161 and a number of other advanced countries (CCA, 2009b; CCA, 2009). The report maintains that Canada’s productivity weakness is the result of weak growth in Canada’s multifactor productivity$162 (MFP), “which over long periods of time, reflects the contribution of business innovation to labour productivity growth – including better organization of work, improved business models, the efficient incorporation of new technology and the payoff from research

$161$ Between 1984 and 2007, relative labour productivity in Canada’s business sector declined from more than 90% of the US level to about 76% (CCA, 2009: 32).

$162$ MFP is the effectiveness with which labour and capital are combined in the economy (CCA, 2009: 3)
and development (R&D) and from the insights of entrepreneurs” (p. 4). To this end, the CCA contends that “Canada’s problem is actually a business innovation problem” (p. 210). Below, it will be shown how the same conclusion can be drawn for Ontario.

The following section discusses the different responses offered to address the question: Does Ontario have an innovation problem? As discussed in Chapter 3, the identification and interpretation of a problem is the first step government officials should take in developing a customized mix of innovation policy instruments to improve its ecosystem’s performance.

6.5.1 Ontario’s “Innovation Problem” – The Stakeholder Perspective

Most of the non-governmental actors interviewed maintained that Ontario had an innovation problem. In the effort to define Ontario’s innovation problem, the interviewees raised attention to shortcomings related to the private sector. It was determined that compared to American counterparts, Ontario businesses are not as actively engaged in R&D activities as they should be. This compromises private sector competitiveness and compounds productivity deficiencies. It was suggested that business needs to intensify investments in high-growth sectors like information and communication technology and increase expenditure in R&D. The government was criticized for protracting Ontario’s innovation problem by not providing business with the appropriate support it needs to innovate and compete effectively. In particular, several research and innovation actors recommended that government must develop more initiatives that strengthen the management capabilities of Ontario business and provide increased support for business education in general. These responses confirm the close interaction and interdependencies between innovation policy, industrial and enterprise policy, labour policy and higher education policy. As discussed in
Chapter 3, it is critical for the government to establish a comprehensive policy mix that multiple ministries will deliver in order to resolve systemic innovation deficiencies.

Ontario’s innovation problem was alternatively defined as the inability to realize value with the knowledge already created. One senior administrator employed at a leading innovation intermediary organization and with a long history of advancing initiatives aimed at supporting technology and product development as well as business acceleration suggested that “there is a gap between the supply side and the output of the innovation process.” A senior executive at another one of Ontario’s innovation intermediary organizations suggested that this gap has been largely due to an imbalance between public funding for commercialization relative to research:

We also have tons of supports for research but when it comes to the commercialization piece, this is where we fall short – a drop in the bucket if you consider the whole budget – whether federal or provincial. The piece that is devoted to commercialization is really a speck. Not enough strong policies on commercialization.

On a similar note, another interviewee suggested that while Ontario researchers conduct world-class inquiry and continue to produce cutting-edge ideas, commerce – the exchange of value between human beings – does not result. To this end, Ontario was described as having a “commerce averse” attitude which is reflected in a general unwillingness to talk about customers and link customer demand into the innovation process. Interviewees indicated that this cultural aversion to commerce will continue if business skills that advance commercial know-how are not improved and opportunities for experiential-based learning are not provided, particularly at a post-secondary education level. Several informants recommended enhanced entrepreneurial learning by governments, regional economic development agencies, business enterprises and citizens, as well as enhanced enterprise training and literacy from K-12 to a post-secondary education level.
Ideas regarding Ontario’s innovation problem also related to the entrepreneur’s ability to develop his/her intellectual property. It was suggested that entrepreneurs do not have sufficient support to bring their ideas to market, and this lack of funding for commercialization activities impairs the entrepreneur’s capacity to create a new company as well as generate exports and skilled jobs in high-growth sectors of the economy. A number of informants stated that Ontario will continue to underperform if the government does not provide more support for commercialization efforts.

Several interviewees maintained that the innovation problem they spoke of is not unique to Ontario; it is one shared by the rest of Canada. To underscore the scale of the innovation problem, the link between innovation and prosperity was emphasized. It was suggested that if Canadian-made innovations did not succeed in world markets, this would result in less value-added economic activity and impair wealth creation. In the absence of wealth creation, Canada and Ontario would not be able to achieve a higher level of prosperity.

Many of Ontario’s non-governmental research and innovation actors agreed that the government has an integral role to play in creating a supportive environment for new ideas to emerge and grow into profitable ventures. To this end, government was portrayed as a catalytic agent for solving Ontario’s innovation problem. Instead of saddling government with the full responsibility of increasing Ontario’s innovation capacity, some interviewees pointed out that innovation is a team sport, requiring the participation of all innovation actors. Several informants demonstrated a sophisticated understanding of the systems approach to building innovation capacity and emphasized that all research and innovation actors have a shared duty in advancing innovation in Ontario. These interviewees maintained that all
research and innovation actors are also obligated to ensure that innovation remains on the government’s agenda.

6.5.2 Ontario’s “Productivity Challenge” – The Government’s Perspective

Productivity is defined as the average value produced per hour worked (Martin and Milway, 2012; Deloitte, 2012). Some provincial government interviewees suggested that the province had a productivity problem rather than an innovation problem. These individuals maintained that the Liberal administration acknowledged that Ontario had lower levels of productivity and a slower growth rate than comparator jurisdictions. One respondent working at MRI between 2005 and 2010 maintained that the government deemed innovation to be “an enabling paradigm” for increasing productivity, economic growth and job creation.

Another senior MRI official offered a similar assessment. However, this second interviewee provided more detail regarding the link between (a) issue recognition, framing and problem definition and (b) policy design. Firstly, the informant suggested that early in Liberal administration’s mandate, the government acknowledged that the province had lower productivity and slower economic growth than comparator jurisdictions. To this end, issue recognition had occurred. The government framed this issue as a “productivity challenge.” Once the productivity challenge was recognized, it was defined as a commercialization problem. In turn, the government rationalized that innovation could spur economic growth and productivity, and the policy problem was centered on closing the commercialization gap, i.e. the government was focused on addressing the problem of getting ideas from the lab bench to the market. Policy solutions were designed to support the commercialization of

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163 Deloitte (2012) measures productivity by GDP per capita, and in their assessment of Canada’s productivity challenge, it was found that the productivity gap between Canada and the USA has widened over time. In the 1980s, the productivity gap between Canada and the USA was $2,700, and by 2010, that gap had increased to $8,900, representing a 30% increase.

164 During the interview, this informant never used the term “productivity problem.” The use of the word “challenge” appeared very intentional.
research, which called for establishing policies that aligned with a supply-side innovation model. These ideas were captured in the government’s *Ideas to Market Strategy* and the *Ontario Innovation Agenda*.

With the onset of the economic downturn of 2008, a second round of problem definition and policy design took place. The government defined the problem as Ontario having a low level of industry engagement and private sector activity, and it was believed that increased business activity in the innovation space would spur economic growth and productivity. This new interpretation of the problem necessitated an intensified effort at providing support for entrepreneurship, promoting initiatives that would increase the demand for innovations and improve the conditions for the uptake of innovative products, processes and services – all of which aligned with a demand pull model of innovation, thereby making demand-oriented solutions appear more appropriate. Below, the informant describes the shift in government’s conceptualization of the problem and the two stages of policy design that occurred between 2003 and 2011:

Our first innovation agenda was developed between 2006 and 2008, and released in 2008. So it’s been a very durable guiding document but as I said it’s really focused on Ideas to Market. Increasingly our thinking in the innovation space is around linking it to the productivity challenges and to customer need as a driver of innovation as opposed to the concept of generating ideas in a research lab and pushing them out, because there is a struggle in getting those ideas and finding market niches. So the market niche first drives innovation is kind of where are heads were [by 2011]. And really understanding that innovation is at the core of job creation, productivity and competitiveness.

6.5.3 Alternative Interpretations of Ontario’s Problem

One innovation expert with working experience in the research community, the provincial government and at the federal level offered a different perspective on Ontario’s problem. This person suggested that all of Canada had a *prosperity problem*. As indicated
below, the interviewee explained that Canada (and by extension, Ontario) had to create more wealth in the economy, and innovation had an integral role to play in wealth generation:

So our problem is a prosperity shortfall. We need to create more wealth in the economy. We as a country, we are still a resource-based economy. We have invested the wealth created and the resource industries in bringing our research and our science up to a good quality. They’re competitive with the rest of the world. But they’re not generating the wealth...We haven’t developed the ability to connect high quality research in the universities and some governmental labs, but mainly in the universities, with creating more wealth in the economy and that’s where innovation comes in. So if we have an innovation problem, I’d describe it this way: It’s that we are not using a tool that we need to connect the high quality of our science and engineering with more wealth creation in the economy and that tool is innovation.

During this interview the informant was asked to discuss the Ontario government’s efforts at addressing the province’s productivity problem. The interviewee underscored the interviewer’s error in confusing the terms “productivity” and “prosperity” when discussing Ontario’s problem. It was suggested that this kind of concept confusion is widespread across the Ontario research and innovation policy community and it complicates policy development when sub-government actors do not have a shared understanding of what these concepts mean yet attempt to integrate them into their efforts at influencing the political agenda. The interviewee defined these key terms and commented on the implications of conflating them:

Productivity is an indicator. The problem is not a productivity problem. If you’re driving a car up a long hill and the car keeps slowing down, you don’t go fixing your speedometer. You fix the engine. Productivity is just the indicator – the speedometer. Our problem is insufficient wealth creation.

In reviewing informants’ responses to the questions, “What is innovation?” and “Does Ontario have an innovation problem?” it is clear to see how fuzzy definitions of key terms can have a tremendous effect on these actors’ perception of which set of policy solutions are more appropriate for advancing innovation in Ontario.
6.6 Innovation from a Northern Ontario Perspective

The needs, concerns and priorities of research and innovation actors in Northern Ontario are qualitatively different from their counterparts located across the rest of the province. Indeed, the resource-based economic environment and expansive space offer these actors a unique landscape in which to generate new ideas, innovate and bring those innovations to market. As such, the following section attempts to capture how Northern Ontarians contribute to the innovation process, the breadth of governmental and non-governmental supports targeted towards advancing the efforts of local researchers and innovators/entrepreneurs, the distinctive challenges Northern Ontario research and innovation actors face, as well as the strengths and opportunities these individuals leveraged in order to actualize important social and economic goals.

Between 2003 and 2011, Northern Ontario built up its research and innovation capacity and in turn achieved notable success in intensifying innovative activity across a number of sectors that have contributed to economic growth at a local and regional level. These sectors include but are not limited to mining, forestry, mineral processing, biofuels, environmental technologies, and medical and life sciences research (Ontario, 2008; NOLUM, 2007). It is worth noting that no other region in Ontario has placed a comparable degree of focus on driving production and innovation in the province’s traditional resource-based industries. However, the sustained proliferation of innovation activity in these areas has been challenged by a number of factors. Firstly, Northern Ontario constitutes about 88% of the province’s land mass, and research and innovation actors are widely dispersed across this area; the region has a density of approximately one person per square kilometer, compared to Southern Ontario which has 119 persons per square kilometer (NOLUM et al., 2005; Ministry of Northern Development and Mines, 2012). Ongoing communication is necessary
for researchers and innovators to maintain a collaborative, productive working relationship in spite of the physical distance that separate them. Reliable telecommunications infrastructure, particularly broadband, ensures that these agents remain connected and enable knowledge and technology exchange between them. However, in many parts of Northern Ontario, the shared phone system still exists and DSL internet service is not available, let alone broadband.

Additionally, relative to other regions in Ontario, employment opportunities in a range of industries is limited. Young people – the next generation of entrepreneurs and knowledge workers – have left the region to pursue opportunities in different parts of the province/country, taking with them the bright ideas and talent that could strengthen Northern Ontario’s innovation ecosystem. Several scholars have documented the range of difficulties this region has faced in developing and leveraging research talent, entrepreneurial opportunities and innovation activity (Hall and Donald, 2009; Rosehart, 2008; Mulholland and Vincent, 2007).

From 2003 to 2011, the federal and provincial governments introduced initiatives aimed at addressing ICT deficiencies, brain drain and other challenges that mitigate technology transfer, product development and business acceleration in Northern Ontario. While the Ministry of Research and Innovation did not introduce any multi-year funding programs to support the innovative activities of Northern Ontarians specifically, MRI, other provincial government ministries, federal departments and agencies launched and/or expanded a number of publicly-sponsored initiatives to support entrepreneurship and innovation across this region. These programs and resources included FedNor’s Community Futures Development Corporations (CFDCs), the federal government’s Applied Research and Commercialization (ARC) initiative, the province’s Northern Ontario Heritage Fund,
Ontario’s Small Business Enterprise Centres (SBECs), and the Ontario Network of Excellence northern Regional Innovation Centre, i.e. the Northern Technology Alliance. Entrepreneurs in Northern Ontario also received support from northern development advisors and officers working in the Regional Economic Development Branch of the Ministry of Northern Development and Mines. These service providers were grouped in area teams to service multiple parts of northern Ontario including Kenora, North Bay Sault St Marie, Sudbury, Thunder Bay and Timmins. These funding programs and initiatives have been critical for supporting Northern Ontario’s mining clusters, facilitating health innovation and promoting commercialization in sectors that are of strategic advantage to the regional economy.165

Northern Ontarians’ success in securing publicly sponsored research and innovation support may have been largely attributed to their style of advocacy. These policy community members employ an inclusive, collaborative approach by building alliances with other community members who have a vested interest in realizing a common economic and/or social goal, and with a single voice, these actors presented a mutually agreed upon position to decision-makers. One member of the research community describes how his/her institution worked with other local research and innovation actors to realize commonly held goals:

…if you look at Sudbury, it had to survive…When I was in Sudbury, everyone had to be together. When we had the Sudbury [Regional] Innovation Network – which was created with the CEO of the municipality, myself, we had Cambrian College – all the partners were together. And the reason was that it made sense. It’s the only sense for a community like Sudbury to move – we move together.

Indeed, Northern Ontarians demonstrated a strong proclivity towards working in partnership with other community actors to realize their interests. Comparatively, even though research

165See Hall and Donald (2009) and Ontario (2009) for a discussion on the promotion of the mining clusters in Northern Ontario and advancements made in health innovation across the region.
and innovation actors in Southern Ontario also agreed to work collaboratively with one another and publicly articulated their intentions to do so, some interviewees conceded that many of them actually competed aggressively amongst themselves for the limited resources available to support their innovation activities. Chapters 7 and 8 will further tease out the various ways in which research and innovation actors differed in their efforts at influencing the policy-making process and the implications of these dynamics on the development of research and innovation policy and more specifically, resource allocation decision-making.

This chapter has discussed the composition of Ontario’s research and innovation policy community between 2003 and 2011, as well as the shared ideas and varied perceptions they held regarding innovation, the innovation process and one another. The following chapter will review the extent to which these actors worked together to develop research and innovation policy as well as their efforts at promoting a broad range of programmatic ideas intended to advance their own interests and impact the decision-making process between 2003 and 2007. To this end, Chapter 7 will discuss how the context, structure and agency of the province’s state-pluralist network influenced the development of research and innovation policy, and helped preserve a supply-side innovation policy orientation in Ontario before 2008.
Chapter 7

7.0 Introduction

During the Liberal government’s first term in office, government officials acknowledged the importance of advancing commercialization efforts and building up the research and innovation capacity of the province. As such, it was critical for the new administration to determine the most effective mix of funding initiatives and support programs to facilitate the activities of Ontario’s research and innovation actors. Moreover, 2003 to 2007 was an ideal opportunity for the Liberal government to recreate Ontario’s research and innovation programs to ensure that they aligned with its policy preferences and economic goals, and to bring together, under one single over-arching policy, funding programs and initiatives that were disjointed and operated in isolation.

The government consulted widely with other members of the research and innovation sub-government during the pre-decision stages of the policy process in order to address this resource allocation issue. This chapter discusses the nature of the group-state relations that developed around the issue of research and innovation funding and shows how the structure, context and agency of the policy network influenced the development of Ontario’s research and innovation policies between 2003 and 2007.

7.1 The Context of Research and Innovation Policy Decision-Making

The context within which the policy network was situated had a noteworthy impact on Ontario’s research and innovation policy formation process between 2003 and 2007. This section discusses the effect of political, economic and historical factors on the policy
network. It also draws attention to the extent to which uncertainty, risk-aversion and fear of failure influenced government decision making.

7.1.1 Political Context

- The Goals of the Ruling Party

Early in its first mandate, the Liberal administration underscored the importance of accelerating commercialization and building up Ontario’s research and innovation capacity in order to raise productivity levels across the province. These priorities were framed as economic imperatives for closing the productivity gap between Ontario and peer jurisdictions in North America and intensifying the province’s competitiveness in a knowledge-based economy. By 2006, the Ministry of Research and Innovation launched its Ideas to Market Strategy (2006) which articulated the provincial government’s commitment to support the generation of transformative ideas and facilitate the transfer of these ideas to the market (MRI, 2006a: 1). To this end, MRI’s innovation-related goals were as follows:

- Ensuring research excellence
- Advancing the development of HQP and attracting talent from around the world
- Intensifying R&D collaboration between a broad spectrum of research and innovation actors, particularly industry-academia partnerships
- Supporting the early stage development and growth of knowledge-based firms, particularly start-ups
- Supporting commercialization activities in areas that would grow Ontario’s knowledge-based economy/facilitating the commercialization of university research

166 The list is based on the ideas undergirding the Ideas to Market Strategy, the 2006-07 Results-based Plan Briefing Book, and the Strategic Plan (2006).
- Attracting increased private-sector investment in R&D
- Raising awareness across the province regarding the importance of innovation

As chapter 3 indicated, these goals are critical for informing the government’s selection of policy instruments. Moreover, programmatic ideas from societal groups that addressed these goals had an increased probability of being considered by policy-makers.

- Political Ideology

The priorities and goals of the McGuinty government aligned with the market-oriented approach to policy development that dominated in many knowledge-based jurisdictions in the early 2000s; in these societies, the market has a prominent role in the processing and distribution of knowledge and information (Pellizzoni and Ylonen, 2012). Hence the effort to grow and/or regulate “the marketplace of ideas” is a central focus of many of these knowledge-based economies (Ibid; Tyfield, 2010: 63). Given that scientific knowledge and technology advancements became important products or commodities (Reynolds and Szerszynski, 2012), it was critical for decision-makers to develop policy that would support the activity of the key figure of neoliberalism – i.e. the entrepreneur – and to provide him/her with the resources needed to participate in a neoliberal economy’s “key social mechanism,” i.e. competition (Pellissoni and Ylonen, 2012). It is within this context that the Ontario government aimed to develop policies that would strengthen the knowledge generation and commercialization capacity of its research and innovation ecosystem in order to enhance the province’s competitiveness.

- Political Culture

The operative norms associated with Ontario’s political culture – the imperative pursuit of economic success; the assumption of pre-eminence; the requirement of managerial
efficiency; the expectation of reciprocity; and the balancing of interests – influenced
government decision-making regarding the development of research and innovation policies
in general, and the development of funding programs in particular. According to Premier
McGuinty, “Economic success occurs when people have the necessary support to turn good
ideas into innovative products and services.” (Office of the Premier, 2006a) As such, MRI
had to establish funding programs and initiatives that would support human capital
development, ensure local entrepreneurs had access to financial capital, and facilitate
research and innovation actors in acquiring the physical capital needed to carry out their
activities. The government framed these publicly-sponsored initiatives as a means to increase
the likelihood of Ontario maintaining its position of pre-eminence relative to the other
provinces and intensifying its competitiveness at a global level. The requirement to
demonstrate managerial efficiency meant that MRI had to establish programs that targeted its
limited funds towards a select set of sectors, institutions and individuals with proven or
potential R&D strengths.

In terms of the expectation of reciprocity, the Ontario government was aware of the
electoral implications of ensuring that politically sophisticated research and innovation actors
across Ontario had the resources they advocated for. Initiatives had to be created that
reflected a number of these societal actors’ interests, and in particular, the government
encouraged member of the research community, private sector firms and IIOs to think of
themselves as partners in advancing institutional and regional wealth generation. Moreover,
in the months leading up to the provincial election, it was expected that these actors would
provide the government with critical support for establishing programs that supported their
research and innovation activities.
Resource allocation decision-making called for the government to balance a number of competing ideas and approaches to funding research and innovation. For instance, when it came to providing support for research, the ministry had to determine the ideal split between funding for basic research and applied research (and experimental development). The task of balancing support for innovation activity across different regions within Ontario was a particularly sensitive and politically charged issue. Indeed, research and innovation actors in Southern Ontario exemplified R&D strengths and emerging potential in a number of high-growth sectors of the provincial economy. While the Ontario government acknowledged that enhanced support was necessary to further innovation activity in these regions, it was also understood that this undertaking should not be provided to the detriment of innovation support for other regions within the province, particularly Northern Ontario. Hence, resource allocation decisions had to be made with this issue in mind. Finally, in order to intensify research and innovation capacity across Ontario, the government also dealt with the challenge of balancing innovation supports between local LMEs and SMEs, between colleges and universities, and between Ontario’s high-tech and natural resources sectors.

- Federalism

The research and innovation funding activities of the federal government had implications for Ontario’s resource allocation decision-making and hence funding program development. Actors who secured CFI funding had a vested interest in ensuring that the provincial government would commit a sufficient amount of support towards matching CFI funds. The following interviewee underscored the impact of CFI funding on resource allocation decisions made by the Ontario government\(^\text{167}\):

\(^{167}\) Cameron (2005) discusses the federal government’s “pre-eminence in financing university research” and reviews a number of federal initiatives deployed to advance knowledge generation across the provinces (pp. 277 – 292).
The CFI was set up in order to stimulate the rebuilding of research capacity, research infrastructure in the country. The program was set up with a 40-40-20 formula with 40% of a project would be funded by CFI and you had to find the other 60%. Well, in provinces like Ontario, Alberta and Quebec where there was sufficient provincial support – and in particular in Ontario and Quebec where you had a critical mass of advanced institutions – it became really important to go to the province for matching. It was a sweet offer because provinces generally like to get their share of the federal money but it meant a serious commitment of funds – hundreds of millions of dollars over time. So that federal initiative to restore university research infrastructure, which no doubt was influenced by a lot of chat with the [university] presidents at the federal level, had a significant influence on how research dollars in the provinces were allocated because these were big bucks that had to be put aside to support the CFI.

- Opposition Parties’ Reaction

Political issues that draw strong opposition from other political parties represented in the legislature can delay or derail policy development. However, the Liberal government’s development of research and innovation policy – including decisions regarding research and innovation funding allocations – was established with relatively little contestation from the Ontario Progressive Conservatives and the NDP. During standing committee meetings, opposition members raised questions and critiqued a small number of the government’s research and innovation funding programs; however, nothing substantive came out of these hearings. Overall, neither of the opposition parties established a distinctly opposed position on research and innovation policy during the McGuinty years.

7.1.2 Economic Context

The state of the economy greatly impacted the provincial government’s decision-making process regarding the distribution of resources to help intensify Ontario’s research and innovation capacity. After 2004, the provincial economy was on the upswing (Refer to Table 7.1). As such, between 2003 and 2007, the Ontario government expanded its suite of
research and innovation funding programs. As Chapter 5 demonstrated, the majority of this money was committed to supply-side innovation policy development.

Table 7.1: Selected Economic Indicators, Ontario: 2003-2007 (Per cent)

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<tbody>
<tr>
<td>Real GDP Growth</td>
<td>1.4</td>
<td>2.6</td>
<td>2.8</td>
<td>2.4</td>
<td>2.0</td>
</tr>
<tr>
<td>Nominal GDP Growth</td>
<td>3.2</td>
<td>4.7</td>
<td>4.1</td>
<td>4.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Employment Growth</td>
<td>3.0</td>
<td>1.5</td>
<td>1.0</td>
<td>1.2</td>
<td>1.8</td>
</tr>
<tr>
<td>CPI Inflation</td>
<td>2.7</td>
<td>1.9</td>
<td>2.2</td>
<td>1.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>


7.1.3 Historical Factors

Policy decisions regarding research and innovation funding program development were conditioned by decisions that were made before the Liberal administration took office. During the Harris era, the government developed a great deal of momentum in establishing programs and initiatives that advanced R&D in the life sciences, particularly biotechnology and oncology. Hospitals, universities and institutions like MaRS, the Ontario Institute for Cancer Research (OICR) and the Ontario Centres of Excellence (OCE) were receiving millions of research dollars annually to drive research and commercialization; many of these research community members and innovation intermediaries had also forged strong R&D collaborative ties with other local and international researchers, industry partners and investors who were keen on developing the research generated. When the Liberal administration assumed office, they were unwilling to terminate a number of funding programs that had been instrumental in building up Ontario’s R&D capacity in areas that were identified as strategically important to the province.

As such, decision-making regarding resource allocation was largely conditioned by path dependency. Unwilling to disrupt the institutional stability that existed, the new Liberal government opted to confine its changes to Ontario’s research and innovation funding
policies and programs at the level of Hall’s (1993) first- and second-order change, representing “normal policy making.” Thus, between 2003 and 2007, the Liberal government either adjusted the policy settings of a number of the programs it had inherited or changed the set of policies and programs in place. First- and second-order policy changes provided the Liberal government the opportunity to expand the province’s suite of research and innovation funding programs; to rebrand existing funding programs; and, to an extent introduce some elements of incremental policy innovation.

For instance, consider the replacement of the Ontario Research Development and Commercialization Fund (ORDCF) with the Ontario Research Fund (ORF). Changes were made to address the transparency and accountability concerns articulated by the Auditor General in 2003; essentially the problem of managerial inefficiency had been raised to the government’s attention and Ministry officials were obligated to resolve this problem. The ORF was launched and measures were put in place to guarantee increased accountability and transparency, however the purpose of the program remained the same, i.e. the ORF – like its predecessor program – was the Ontario government’s flagship matching funds instrument for supporting research capacity building, enabling knowledge transfer between industry and academia and contributing to job growth and economic development. To this end, the Conservative government’s program was rebranded, the settings of the policy instrument were adjusted, and policy-making as normal ensued.

7.1.4. Uncertainty, Risk Aversion, Fear of Policy Failure

Uncertainty is inherently embedded in the policy-making process. As MRI endeavoured to determine how to develop the most comprehensive set of support programs, Ministry officials could not be absolutely certain about the implications of selecting one set of policy alternatives over another. In an effort to reduce uncertainty, MRI policy staff
conducted research on different models of innovation and accumulated information on a range of innovation policy mixes that other comparator jurisdictions had established. Moreover, the Ministry referred to the expert advice of other sub-government members for recommendations on how to best distribute funding in order to build up Ontario’s research and innovation capacity. Opening up the policy making process in this way democratized the decision-making process, but also introduced more interests, with various policy entrepreneurs promoting different ideas for the most effective suite of research and innovation funding programs. The task of narrowing the set of policy alternatives the Ministry should consider was further complicated by the government’s general fear of policy failure and aversion to risk. Indeed, it is arguable that the government’s fear of failure and risk aversion may have prevented the introduction of more innovative research and innovation funding programs at a time when a number of political and economic factors were in the province’s favour.

7.2 The Policy Network Structure – State Pluralism

Ontario had a state pluralist research and innovation policy network. As mentioned in Chapter 2, this policy network is characterized by a dominant state with a high concentration of power and a large number of societal actors focused on influencing the policy making process. The Ontario government exemplified its dominance by centralizing decision making in the Ministry of Research and Innovation. In particular, an Innovation Policy Branch and a Strategic Planning and Policy Branch were established, and employed teams of civil servants who supported the development of innovation policies and programs and reported on best practices for strategic planning. In the case that MRI was unable to develop material in-house, Ministry officials were not only capable of accessing information from other agents, but they also had the ability to evaluate and apply that information (Milloy, 2009). To this
point, since its inception, the Ministry reached out to a variety of sources for information and policy recommendations and received advice from a number of experts from Ontario’s research community and business sector. Some of these non-governmental advisors served as participants on several of MRI’s advisory councils and expert panels including the OCN review panel, the Ontario Research and Innovation Council (ORIC), the Ontario Research Fund Advisory Board (ORFAB), etc. A number of working groups were also established to facilitate regular information exchanges between senior civil servants and non-governmental sub-government members from organizations that conduct research and innovation in areas that are of strategic importance to the province. For instance, in late 2006, the Pharmaceutical Innovation Working Group (PIWC) was established to formalize interaction between Deputy Ministers from MRI, the Ministry of Health and Long-Term Care, Economic Development and Trade and Finance and senior industry leaders from research-based pharmaceutical industry in order to discuss investments, innovation and determine the most effective means of leveraging shared opportunities. Additionally, the state considered feedback from several individual experts who had provided multiple Ontario governments (and the federal government) with research and commercialization (and science and technology) policy advice over the years; this group included persons like Tom Jenkins, Cal Stiller, John Evans, Joseph Rotman, Ken Knox, David Pecaut and J. Fraser Mustard.

To demonstrate a high concentration of authority, MRI also led internal committees and working liaison groups with other ministries that had innovation and economic development incorporated in their mandates in order to discuss resource allocation. Additionally the state worked with municipal governments and civic leaders regarding the

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allocation of research and innovation funding. As such, MRI evinced an appreciation for a “place-based approach” to developing policy by consulting and/or working with key local decision-makers in order to ensure that resource allocation policies suited the needs and demands of recipient regions (Bradford and Wolfe, 2010).

As discussed in Chapter 2, a state is more likely to be autonomous if the policy-making ministry has a clear conception of its role and a value system that is consistent with its mandate (Atkinson and Coleman, 1989: 52). The Ontario government established a mandate for the Ministry of Research and Innovation which defined its objectives, value system, and responsibilities distinct from other societal interest within the sub-government; these structural elements were posted on the ministry’s website and outlined in the Strategic Plan (2006). Most significantly, MRI’s mandate and activities received a notable degree of political support from the majority of elected representatives. Indeed, the Premier’s decision to assume the position of inaugural minister of MRI was a visible commitment of political support. Additionally, the likelihood of the ministry realizing its objectives was favourable given its ability to generate the information it needed to pursue its mandate. However, despite all of these autonomy enabling factors, the ministry was not at all insulated from clientelistic political pressure. The following section discusses the degree to which societal groups mobilized to influence decision making. In particular, it draws attention to the high level of organization and mobilization exemplified by the Ontario universities relative to other societal members of Ontario’s research and innovation policy network.

7.2.1 Societal Organization and Mobilization

Non-governmental members of Ontario’s research and innovation sub-government organized themselves very differently in the effort to influence the development of research and innovation funding programs.
Industry’s Level of Organizational Development

Compared to other societal actors, industry was the most loosely organized in its efforts to influence resource allocation between 2003 and 2007. Members of the private sector were spread across several key sectors of Ontario’s economy including aerospace, automotive, clean energy, digital gaming, financial services, food-processing, information technology, life sciences, materials, medical technologies, mining and nanotechnology.\textsuperscript{169} The panoply of interests held by industry members working within those areas challenged the development of robust linkages across sectors. Furthermore, the interests of large vs. small firms and established vs. start-up enterprises varied, and divergent views on resource allocation were common. In light of the structural and functional differences that existed between private sector actors, a number of industry representatives opted to advocate on behalf of their own firms.

While relatively weak cross-sectoral linkages were most common, a few ad hoc, cross-sectoral partnerships and/or coalitions formed. Business representatives from different sectors within a given region entered into collaborative advocacy initiatives in order to influence the early stage development of systemic innovation policy. Some level of cross-sectoral advocacy was also facilitated by regional chambers of commerce and local boards of trade. Collaborative advocacy activity also occurred between different firms that conduct R&D activity within a given sector. Sector-specific industry associations, professional societies and advocacy groups were instrumental in pooling the resources of its members and advocating on their behalf. Organizations like Canada’s Research-based Pharmaceutical Companies (Rx&D), the Canadian Manufacturers and Exporters-Ontario division, Canada’s

V Venture Capital and Private Equity Association, and the Ontario Society of Professional Engineers have met with senior ministry officials and/or submitted briefings to different legislative standing committees in the effort to express the concerns and policy ideas of their respective members.

- Intermediary Organizations’ Mobilization

There was no umbrella organization mandated to advance the interests of Ontario’s innovation intermediary organizations; however, many of these agents capably engaged in policy advocacy activities and participated in the development of research and innovation funding policies and mechanisms. IIOs with intentions of influencing resource allocation policy development pursued one or more of the following courses of action:

- IIOs seeking to influence the development of regionally focused funding policies and instruments partnered with proximate firms, hospitals, universities, colleges research institutes and/or other IIOs to represent the interests of a sub-region or city-region.

- IIOs seeking to influence the development of sector-specific funding policies and instruments initiated collaborative advocacy initiatives with provincially-dispersed research and innovation actors working within the same sector/discipline.

- IIOs seeking to influence the development of funding policies and instruments aimed at supporting research and innovation activity within several sectors and across multiple regions have often partnered with other IIOs in order to influence the development of resource allocation policies that were of interest to research and innovation actors from multiple sectors/disciplines across the province.
The Research Community’s Organizational Development and Mobilization

Relative to the other non-governmental members of Ontario’s research and innovation sub-government, the research community demonstrated the highest level of organizational development and the greatest mobilization capacity. Hospitals, colleges and universities were well-resourced and over the years had established strong communication ties and working relations with the bureaucracy. Hence, these institutions were capable of engaging the provincial government as individual advocates, as members of ad hoc and standing advocacy partnerships, and as members of one or more established associations. On occasions where members of the research community agreed on a common policy position, discussion forums and/or working groups have been formed in an attempt to share policy information and best practices for influencing the development of resource allocation policies and instruments.

Ontario colleges achieved a notable degree of success in policy advocacy and policy-making due to a well-developed organizational structure. Their capacity to engage the provincial government was partially attributed to the work of Colleges Ontario (CO), an advocacy and outreach association that was instrumental in coordinating the interests of the province’s highly differentiated system of colleges. The association worked with its members to establish and promote a shared policy position on the issue of research and innovation resource allocation. College Ontario’s committee of the Heads of Applied Research (HAR) was particularly influential in articulating Ontario colleges’ demands and concerns to decision-makers in order to impact the development of (applied) research funding policy and programs.

Ad hoc and standing alliances between colleges also emerged. Some of these collaborative arrangements were driven by a shared interest in influencing the development
of policy with a regional focus; in these cases, colleges within close proximity to one another established an “advocacy partnership” in order to bring commonly held programmatic and policy ideas to the attention of the government. In a number of instances, Colleges Ontario facilitated these collaborative efforts by providing administrative support and generating the policy information its members needed to advance their shared goals. Alliances between colleges (and other sub-government members) also formed when an opportunity arose to influence the development of resource allocation policies that impacted a particular sector, market and/or technology. For instance, in the early years of the McGuinty mandate, a number of colleges collaboratively engaged the provincial government to secure public funding for a college-led initiative intended to support the growth and innovation activities of local, technologically-based SMEs. In 2006, the Ministry of Research and Innovation committed $3.5 million\textsuperscript{170} over three years to launch an applied R&D network called Colleges Ontario Network for Industry Innovation (CONII).\textsuperscript{171} This initiative enabled ten colleges\textsuperscript{172} and multiple private sector entrepreneurs to work together to advance the commercialization of innovative products and services.

Associations representing the interests of Ontario’s hospitals were well-resourced and capable of employing sophisticated advocacy strategies to influence the development of policy that impacted the medical sector. Representatives from organizations like the Ontario Hospital Association (OHA) and the Ontario Medical Association (OMA) regularly took part in pre-budgetary committee hearings and met with elected members of the legislature and senior civil servants to discuss the policy ideas of their members. Furthermore, many of their members served on various working groups, expert panels and advisory councils convened

\textsuperscript{170} This funding was a grant from the Ontario Research Commercialization Program (Fisher, 2008; MRI, 2006g).
\textsuperscript{171} CONII website: \url{http://www.conii.ca/about-us/history.html} Accessed: March 5, 2013.
\textsuperscript{172} The CONII network included Algonquin, Centennial, Conestoga, Fanshawe, George Brown, Humber, Niagara, St. Clair, Seneca, and Sheridan (Fisher, 2008).
by different ministries (i.e. Ministry of Health and Long-term Care, Ministry of Health Promotion, etc.) to address a wide range of health and medical issues.

The interests of Ontario’s academic hospitals in particular were represented by the Council of Academic Hospitals of Ontario (CAHO), an association focused on influencing the development of research and innovation policy, and more specifically, the allocation of research funding resources.\footnote{According to an executive member of CAHO, MRI staff attended CAHO meetings once or twice a year.} One of CAHO’s eight committees, the Council of Ontario Research Directors (CORD), was responsible for engaging with the provincial government and industry in order to develop policy and funding programs to support excellence in medical research. On behalf of the province’s academic hospitals, CORD continuously urged the provincial government to review its research funding mechanisms to ensure that their members had access to a predictable, sustainable and adequate source of funds; advocacy efforts were principally aimed at the Ministry of Research and Innovation and the Ministry of Health and Long-Term Care – the two ministries that provided the majority of funding to Ontario researchers at the time.

Hospitals in the GTA had three alternative routes of policy advocacy: the University Hospital Network (UHN), BioDiscovery Toronto (BDT) and the Toronto Academic Health Science Network (TAHSN). The UHN is the overarching organization supporting the work of four hospitals, the Toronto General Hospital, Princess Margaret Hospital, Toronto Western Hospital, and Toronto Rehabilitation Institute. BioDiscovery Toronto, formerly known as the Toronto Biotechnology Commercialization Centre, was a consortium of hospitals and biomedical research institutions concerned with advancing research and commercialization in genomics, diagnostics, neuroscience, regenerative medicine, immunology, bioinformatics,
The TAHSN is a consortium of the University of Toronto and its affiliated teaching hospitals that engages in local, regional and provincial system planning to advance its collective academic mission of optimizing and advancing high quality patient care delivery, education and knowledge transfer and innovative research (TAHSN, 2007). Collectively, the UHN, BioDiscovery Toronto and TAHSN were instrumental in advocating on behalf of member hospitals and other research institutes for funding from the Ministry of Health and Long-term Care and the Ministry of Research and Innovation.

The most influential association representing the interests of Ontario universities to the provincial government was the Council of Ontario Universities (COU). COU’s members included all of Ontario’s publicly funded universities and the Royal Military College of Canada. On behalf of these institutions, the organization advocated for improved public policies to help universities provide a high-quality teaching and training experience for its students as well generate and develop brilliant new ideas to address some of the most challenging social, economic and cultural issues. The Executive Council of COU – which consisted of Ontario university presidents – met regularly with Ministers and senior civil servants from various ministries relevant to the university sector, including the Ministry of Training, Colleges and Universities, the Ministry of Finance and the Ministry of Research and Innovation. One of COU’s committees, the Ontario Council of University Research (OCUR), was particularly instrumental in developing and articulating a common position on research and innovation resource allocation. OCUR was comprised of Ontario universities’ Vice-Presidents Research, and these individuals met monthly throughout the academic year with one or more of MRI’s senior bureaucratic staff to receive information about the Ministry’s research and innovation agenda and activities; discuss the development of

\[^{174}\text{Toronto BioDiscovery Directory 2010 http://www.torontobiosource.ca/01 QuickFacts _06.html}\]
research funding programs; and provide the government with expert advice on how public resources should be distributed to ensure support for R&D and the development of Ontario’s next generation of HQP. OCUR members also met with each Minister of Research and Innovation, excluding Premier McGuinty.

Ontario universities also established less formal coalitions. In some cases, institutions with similar interests in a particular government policy or institutional practice would partner together. Universities with a similar institutional structure also developed communicative ties. In other instances, institutions located in the same region would coalesce to develop a shared policy position and meet with policy-makers either as a group or individually. The U15 is comprised of Canada’s fifteen leading research universities and together these institutions conduct over 90% of contracted university-industry research (U15, 2011). Six of Ontario universities are a part of this group; two university interviewees mentioned the U15 and its value in advancing the interests of Canadian research-intensive universities.

Finally, there were a number of sector-specific research institutes that also engaged the Ministry through policy advocacy. Without an umbrella organization to represent research institutions’ interests at the provincial level, many of these organizations employed mobilization tactics similar to those used by Ontario’s IIOs. Most notably, representatives from a number of these institutions also influenced policy-making by participating in Ministry-organized expert panels, advisory boards and commissions on research and innovation policy.

7.3 The Agency of Research and Innovation Actors in the Sub-government

A discussion on the context and structure of the policy network provides some insight into the conditions research and innovation actors operated in. However, a focus on the agency of these actors provides an increased understanding of the ideas these actors
promoted, the strategies they used to gain access to the decision-making apparatus, and the tactics they employed to influence the formation of research and innovation funding programs in a closed, corporatist policy network.

The Ministry of Research and Innovation opened up the decision-making process to members of the sub-government to discern their views on how the government should allocate its limited resources. These non-governmental actors attempted to convince policymakers that their ideas were also aligned with the Liberal administration’s political preferences, addressed the provincial government’s economic objectives and were capable of being implemented by Ministry officials. Indeed, ideas that demonstrated economic, political and administrative viability were more likely to be seriously considered and/or accepted (See Figure 7.1).

Figure 7.1: Factors Affecting the Reception of a Programmatic Idea

The reputation of the entrepreneur also played an important part in whether government officials would take seriously a set of ideas offered by non-governmental experts and advisors. Policy entrepreneurs with strong interpersonal relationships with decision-makers that extended over several years and had established a reputation for providing sound advice in the past were likely to be listened to. The following section discusses the efforts of the research community, industry, IIOs and individual policy entrepreneurs to influence the development of Ontario’s research and innovation funding programs and it examines the viability of the ideas these sub-government actors offered.

7.3.1 Research Community

Representatives of the research community promoted ideas primarily aimed at expanding research and innovation funding programs that supported knowledge generation and transfer, building up talent and advancing research excellence, i.e. supply-side innovation policies. Generally, universities, colleges, academic hospitals and various research institutes were well-resourced and sufficiently organized to launch sophisticated advocacy campaigns to articulate their ideas on resource allocation. Moreover, as members of several MRI-commissioned advisory panels and committees, they were active participants in the policy process. Most notably, these actors demonstrated that they were highly capable of bridging their programmatic ideas with MRI’s innovation-related goals.

- Nature of Relationship between the Research Community and MRI

Ontario universities forged strong ties with the MRI’s political and policy staff, and these linkages were supported by open lines of ongoing communication via formal and informal meetings, consultations, private phone calls, etc. Several persons from the university sector commented on the relationship they shared with MRI bureaucrats:
Senior Administrator at COU:

We are in a continual process of consultation and engagement with the Ministry. Every year there are areas that emerge that we are working with them hand and glove. Our members – various Presidents – serve at different times in various capacities in consultation processes or in commissions or committees they set up to review certain practices. So for example, one of the groups we work very closely with is our Vice Presidents Research across the sector. So there is a close connection between the innovation agenda the province has and the kind of research that takes place within our university sector…[W]hether it’s the innovation agenda and specific programs or research programs that are matching fed funds or establishing criteria for gaining support for various types of research or working in partnership with other organizations that the government has funded through a program, I think the universities are very intimately involved in all of those dimensions of program development and review.

Vice-President Research from a research-intensive university:

[MRI officials] are very consultative. There are all kinds of channels open to come back and forth. I take no issue with picking up the phone and calling Deputy George Ross or the ADMs. Bill Mantel is one. Tony Rockingham was one, but he retired… I talk to these people quite frankly.

The majority of Ontario universities also established a healthy rapport with the Minister of Research and Innovation. In October 2007, Premier McGuinty relinquished the research and innovation portfolio\textsuperscript{175} and appointed John Wilkinson as minister. The new minister was more open to consulting with larger groups of stakeholders than the Premier, and hence significantly more accessible to Ontario’s research and innovation actors. Many informants spoke highly of the leadership style of Minister John Wilkinson\textsuperscript{176} (2006-07):

\textsuperscript{175} One former senior MRI bureaucrat commented that it was largely impractical for the Premier to serve as the Minister of Research and Innovation for an extended period of time. The informant explained that research and innovation is a “risky” sector; millions of public dollars are invested into high risk initiatives that have a small potential of generating a significant return on investment in the short-term, i.e. within an electoral cycle. To this end, it was undesirable to expose the head of government to the risk of wasting money, which in turn would compromise the government’s role as a responsible manager of tax-payers’ dollars and potentially undermine re-election prospects.

\textsuperscript{176} John Wilkinson served as Ontario’s second Minister of Research and Innovation from October 30, 2007 to June 24, 2009.
Former Associate Vice-President Research from a small university in Northern Ontario:

The McGuinty time was busy – for small universities and for everyone. When we got Wilkinson, Wilkinson had a very good open ear. He came many times, we had several personal meetings and it was great. He was more perceptive of what was happening in Northern Ontario for example.

Vice-President Research from a research-intensive university:

And there definitely [was] consultation particularly when John Wilkinson was Minister – was extremely good – was very pleased with him. From my perspective he was an excellent minister in terms of what he did with MRI. He really knew the file, he got out there, got involved and he listened. Everything you would expect from a good minister…

The colleges also maintained good relations with MRI even though the majority of their applied funding was provided by the federal government. Like the universities, many of the college interviewees commented on Minister Wilkinson’s strong leadership style and demonstrable commitment to the research and innovation portfolio; the Minister’s “personal visits” to college campuses was deemed “a credit to him and [the Liberal] government’s approach to things.” One interviewee also discussed the nature of information exchange between Ministry staff and the colleges that occurred between 2005 and 2007 regarding the development of research and innovation policy:

It was through Colleges Ontario where we were beginning to make our ask for funding. We were beginning to develop a relationship with the Ministry of Research and Innovation. The ministry at that point was beginning to carve its mandate. So we met directly with Bill Mantel where he revealed to us in terms of what he was thinking about an innovation agenda, what some of the focus areas and priorities would be and some of their goals and objectives were as they evolved the research funding programs and tried to support the innovation agenda. So we were actually involved prior to the public consultations.

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177 Comment from an interviewee, President of a college.
178 Comment from an interviewee, former senior administrator at a college.
This informant’s comments suggested that even though his institution was not actively involved in setting policy direction, the Ministry considered the college community an important stakeholder to meet with in order to discuss MRI’s policy plans and solicit programmatic ideas for realizing the Ministry’s innovation-related objectives and the government’s economic goals. Similarly, MRI officials also met with representatives from Ontario’s academic hospitals; ADMs and other senior level bureaucrats were invited to attend meetings organized by BioDiscovery Toronto, the Council of Academic Hospitals of Ontario (CAHO) and the University Health Network (UHN) to ensure an open line of communication was maintained. According to one informant – an accomplished biomedical researcher at the UHN – MRI staff came to BioDiscovery board meetings to discuss research funding policy which gave meeting participants the opportunity “to make sure the government knew what [their] challenges were [and] what [their] solutions would be.” Interviewees from research institutes also commented on the positive relations they shared with MRI. Consultations and information exchanges occurred often between Ministry officials and these representatives from these research institutions, typically on a one-on-one basis. These exchanges strengthened trust ties, encouraged interpersonal working relationships, and provided members of Ontario’s research community countless opportunities to offer up programmatic ideas to influence the development of Ontario’s suite of research and innovation funding programs.  

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179 One interviewee from a research institute in the health sector recounted his experience travelling outside of the country with the Premier, government officials from other Ontario economic development ministries, and various senior research and innovation leaders to meet with industrial leaders from leading jurisdictions; this trip took place at the time the Premier was Minister of Research and Innovation. The trip provided the interviewee the opportunity to interact with the Premier and other bureaucrats, and engage in discussions regarding the importance of the Ontario government providing continued policy support for his institution specifically and the health sector in general.
Overall, members of the research community were encouraged to think of themselves as MRI’s partners, working along with the Ministry and other research and innovation actors towards achieving mutually-beneficial innovation-related objectives. However, challenges remained. One interviewee employed in the research services department of a large research-intensive university discussed the perceived “overlord/recipient” relationship that had developed between the universities and the Ministry in the development and implementation of funding agreements. According to this interviewee, MRI did not consult enough on these agreements and instead, the institution was merely “told how things [would] be administered.” Another interviewee from a small, Northern university also discussed the extent to which his/her respective institution could impact resource allocation decision-making. The informant alluded to the idea that the influence of certain universities was generally compromised due to the institution’s size; it was implied that smaller institutions were not taken as seriously as their larger, more research-intensive counterparts, and as such they tended to assume an outsider status.

- Core Programmatic Ideas of the Research Community

Research community members were skillful at articulating their programmatic ideas in a way that appealed to policy-makers. Indeed, these actors were capable at framing their preferences to fit favourably with MRI’s innovation related objectives and/or Ontario’s economic goals. For instance, interviewees from the college sector pointed out that with an increased level of support from the provincial government, their institutions would be better able to strengthen collaborations between academia and industry in order to bring ideas to market; support entrepreneurial activity, particularly at the local level; and meet local
employment demands. Furthermore, actors promoted themselves as “partners” in the innovation process, with the capacity to complement the R&D work of other research community members as well as drive innovation activity alongside private sector partners. This “partnership” language also resonated with MRI officials, who considered members of the research community as important partners in building up the province’s research and innovation capacity in collaboration with other research and innovation actors.

Hospitals, colleges, universities and research institutions advocated for the development, continuance and/or expansion of funding programs that encouraged and rewarded research excellence, supported knowledge generation and advanced knowledge transfer. In particular, these institutions advocated for the provision of a predictable source of funding that was sufficient to match proposals accepted by CFI in order to ensure that Ontario received its fair share of research dollars from the federal government. Overall, this advocacy effort was well received by MRI officials given that it aligned with the government-held idea that investments in transformative research would facilitate the discovery of innovative solutions to complex problems and support the expansion of Ontario’s highly qualified, highly trained workforce. Moreover, the Ministry had the budget to establish these kinds of programs as well as the capacity to administer them. In turn, the development of supply-side innovation funding initiatives like the Ontario Research Fund, Early Researcher Awards, the Premier’s Awards, the Postdoctoral Fellowship Program, and International Strategic Opportunities Program were influenced by the research community. A number of these societal actors engaged with MRI staff to discuss the conditions and parameters of these programs.

While all members of the research community agreed on the importance of developing programs that supported knowledge generation and transfer, there was little group consensus on how MRI should split research dollars in support of basic research, applied research and “experimental development.” Universities, hospitals and research institutes in particular capably advocated for the development of programs and initiatives that support basic research.

MRI officials fundamentally agreed that support for basic research is critical to building the province’s research and innovation capacity. However, it was also widely accepted by research and innovation actors that the Ontario government did not have the resources to fund unfettered inquiry into everything; in consideration of economic feasibility, difficult decisions had to be made. Between 2003 and 2007, the majority of MRI funding was dedicated to advancing applied research and experimental development. Ideas that supported the development of programs that advanced applied research initiatives more readily facilitated industry-academia partnerships and in turn addressed the Ministry’s innovation-related objectives of supporting the commercialization of university research, attracting increased private-sector investment in R&D and intensifying R&D collaborations between multiple research and innovation actors. Moreover, it was generally expected that the government could realize a quicker return on investments made in applied research given that returns on investments made in basic research may take decades depending on the sector/discipline/technology involved. Crudely stated, in light of Ontario’s four-year election

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181 A senior administrator at one of Ontario’s colleges stated that colleges conduct “experimental development” as defined by the OECD, even though their work is more commonly known as applied research. The OECD’s Frascati Manual (2002) defines experimental development as “systematic work, drawing on existing knowledge gained from research and/or practical experience, that is directed to producing new materials, products or devices; to installing new processes, systems and services; or to improving substantially those already produced or installed” (p. 30).

182 Comment from an interviewee, senior administrator at a college.
cycle, it was in the Liberal government’s political interest to invest in initiatives that had a quicker, tangible pay-off.

Members of the research community endorsed the importance of investing in highly qualified, skilled personnel and advocated for increased support for building up the province’s pool of creative talent. These programmatic ideas corresponded with MRI’s innovation objectives as well as the Ontario government’s economic goals and programmatic ideas for advancing economic development. Indeed, the Liberal government consistently promoted the linkage between a highly-trained, qualified workforce and economic growth in a knowledge-based economy (Office of the Premier, 2005a). According to the Premier, an investment in the education and skills of Ontarians was critical for the provincial economy and the future, and support for postsecondary education and training was “key to building a stronger Ontario” (Office of the Premier, 2005b). As such, MRI was open to receiving advice regarding initiatives that would support HQP. The Ontario Research Fund (ORF), the Early Researcher Awards program, and the Post-doctoral Fellowship Program clearly advanced these programmatic ideas.

Representatives of Ontario’s research community advised the Ontario government to develop programs that would drive an integrated approach to innovation. According to one representative from the university sector, universities were actively consulted during the time the Ontario government was developing the integrated network model and many of them provided advice on the role that organizations like MaRS and OCE should play at a sectoral, regional and provincial level. Using the Colleges Ontario Network for Industry Innovation (CONII) as frame of reference, a number of colleges actively promoted the advantages of advancing a collaborative approach to innovation and advocated for the funding that would engender productive working relationships between research and innovation actors across
multiple research and innovation actors. Once again, these programmatic ideas readily demonstrated economic, political and administrative viability. They aligned with MRI’s innovation goals and advanced the innovation systems approach\textsuperscript{183} literature to which Ministry officials subscribed.

Members of the research community also maintained that the Ontario government should employ a place-based approach to research and innovation funding. As one university VPR described it, his ideas as well as those of his colleagues regarding resource allocation were “based on the cities that [they] live in and the economic conditions of [those cities.]” Universities, colleges, hospitals and research institutes alike encouraged the provincial government to create funds that were sensitive to regional diversity. A number of research community members advocated for MRI to design funding instruments that would leverage the strengths and meet the needs of a broad spectrum of research and innovation actors within specific geographic locations. One informant from an institution within the research community was particularly adamant about the importance of advocating on behalf of the Toronto region; he/she conceded that his/her institution was “certainly looking for a differential or preferential advantage.” As such, this individual’s institution advised MRI to think seriously about the level of research and innovation that occurred within his/her surrounding area relative to less active areas, and allocate funding to build on Toronto’s success. These kinds of ideas appeared to align with the government’s efforts at thinking more strategically about allocating public resources in a way that demonstrated managerial efficiency, however these ideas also challenged the Liberal administration’s efforts at

\textsuperscript{183} The “innovation systems approach” is premised on the understanding that innovation is an iterative process, and successful innovations depend on long-term relationships and close interaction between a given set of innovative organizations and institutions including companies, universities and research institutes (Abrunhosa, 2003; SciDev-Net, 2005). This approach advances the idea that “innovation and technical progress are generated by the complex interaction among the institutions that produce, distribute and apply various kinds of knowledge” (Wolfe, 2002b, 19). Refer to Chapter 3 for a discussion on the systems of innovation approach to policy development.
balancing the interests of research and innovation actors spread across different regions. MRI made the effort to address this issue in a few ways. For instance, resources were administered through the province’s regional commercialization network, the OCN, to boost the research and innovation capacity in different regions across Ontario. Additionally, institutions within certain regions received special funding envelopes to advance their innovation activities.

Research community members also focused their advocacy efforts on the issue of which sectors and disciplines the government should invest in. This was one of the most divisive issues within the research community, and the mix of competing interests and ideas essentially complicated the policy formation process. According to an interviewee who worked in the university sector during the first mandate of the Liberal government, the Council of Ontario Universities (COU) promoted the idea that the government should be less concerned about targeting specific disciplines and instead provide more peer-adjudicated grants with excellence as the only criteria for funding. The interviewee suggested that the consensus among COU members was that governments cannot and should not attempt to pick sectors that are going to be successful. Moreover, government officials are incapable of ensuring that the projects they choose to fund will realize the highest economic returns. Other research community members interviewed discussed their contributions to the debate. A college president mentioned that his institution promoted the idea that government-sponsored programs should be designed to support a wide range of sectors, and funds should be apportioned to industries beyond auto and manufacturing in order to support innovative activity in “the new worlds” of nanotechnology, green energy and aerospace. Similarly, a university president mentioned that his institution cautioned against concentrating investments on a small set of sectors and underscored the danger of the government falling prey to the “high tech fallacy” – an obsession with investing in a small number of high-tech
areas even though these sectors employ a very low percentage of Ontario’s workforce. According to this informant, if Ontario was going to compete, the government had to eschew the idea that innovation only happens in the high tech space.

In spite of the many competing societal interests, arguably the Ministry achieved a compromise by building a demand-side component into some of its supply-side innovation programs like the Ontario Research Fund and Post-doctoral Fellowship program, which prioritized research and innovation activities conducted in a number of very broadly defined sectors and disciplines; however, the Ministry also maintained that excellence was the primary criterion for assessing proposals and awarding funding. MRI rationalized that “the joint requirements of excellence and strategic focus [would help] ensure maximum value from research investments (MRI, 2006l: 6).

- Strategies to Influence Policy Formation

Members of the research community were tenacious in their efforts to influence the development of Ontario’s suite of research and innovation funding programs. As one interviewee stated, “Persistence [was important.] You have to keep going back, you have to know the right people and you have to make a good case.” Indeed, representatives from this group of stakeholders adopted a range of tactics to engage decision-makers. A number of interviewees discussed institution-specific strategies of influencing the policy formation process; these strategies ranged from meeting with government representatives on a one-on-one basis, to efforts at advancing a set of programmatic ideas at multiple levels of the bureaucratic apparatus, i.e. University Presidents would meet with the minister, while Vice-Presidents Research would meet with the Deputy Minister and senior bureaucrats. Some informants also talked about the value of establishing partnerships with other organizations that have similar interests in research and innovation funding. A few interviewees recounted
stories about collaborating with a broad range of community actors to draw policy-makers’ attention to resource allocation issues. Finally, a handful of these individuals also talked about their experiences in becoming a part of the decision-making apparatus by serving on an expert panel or working with the Ministry through secondments.

Notably, members of the research community also collaborated with a variety of different organizations to promote dialogue, debate and information exchange related to research and innovation. For instance, representatives from the research community participated regularly in conferences organized by the Ontario Chamber of Commerce, the Ontario Centres of Excellence and the Toronto Board of Trade which brought together hundreds of research and innovation stakeholders and policy makers from across the provincial government. These forums offered universities, colleges, hospitals and research institutions a platform for sharing their programmatic ideas and demonstrating the extent to which other non-governmental research and innovation actors subscribed to those ideas.

- Research Community Ideas Not Adopted by MRI

The Ministry did not adopt all of the programmatic ideas this group of stakeholders promoted up to 2007. It is misleading to state that MRI officials did not take these ideas and their carriers seriously. It is also misleading to assume that these ideas were not implemented because they did not sufficiently demonstrate political, economic and/or administrative viability. Indeed, the demonstration of viability increases the likelihood of idea adoption;

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184 One interviewee who worked at a research-intensive organization in Northern Ontario explained that her institution would partner with representatives from the mining industry to advance the research and innovation interests of their region. Partnerships were also forged between research community members and municipal leaders. The same interviewee from Northern Ontario mentioned the willingness of the mayor to meet with provincial officials as part of a collective effort to secure more funding for research.

185 For instance, the Ontario Research and Innovation Council (ORIC) provided expert advice directly to the Minister of Research and Innovation from 2006 to 2007. Seven of the thirteen ORIC members were from the research community: Dr. H. D. Barber (university), Dr. Tak Mak (hospital), Dr. Elspeth Murray (university), Dr. Gilles Party (university), Dr. Janet Rossant (hospital and university), Dr. Molly Shoichet (university), Dr. Mamdouh Shoukri (university).
however, it did not guarantee that the Ministry would actually adopt those ideas. Three of these ideas are worth mentioning:

Firstly, Ontario universities were unsuccessful in advocating for the creation of a separate funding program and/or an initiative aimed at supporting research and innovation in the arts, humanities and the social sciences. Some interviewees speculated that the program was not developed because the political leadership believed that investments in research across these disciplines would not lead to the development and commercialization of products and services in the short-term. Others suggested that investments in these areas of research may not yield as a high a return as investments in the disciplines and sectors MRI had been identified in the Ontario Innovation Agenda. Moreover some informants pointed out that the Ontario government had no historical policy experience developing this kind of initiative; and this kind of program may not have been established because these disciplines have less buy-in from the private sector.

Another programmatic idea MRI chose not to implement came from the college sector. Colleges advocated for the creation of multi-year funding programs that would “bolster college capacity to support business and industry through applied R&D, innovation and commercialization activities…” (Colleges Ontario, 2006: v). It is important to note that while colleges were eligible to receive funding through the ORF, since the inception of the ORF up to 2009, no funding was awarded directly to Ontario’s colleges (Auditor General of Ontario, 2009: 240). Hence, the college sector’s request for increased support seemed well founded.

186 These sectors include bio-economy and clean technologies; advanced health technologies; pharmaceutical research and manufacturing; and digital media and information and communications technologies.
Thirdly, CAHO and other individual hospital representatives advocated for the creation of a Health Research Council that would work with the provincial government “to design a health research strategy for Ontario; leverage and distribute funding; facilitate knowledge translation and commercialization; and monitor health research outputs and communicate the value of health research” (CAHO, 2008: 1). CAHO members proposed that the Council would “bring together the funding streams for health research [that had been] allocated in several provincial government ministries and leverage new funds for health research and innovation from government and other partners” (Ibid.). MRI took seriously the hospital sector’s programmatic idea even though the council was never established by 2007. To some extent, MRI’s hesitation in creating a new expert-driven, arms-length body charged with administering public funds may be attributed to the backlash the provincial government received as a result of the former administration’s decision to allow the OIT to administer the Ontario Research Development and Commercialization Fund (ORDCF) and other publicly funded research programs. Indeed, a negative historical policy experience in outsourcing the allocation of public resources may have been a determining factor in the Liberal government’s decision to retain the administration of health research funds in-house.

7.3.2 Industry

Ministry officials surmised that if Ontario was to become a more competitive player in a globalized knowledge-based economy, it was imperative to encourage local firms and entrepreneurs to become more active in the innovation space. MRI remained receptive to the ideas of industry leaders from across Ontario on how the government could intensify the commercialization of new technologies from the private sector, enhance the commercialization of cutting-edge ideas generated by universities, and improve entrepreneurial activity. Programmatic ideas offered by the private sector on how MRI
should distribute public dollars were aimed mostly at influencing the development of funding programs and initiatives that would support the building up of clusters and ecosystems, advance entrepreneurial activity, and overall, create the conditions necessary for stimulating demand for Ontario-made innovations.

- Core Programmatic Ideas

Industry representatives maintained that Ontario’s entrepreneurs and innovators needed increased funding to advance their ideas from mind to market. As such, private sector partners advocated for the development of policy to support the activities of newly established technology companies. These industry advocates advanced the idea that start-ups with high growth potential could contribute significantly to Ontario’s competitiveness by creating high-value jobs in a number of knowledge-based sectors and increasing GDP as a result of profits made. A number of private sector actors met with MRI staff to discuss the technical details of these initiatives and several industry leaders worked along with government officials in the development of the supply-side innovation program, the Investment Accelerator Fund (IAF), which was specifically designed to accelerate the growth of these fledgling firms and their commercialization activities. Industry representatives also advocated for increased support for other firms (not necessarily start-ups) who wished to bring new technologies to market but did not have the funding to support the early-stage development process. By raising attention to the financial challenges entrepreneurs face at the outset of their efforts, industry was influential in and supportive of the development of the Innovation Demonstration Fund (IDF), yet another supply-side innovation program.

Secondly, business representatives promoted the idea that venture capital in Ontario was sorely underdeveloped. Given that the Labour Sponsored Investment Fund was being wound down, the private sector argued that it was imperative for the government to develop a
new initiative for ensuring that entrepreneurs had access to a sufficient amount of risk capital and high growth firms – particularly start-ups – had the funds they needed to commercialize their innovations and reach their full growth potential. Most notably, carriers of this programmatic idea underscored the success rates of venture capital-supported companies compared to companies that did not have access to predictable, adequate sources of investment capital. It was also suggested that a strong investment community in Ontario would attract increased investments from local as well as international investors. To this end, industry certainly motivated the development of the Ontario Commercialization Investment Fund and played a role in influencing the creation of other programs like the Ontario Venture Capital Fund and the Angel Network Program. The Ministry consulted with a range of industry experts regarding the development of these programs. MRI officials also received input from retired investors with knowledge and experience across various industries, lawyers (due to the technical nature of these funds) as well as other private sector advisors.

The private sector community acknowledged the importance of building Ontario’s human capital, and in turn, advocated that the Ontario government set aside funding for entrepreneurial training and mentorship programs to ensure that new and/or inexperienced entrepreneurs would develop the business and management skills necessary for creating a business, expanding an existing initiative and/or bringing a new or improved product, process or service to market. This kind of advocacy was instrumental in influencing the development of the Business Mentorship and Entrepreneurship Program (BMEP).

The private sector also advocated for fiscal instruments to incentivize business activity in R&D. The Ontario government acknowledged that it had a critical role to play in creating an ideal business climate to facilitate and encourage the private sector to partner with other local research and innovation actors to innovate. Additionally, Ontario had years of
historical experience implementing tax policy designed to support R&D activity of locally-based firms. The formative ideas that undergirded the Ontario Tax Exemption for Commercialization Program (2008) were being discussed and refined during the first mandate of the Liberal administration.

Finally, industry representatives also proposed that government strategically target its limited resources at sectors that had already demonstrated R&D and commercialization strength as well as those sectors with high growth potential. To address this idea, a number of the supply-side innovation programs MRI established prioritized proposals aimed at advancing innovations in particular sectors, including the green sector, biotechnology and ICT. Notably, the government also developed a new program – the Ontario Fuel Cell Program – a demand-side innovation initiative intended to promote public awareness of Ontario’s fuel cell R&D strengths, support the growth of fuel cell clusters in Kingston and the GTA, and drive commercialization (MEDT, 2005b).

• Strategies to Influence Policy Formation

One-on-one meetings between industry representatives and MRI officials were potentially the most meaningful and impactful exchanges that occurred. Representation on MRI-convened groups like ORIC also provided private sector actors the opportunity to articulate their programmatic ideas, some of which were applied by the government. However, one of the more elaborate strategies Ontario’s business community sector employed to influence policy formation was the Ontario’s Economic Summit, organized by the Ontario Chamber of Commerce. The OCC’s annual summit was first launched in 2004 to bring together leaders from the research community, industry, government and the third sector to discuss some of the province’s most pressing economic issues and share policy solutions for some of Ontario’s most complex problems. Over the years, the Summit has
provided research and innovation actors with a platform for expressing ideas on how to advance commercialization across all sectors of Ontario’s economy; stimulate business-led innovation activity; strengthen the relationship between the business community and academia to leverage university research, etc.

7.3.3 Innovation Intermediary Organizations (IIOs)

Ontario’s IIOs consulted with the provincial government and promoted the importance of establishing funding programs and initiatives that would accelerate commercialization, advance technology transfer and support HQP development. As part of their advocacy efforts they also underscored the idea that innovation is a team sport that requires the concerted participation of research and innovation actors from different sectors of the economy.\footnote{One senior VP from an IIO described commercialization as “a full-bodied contact sport” which required all research and innovation actors to be engaged, from the two-person start-up to large multi-national corporations.} IIOs maintained that sustainable innovation could only occur if these various agents committed to working collaboratively and efficiently as part of an innovation system, rather than working competitively in silos.

- Core Programmatic Ideas

IIOs like Communitech, OCRI, OCE and MaRS maintained that Ontario suffered from “a commercialization gap”, wherein brilliant ideas generated by the private sector (i.e. firms and individual entrepreneurs) and the research community were not being transformed into market-ready, innovative products, processes and practices. MEDT (2003-04) and MRI (2005-07) were encouraged to assume a holistic approach to research and innovation and establish more robust resource allocation policy that would support the activity of research and innovation actors at all stages of the innovation continuum. Moreover, in their characterization of innovation as a social activity, IIOs maintained that the provincial
government needed to dedicate more resources to support ongoing communication, partnerships and collaborative working relationships between researchers and innovators within and across multiple disciplines. To this end, IIOs consulting with MRI pushed for enhanced support for regional cluster development and provided advice on defining and strengthening Ontario’s existing networked model of commercialization. Programmatic ideas like these informed the evolution of the Regional Innovation Networks (RIN) Program as well as the development of the Ontario Commercialization Network (OCN) and its associated funding programs.

IIOs also advocated for the development of funding programs that supported the individual entrepreneur’s efforts at transforming an idea into an innovation and/or growing a company. Moreover, a number of IIO representatives interviewed emphasized the importance of allocating public resources to support the creation and expansion of high-tech start-ups and small companies in high-growth sectors. Informants maintained that these enterprises, if fully supported by the provincial government, had the capacity to reduce Ontario’s commercialization gap and contribute to economic growth. As such, the programmatic ideas of the IIOs fed into the Market Readiness Program (BMEP and IAF).

- Strategies Employed to Influence Policy Formation

IIOs have had significant success in aligning their programmatic ideas with the government’s goals of building R&D partnerships and promoting an entrepreneurial spirit in order to intensify commercialization and in turn contribute to wealth generation and prosperity. Indeed, these organizations capably demonstrated a sophisticated understanding of the systems approach to innovation. Moreover, these IIOs had a notable degree of success in defining their role in the innovation system as indispensable conduits of innovation with the capacity to provide programmatic ideas that were in line with provincial priorities and
provide the services and resources other research and innovation actors required to push their innovative ideas onto the market.

A number of these organizations were created before the Liberal government assumed office. Several of the senior administrative staff at IIOs had developed robust interpersonal relationships with career civil servants that spanned a number of years. Like many of the research community members, the representatives from these IIOs had established themselves as “trusted partners” willing to not only work with government, but also capable of building collaborative ties with other IIOs and facilitating partnerships with other research and innovation actors. This kind of posturing provided a few IIOs favour amongst policy-makers and a small number of them were deemed reliable policy advisors whom the government could turn to for well-thought out programmatic ideas.

IIOs that had earned a reputation as reliable policy advisors had a number of points of access to government. Like other individuals in the sub-government, IIO representatives maintained that private meetings and phone calls with senior MRI staff were most conducive for promoting their ideas regarding research and innovation resource allocation issues. A few IIOs also took part in formal consultations the provincial government organized to solicit ideas on the development of research and innovation policy, as was the case with the development of the Strategic Plan (2006). Moreover, senior administrative staff from different IIOs also sat on Ministry-commissioned expert panels and advisory bodies and used that platform to influence the policy-making process. By employing these strategies, IIOs were instrumental in securing special envelopes to fund the expansion of their institutions and others like them, including OICR, MaRS, and the OCE. These strategies were also useful in influencing the development of Ontario’s suite of research and innovation programs.

Indeed, the development of the supply-side innovation policies that funded the activities of
the OCN – including the Market Readiness Program, the ORCP and the Angel Network Program – was influenced by the input provided by IIO representatives. Additionally, some of the IIOs encouraged the provincial government to target their funding at sectors of the economy with emerging or existing R&D strengths like ICT, digital media and other high-tech industries. To this end, IIOs had a part to play in ensuring that Ontario’s suite of supply-side innovation funding programs had a built-in demand-side element.

Some IIOs like MaRS and Communitech employed what may be described as “the show-tell-ask” advocacy. In order to influence the government’s funding decision-making process, they would showcase the commercialization successes achieved with the existing level of funding; tell the government the reasons why public investments had been a crucial component in commercialization success; and then pitch an ask for more funding by presenting programmatic ideas that would enhance institutional, regional and/or sectoral successes, leverage public funding to attract more funding from other sources, and increase the likelihood of realizing a substantive return on the provincial government’s investments. It is important to note that IIOs that capably deployed the show-tell-ask advocacy technique to secure increased funding for their own institution, regional partners and/or sector also cautioned the government against investing similarly in other institutions, regions and sectors and expecting the same level of commercialization success. As such, these organizations encouraged the government to deploy public funding strategically, using a place-based approach to resource allocation. This approach called for decision makers to determine the needs, strengths and challenges of a particular region or sector, assess the capabilities of the research and innovation actors within that region or sector and determine how the social and economic climate would condition the impact of public funding on that region and/or sector’s commercialization activities. The advice to strategically target the provincial government’s
limited resources resonated with the Ministry and became an integral part of Ontario’s research and innovation funding decision-making process.

7.3.4 A Closer Look at Societal Actors: Power Struggles and Identifying the Influencers

While research and innovation actors across multiple sectors and disciplines acknowledged the value of working collaboratively to enhance Ontario’s research and innovation capacity, power struggles emerged as different agents competed to have their specific resource allocation interests met. Additionally, some research and innovation actors were believed to be greater influencers of the decision-making process. The sub-section that follows discusses a few power struggles that developed between different societal actors involved in resource allocation issues as well as these agents’ perception of which groups and/or individuals had the greatest success in influencing the formation of research and innovation funding policies and programs.

- Power Struggles

According to interviewees from the research community, universities and colleges often appeared to compete against each other in order to secure the maximum amount of limited research money available. These institutions were generally disinclined to advocate collaboratively during the early stages of research and innovation funding policy development and approached the provincial government separately, each seeking to ensure that funding programs were developed to address their own interests, sometimes to the detriment of the other group of institutions receiving sufficient funding for their own activities.

Power struggles also emerged between IIOs like MaRS and the OCE. Contestation was most visible around the administration of the Market Readiness Program. According to one senior administrator at one of these IIOs, just before the launch of the program, there was
a great deal of disagreement on which organization should deliver the IAF. The MRI delegated the management of the IAF to the OCE, and despite the Ministry’s efforts at delineating the roles and responsibilities of the MaRS and the OCE, almost two years later the mandates of both IIOs appeared to overlap. \footnote{One senior administrator from an IIO commented that OCE was impinging too much on MaRS’ mandate.} This “mandate creep” was one of the many challenges the Ministry attempted to settle during its review of the OCN in 2008.

Between 2003 and 2007, it was generally accepted that Ontario was suffering from a commercialization gap, and research and innovation actors’ efforts at scaling the “valley of death” could be facilitated with increased government funding. However, a debate emerged around the question of which set of actors were most capable of addressing this gap; the answer to this question had implications for how – and more specifically, to whom – the government should target its limited resources. COU, CAHO, Colleges Ontario and their respective members contended that the research community had the capacity to address the province’s commercialization gap; increased funding to support the research activity of faculty and students was needed along with more funding to support the technology transfer activity of institutional TTOs and TLOs was needed to realize this goal. However, industry argued that it was more capable of starting and growing successful companies. As such, many advocates from the private sector maintained that more funding for advancing commercialization efforts should be primarily aimed at industry and individual entrepreneurs focused on creating and expanding start-ups that had the potential to increase GDP levels and productivity.

The Ontario government demonstrated that it took seriously the advice of these innovation agents by establishing funding programs specifically designed to support start-ups and innovation activity within the private sector (i.e. The Market Readiness Programs, the
Innovation Demonstration Fund, the Ontario Venture Capital Fund, and the Early Stage Venture Capital Fund were all targeted towards the private sector.) However, MEDT and MRI dedicated a much larger amount of funding to enhance the commercialization capacity of the research community. Indeed, the Rae Report\(^{189}\) discussed the importance of the provincial government providing support for research generated by colleges, universities, hospitals and research institutions as well as the commercialization of that research (p. 90). Arguably, the Ministry’s decision to split the commercialization resources between industry and the research community represented one of several attempts government officials made at balancing the competing interests that existed between Ontario’s research and innovation actors in order to establish resource allocation policy that would increase regional economic development and further the province’s innovation agenda.

Finally, there was also a great deal of tension between some actors from the business community and IIOs regarding the division of public resources between big business and start-ups. Advocacy conducted on behalf of both sectors of the business community influenced the development of certain programs like the IDF, Market Readiness Program (i.e. IAF and BMEP), OVCF and the OCN but also contributed to the divisiveness between actors within the private sector as they struggled to secure the limited resources that would support their continued existence.

- Identifying the Key Influencers

Overall, interviewees believed that industry, universities and trusted advisors from the private sector had the most influence on resources allocation decisions. Industry partners had the market intelligence necessary for identifying existing and emerging market

\(^{189}\) In 2004, the Ontario government commissioned a review of the post-secondary education sector, led by former Ontario Premier Bob Rae. The report, *Ontario - A Leader in Learning*, was released in 2005 and underscored the critical role post-secondary education institutions play and provided recommendations for increased funding and policy reform in order to support excellence, opportunity and sustainability.
opportunities and the business intelligence needed to meet customer demand and leverage
new and existing market opportunities. It was generally accepted that these agents are the
engines of innovation with the capability to intensify productivity, increase job growth and
advance wealth creation through the commercialization and marketing of new innovations.
Members from the research community and the IIOs all acknowledged that the Ontario
government had a vested interest in seeking out the advice of industry partners, particularly
those that had achieved prolific gains in key sectors of the economy, including TELCOM and
the green sector (i.e. energy, solar, natural gas.)

Most interviewees considered universities the most powerful advocate, particularly
research-intensive universities with strong, well established linkages with Ministry staff. One
interviewee commented on the influence of the University of Toronto vis-à-vis resource
allocation decisions, particularly the mechanics of program administration:

The program specific advocacy from the University of Toronto is interesting, and it
was perhaps a louder voice than the voice of other institutions to some extent because
it's across the street from the Ministry, but also because it has a larger volume of
researchers and as such, a larger research administrative group. So when there were
implementation glitches in programs, the U of T spoke out strongly and clearly.

Several interviewees also claimed that trusted advisors from the research community
and/or the private sector were key influencers. Some of these advisors worked in the research
and innovation interface for many years before the McGuinty administration took office. A
number of them may have at one point also worked as part of the civil service at one time or
another. Others have had experience working in organizations from different sectors of the
economy, including industry, government and academia. Tom Brzustowski calls these
individuals “three-legged people” (Brzustowski, 2008: 160). Overall, these persons had
accumulated invaluable institutional knowledge and developed strong trust ties with multiple
constituencies across the province, making them reliable and highly influential advisors to Ministry staff. As one former MRI official suggested:

There have been very influential stakeholders who had the ear of government giving them advice…That has been a major thing in driving this whole thing forward…In some cases, it’s business leaders – retired – that are sharing their wisdom, and there’s nothing in it for them…Some of them are even adding money to the pot. If you go down to MaRS there is a dozen or more founders but many of them are individuals that gave money…[Is there a public record of their names?] Yeah – it’s on the wall by the main door – the college of founders…They would have been telling the Premier: this is what you should do. And we’d be saying, yeah we can do that, here’s how.

Overall, the Ministry and a number of societal actors from the sub-government influenced the agenda-setting stage of policy development and capably worked together to inform the selection of policy alternatives. The following mini case on the Ontario Venture Capital Fund demonstrates the extent to which state-societal interactions influenced the pre-decision stages of the policy process and fed into the development of an important supply-side innovation policy initiative.

## 7.4 Mini Case Study: The Capacity of the Sub-government to Work Collaboratively – The Development of the OVCF

In 2005 the Liberal government announced its intention to phase out the Labour Sponsored Investment Fund (LSIF) program due to poor returns on investments made in LSIFs and investors’ growing lack of confidence.\(^{190}\) Shortly after this decision was made, a

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\(^{190}\) According to Martin and Milway (2005), LSIFs were a flawed alternative for building venture capital capacity. These authors provide the following critique: “Because individual investors receive a high return on their investment through the tax credits irrespective of fund performance, they are not overly concerned with the actual return of the fund. In addition, because most investors in LSIFs are individuals, they each have very limited exposure and are fragmented. Hence the funds do not benefit from the pressure exerted by sophisticated investors with a significant stake in success. Finally, LSIFs are restricted in the type and geography of their investments and are required to invest some funds in the year they are raised. It is no surprise, then, to see that their returns have been dreadfully low… the program may be hurting the overall Canadian venture capital industry more than it helps by increasing the supply of venture capital funds and lowering the industry returns. Finally, the program also represents a significant burden on the provincial and federal treasuries, with an estimated total tax expenditure of $3.3 billion between 1992 and 2002.” (p. 9) Fancy (2012) also points out the shortcomings in the design of the LSIFs. He discusses the flaw in the impact of the tax preferences associated with the LSIF that allowed the funds to survive despite poor returns. He also mentions concerns
number of representatives from the private sector raised the government’s attention to Ontario’s severe venture capital deficit. Indeed, VC investing in Ontario had plunged from $1.5 billion in 2000 to $236 million in 2007 (Zheng et al., 2008: 39). Industry stakeholders maintained that if the government did not develop policy to address this problem, local start-up company creation, growth and innovation success would be significantly jeopardized. The pressure to assume a more interventionist role in encouraging risk capital growth was evident. In turn, MRI formed a Risk Capital Working Group and consulted with the local venture capital industry to identify impediments to risk capital growth and to propose solutions for advancing the development and deployment of Ontario innovations onto the market (Office of the Premier, 2006b). The Working Group determined that two main factors hindered commercialization success: (1) a lack of early-stage financial support and entrepreneurial assistance; and, (2) a lack of skilled and knowledgeable managers and entrepreneurs (Ibid).

Overall, industry partners played a critical role in problematizing Ontario’s risk capital issue, and as members of the Risk Capital Working Group, business and academic leaders also influenced the design of the policy successor to the LSIF. In 2006, the ADM, Office of Economic Policy at the Ministry of Finance, worked with the Ontario Ministry of Small Business and Entrepreneurship, Ministry of Research and Innovation and the Ministry of Economic Development and Trade to collate the input received from the Working Group;

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191 According to an interviewee involved in the implementation of the Working Group’s recommendations, the Working Group membership included John Evans (MaRS), Kelly Holman (Genesys), Ilse Treurnicht (MaRS), and David Pecaut.
using reports on risk capital and commercialization\textsuperscript{192}, ministry officials developed a Risk Capital Strategy for Ontario that would ensure local entrepreneurs’ access to the risk capital and business venture support they needed. The new strategy reflected the provincial government’s pivot away from an approach that relied on tax incentives to attract capital from retail investors towards one that advanced a market-based approach to investing and was aimed at attracting sophisticated investors, i.e. venture capitalists and angel investors\textsuperscript{193}.

The OVCF was launched in 2007 as an integral component of the province’s new Risk Capital Strategy\textsuperscript{194}, and more specifically, a key policy lever for enabling experienced venture capital and growth equity managers to invest in Ontario companies and ultimately help address the lack of investment funding across the province (Government of Ontario, 2011). The government’s policy formation effort was also informed by in-house research the government conducted on over thirty jurisdictions in an effort to discern best practices employed in other parts of the world (OCGC, 2009a). To this end, a range of government-sponsored venture capital (GVCs) initiatives was considered including direct investment (government funds); co-investment funds; indirect investment (i.e. government investment in funds or government fund of funds); and investment in funds of funds managed by a third party\textsuperscript{195}.

Government officials assessed the feasibility of implementing these GVCs by questioning the extent to which they were suitable to the unique economic and social


\textsuperscript{193}Source: a senior civil servant involved in the implementation of the strategy.

\textsuperscript{194}Ontario’s Risk Capital Strategy consisted of three initiatives: the Investment Accelerator Fund (IAF), the Innovation Demonstration Fund (IDF), and the Ontario Venture Capital Fund (OVCF). Source: interviewee involved in the implementation of the Strategy.

\textsuperscript{195}This classification of government involvement in the VC industry was used by Duruflé (2010). The study was financially sponsored by the Ontario government.
conditions of Ontario’s innovation ecosystem. MRI considered the interventionist approaches to stimulating venture capital activity that had been implemented by the federal government as well as the provincial government of Quebec and BC. Jurisdictions like Australia, New Zealand and the United Kingdom had similar political systems to Canada and had successfully implemented a range of instruments to encourage VC investment in local industry. As such, MRI also employed a most-similar case comparison to determine the impact that initiatives from these jurisdictions had on increasing local entrepreneurs’ access to risk-capital as well as the transferability of these instruments to Ontario.196

Most notably, provincial government officials paid attention to the policies, practices and initiatives that the United States and the Israeli governments had established and/or supported to ensure robust private sector investment in high-tech sectors. Indeed, the VC industry activity in these innovation-driven economies was amongst the highest during this time. While the Israeli and American governments did not demonstrate as strong an interventionist approach to venture capital around 2007 relative to many other jurisdictions across the world, it was acknowledged that government incentives introduced decades earlier were critical for seeding the growth of Israeli and American VC industries.197 A few publicly funded measures persisted into the period of the economic downturn to further incentivize the supply of venture capital financing within these countries, namely the US Small Business Investment Company (SBIC) program198 and Israel’s Yozma199 and the Heznek Program.200

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196 For a more thorough summary of alternative public policy initiatives various governments established to provide venture capital support for start-ups, refer to Cumming (2007).
198 The SBIC is a public-private partnership established in 1959, and administered by the US Small Business Administration (SBA) to provide venture capital to small businesses. More specifically, the SBA's Investment Division
These were only a handful of initiatives MRI reviewed to inform the development of the Risk Capital Strategy for Ontario.

The provincial government considered a wide range of options for modeling a new source of venture capital. The Ontario Venture Capital Fund was announced in 2007 using a fund-of-funds model. Soon thereafter a third party fund manager, TD Capital Private Equity Investors was selected. The OVCF was implemented as a policy innovation for Ontario and decision makers deemed it a better alternative to the LSIF given its capacity to attract more sophisticated institutions and high-net worth investors as well as its potential to generate top-tier returns (Government of Ontario, 2011).

7.5 Conclusion

MRI listened to the advice of many of its sub-government partners and incorporated a number of their ideas into the development of Ontario’s suite of research and innovation licenses qualified private equity fund managers and provides them with access to low-cost, government-guaranteed capital to make investments in U.S. small businesses. US SBA website: http://www.sba.gov/content/faqs#1

199 Yozma was established in 1993 to stimulate venture capital and attract and incentivize foreign private equity investments. http://www.yozma.com/overview/. When it was launched, the government invested $100 million to create ten new venture capital funds; each fund was represented by three parties: Israeli venture capitalists in training, a foreign venture capital firm and an Israeli investment company or bank (Senor and Singer, 2009: 166; Buchwald, 2008; OECD, 1997; MacIntosh, 2012). The Israeli state provided 40% of the funding and foreign investment provided the remaining 60%. Avnimelech (2009) provides a full case study of the Yozma program 15 years into its implementation. Most notably, he discusses the capacity of the Yozma Program to build a capable domestic VC industry in Israel and argues that this “targeted government policy” was integral in transforming Israel’s high tech sector toward a start-up intensive ICT cluster.

200 The Heznek Program was a co-investment government seed fund “based on the government matching an investment in a start-up company, proportional to the investment of an investing entity and on giving an option to the investor to purchase the government share in the start-up company at the initial price.” State of Israel, Ministry of Economy website: http://www.tamas.gov.il/NR/exeres/2F9931BD-7695-4FAD-9A54-950A1E99B3F8.htm It was intended “to provide a positive signal to investors and create further inducements for mobilizing investments for the establishment of start-up companies” particularly to address the negative impact of the economic downturn of 2008 on the level of investments in start-up companies (Ibid.) Also see State of Israel. Ministry of Industry Trade and Labour (2008). The Israeli Economy At a Glance 2008. Jerusalem.

201 A fund-of-funds is defined as a professionally managed intermediary vehicle where-in individual and institutional investors allocate or pool assets for subsequent commitment to other funds (OCGC, 2009b). In the case of the OVCF, this fund of fund was designed to commit a minimum of 80% of capital to Ontario-based and Ontario-focused funds and up to 20% is available for direct co-investments in Ontario-based companies (Government of Ontario, 2011).

202 This organization later changed its name to Northleaf Capital Partners. OVCF website: http://www.ovcf.com/AboutOVCF/Structure/tabid/58/Default.aspx
funding programs. Ultimately, decision making was conditioned by the policy network’s structure, context and agency, and resulted in the following set of outcomes:

- By the end of 2007, the Ontario government had developed a much larger number of funding programs than any of its predecessors. Moreover, compared to past government, this administration had invested an unprecedented amount of funding and resources towards building research and innovation capacity. Favourable economic and political conditions enabled increased government spending.

- The provincial government allocated more program funding to support the knowledge and discovery stage of the innovation continuum, relative to any other stage of the innovation pipeline (i.e. technology and development, business acceleration and market development). These initiatives were notably biased to a supply-side innovation approach to policy development. The research community was a strong lobby that ensured the government targeted the maximum amount of dollars to address its interests.

- More supply-side innovation programs were created. The research community in particular had a vested interest in the government developing more of these funding programs and expanding existing supply-side innovation programs. For decades, consecutive provincial governments before the Liberal administration had formulated and implemented supply-side innovation programs that had garnered much support from the recipients of those funds – from university, hospital and college researchers and research institutions to individual entrepreneurs and enterprises of various sizes, across different sectors. With a well-established group of recipients and supporters, and in the absence of any exogenous pressure to change the existing research and innovation funding model,

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203 This four-part classification of MRI programs was mentioned by Deputy Minister George Ross during a standing committee hearing, 2009.
there was very little incentive for the government to engage in any substantive experimentation with demand-side innovation policies.

- The Ontario government developed more programs and initiatives designed to increase private sector activity in the innovation space. Most of these programs were formulated under the advisement of industry representatives, IIOs and individual policy entrepreneurs from across the province. Almost all of these programs were supply-side innovation policies.

- Many of the new programs demonstrated the Liberal government’s preference for incremental policy changes due to the systematic uncertainty embedded in the policy making process. To this end, new funding programs represented first- and second-order policy changes. A number of funding initiatives created during the Conservative era were rebranded and/or phased out. Other funding initiatives – like those that supported the development and ongoing activities of MaRS, OCE, OICR – sought to continue and/or expand the efforts that were initiated by past governments.

The following chapter explains how the economic downturn of 2008 impacted state-societal relations and in turn influenced the development of Ontario’s research and innovation funding policies and programs between 2008 and 2011.
Chapter 8
Research and Innovation Policy Formation, 2008-2011

8.0 Introduction

Between 2008 and 2011, the Ontario government established a new mix of research and innovation policies by including more demand-side innovation initiatives than ever before. Arguably, this transformation was largely facilitated by the province’s first stand-alone ministry dedicated exclusively to advancing research and innovation across the province. The authority of MRI enabled the Ontario government to introduce a number of demand-side innovation policies and explore an alternative policy direction that ministry officials believed would realize a faster return on public investments and inform the development of a more comprehensive, context-specific, place-based resource allocation policy. Notably, during this time, the government made an increased effort to consult with other innovation actors who held programmatic ideas that promoted the demand-side innovation policy approach.

This chapter discusses how the changes in the economy had an impact on the agency of the policy network associated with resource allocation decision making and in turn influenced the development of research and innovation policy between 2008 and 2011. Moreover, it draws attention to the more assertive, interventionist role the ministry assumed during these years and the reduced level of influence a number of societal actors from the sub-government had in the policy-making process.

8.1 The Context of Research and Innovation Policy Decision-Making

The political and economic context in which policy developed between 2003 and 2007 was notably different from that of 2008-2011 despite a few factors that were relatively
constant, including the political ideology of the ruling party and the influence of political culture. Also, while opposition members provided more critique of MRI’s programs and initiatives during Question Period and standing committee hearings\textsuperscript{204}, there is no compelling evidence to suggest that any of these criticisms had an effect on the Ministry’s decision-making process as it related to research and innovation resource allocation. However, shifts in a number of other political factors and the economic condition affected the policy network that existed during the Liberal government’s second term in office, and influenced the development of Ontario’s research and innovation policy. The section that follows discusses how changes in the state of the economy, the provincial government’s economic goals, and MRI’s renewed political goals influenced the Ministry’s decision-making regarding resource allocation, and hence the development of its funding programs and initiatives.

8.1.1 Economic Context: The State of the Economy, the State’s Economic Goals


\textsuperscript{204} Between 2008 and 2011, Ministers of Research and Innovation fielded a number of questions from Opposition party members during standing committee hearings. For instance, on September 23, 2008 Minister Wilkinson appeared before the Standing Committee on Estimates and was questioned by opposition committee members about a number of issues, including the operations of the Ontario Venture Capital Fund, the purpose of the Ontario Innovation Agenda and the completion of the Strategic Opportunities Program. Source: “Ministry of Research and Innovation.” In Ontario Legislative Assembly, Standing Committee on Estimates, (Hansard) (September 23, 2008) (Online) Available: http://www.ontla.on.ca/web/committee-proceedings/committee_transcripts_details.do?locale=en&Date=2008-09-23&ParlCommID=8857&BillID=&Business=Ministry+of+Research+and+Innovation&DocumentID=23237 Like most other hearings, opposition party members’ asked poignant questions, seeking clarity on various policy initiatives, but none of those discussions raised made it past committee hearings and into the media or on top of either of the opposition party’s list of policy priorities.
Table 8.1: Selected Economic Indicators, Ontario: 2007-2011 (Per cent)

<table>
<thead>
<tr>
<th>Economic Indicator</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP Growth</td>
<td>2.0</td>
<td>(0.6)</td>
<td>(3.2)</td>
<td>3.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Nominal GDP Growth</td>
<td>4.2</td>
<td>0.5</td>
<td>(0.9)</td>
<td>5.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Employment Growth</td>
<td>1.8</td>
<td>1.6</td>
<td>(2.5)</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>CPI Inflation</td>
<td>1.8</td>
<td>2.3</td>
<td>0.4</td>
<td>2.5</td>
<td>3.1</td>
</tr>
</tbody>
</table>


The global recession of 2008 raised public concern across the province. Newspapers, economists from leading financial institutions, not-for-profits and advocacy groups representing various interests conveyed recessionary-related fears and offered dismal predictions on Ontario’s economic future. Indeed, the following year, the government forecast a deficit of $14.1 billion in 2009-10 (Ministry of Finance, 2009a: xiv). However, the actual deficit amounted to $21.3 billion (CBC News Toronto, 2010). Table 8.2 provides a synopsis of the three key policy initiatives the provincial government established to drive economic recovery.

Table 8.2 Ontario’s Key Policy Initiatives to Promote Economic Recovery

<table>
<thead>
<tr>
<th>Economic Recovery Initiative</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Five-point economic plan</td>
<td>Announced in Budget 2008, this plan included $1.5 billion Skills to Jobs Action Plan to help workers train for new careers; $1 billion to fund municipal infrastructure improvements; $750 million in tax reductions; $300 million to support innovation; and support for other economic development initiatives such as the Next Generation of Jobs Fund, Investment Ontario and sector-specific support</td>
</tr>
<tr>
<td>Smart stimulus action plan</td>
<td>This 2-year $34 billion featured investments in infrastructure ($32.5 billion); increased funding for skills training ($700 million); increased support for sectors like manufacturing, mining, forestry, agriculture, small business, (green) energy and innovation so as to advance job creation in these sectors; and help for laid-off workers, new Canadians and other groups most affected by the economic downturn, which included which included tax and pension reform measures (Ministry of Finance, 2009b; Ministry of Finance, 2009c). The government also announced its intentions to attract new investment to the province, identify $1billion in internal government efficiencies in 2011-12, mandate certain procurement activities, freeze MPPs salaries, and reduce the size of the Ontario Public service (Ibid: xiii). Finally, the Ontario and Canadian governments jointly provided $13.7 billion of financial support for the restructuring of General Motors and Chrysler with the federal government providing two thirds of the investment (Canada. Department of Finance, 2012: 337). While this funding was not announced in the 2009</td>
</tr>
</tbody>
</table>
Ontario Budget, it was intended to address the significant economic challenges faced by the automotive sector\textsuperscript{205} caused by the global recession (Ibid).

Open Ontario

Announced in the 2010 Ontario Speech from the Throne, this 5-year plan articulated the government’s intentions of “creat[ing] an Ontario even more open to new ideas, new people, [and] new investment” (Onley, 2010). Open Ontario supported partnerships between domestic and international businesses; new international trade opportunities; business expansions in sectors of strategic importance; initiatives to drive innovation; efforts to increase Ontario’s postsecondary education attainment rate; plans to secure new investments for Northern Ontario; and, all other initiatives that were designed to “open Ontario to new ideas, new economic growth and jobs” (Ministry of Economic Development and Innovation, 2011; Ministry of Economic Development and Trade, 2010; Duncan, 2010; Ministry of Finance, 2010a: xvi-xvii).

Similar to other ministries, MRI came under increased pressure to develop policies that aligned with the economic initiatives the government had launched to speed up the province’s economic recovery. MRI officials concluded that spending had to be more narrowly targeted towards initiatives that would advance regional priorities and sectoral strengths as well as generate a more visible impact and quicker return on public investments. In turn, societal actors attempting to influence the decision-making process had to be more adept at framing their demands for more funding as programmatic ideas that would contribute to Ontario’s economic well-being.

8.1.2 Political Context: Ontario’s Innovation Agenda

As mentioned in Chapter 5, the Ministry of Research and Innovation released the Ontario Innovation Agenda (OIA) in 2008. The goal of the OIA was to actualize “a high and sustainable level of prosperity, and healthy communities that provide high-quality jobs and better lives for people in Ontario” (MRI, 2008d:1). To achieve this level of economic success, it was envisioned that Ontario had to (Ibid):

\textsuperscript{205} The Ontario and Canadian governments received ownership stakes in the restructured auto firms and the federal government estimated that approximately 52,000 Canadian jobs were protected by the governments’ support (Canada. Department of Finance, 2012: 337).
Extract more value from all provincial investments in research and innovation
Attract the best and brightest innovators and entrepreneurs from around the world and keep homegrown talent here
Invest in, generating and attracting a workforce with first-rate skills in science, engineering, creative arts, business and entrepreneurship
Stimulate increased private-sector investment in knowledge-based companies and capital that boosts productivity
Be globally recognized as a commerce-friendly jurisdiction

In short, the Agenda attempted to be all things to as many people as possible, at once promising to address “the needs of an innovative culture and economy” (p. 4) while providing few details regarding the breadth of policy instruments it would have to develop and deploy to actualize this commitment. As such, the OIA received a lukewarm reception from many of members of Ontario’s research and innovation community who viewed it as the Ontario government’s attempt to establish “a nice rosy picture showing that [it] believed in innovation, [and] understood what innovation is.”

A number of research and innovation actors interviewed held strong views of the Ontario Innovation Agenda. Proponents of the Agenda considered it a useful policy statement for rationalizing, connecting and integrating some of the existing support programs under an overarching policy framework. Other supporters deemed the Agenda a welcome public commitment by the Ontario government to invest more fully in research and innovation. Multiple MRI staffers interviewed commented that the Agenda was a product of a collaborative effort made by several ministries; early drafts of the OIA were discussed during the Innovation Deputy Minister meetings to ensure that a range of ministries had an

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[206] Comment by an interviewee, a former civil servant.
[207] As stated in Chapter 1, the core purpose of this dissertation is to explain why Ontario’s research and innovation policy deployed by the Ministry of Research and Innovation developed the way that it did. As such, a comprehensive evaluation of the implementation of the OIA and its capacity to actualize the provincial government’s innovation goals is outside the scope of this dissertation. NB. Sharaput (2011) provides a brief critical evaluation of the implementation of Ontario Innovation Agenda and other research and innovation programs deployed between 2005 and 2011.
opportunity to contribute to its development. To this end, the provincial government demonstrated an effort at promoting synergies between different ministries and establishing an integrated policy\textsuperscript{208} that cut across ministerial boundaries.

Despite the aforementioned positive evaluations of the OIA, a large number of stakeholders were critical of the initiative. For instance, several interviewees denounced the idea that the Agenda was a strategic policy initiative particularly in light of the four focus areas that were prioritized. One interviewee from the research community commented that the OIA’s focus areas “were not chosen with any rigorous comparison of Ontario’s comparative advantages or where they would have a competitive edge. They were chosen because they lined up with what other people were thinking they should be pursuing.” This informant further suggested that “the Ontario government was attempting to compete with other jurisdictions without a full understanding of the complete range of characteristics of its own jurisdiction.” According to the interviewee, this kind of decision-making had resulted in “public policy chasing biotechnology strategies across governments because everybody else is chasing a biotechnology strategy.” Another interviewee was equally critical and perceived the government’s identification of focus areas as an attempt to pick winners.

Several governmental and non-governmental interviewees shared another poignant critique of the OIA. It was suggested that the ideas undergirding the Agenda were fundamentally premised on the Ideas-To-Market Strategy which promoted a supply-side innovation model. These critics maintained that the supply-side innovation model had demonstrated its limits in maximizing Ontario’s innovation potential given that despite government efforts to align innovation policy with economic development, the province continued to lag behind most of its North American peer jurisdictions in terms of productivity.

\textsuperscript{208} Refer to Chapter 3 regarding the desirability (and complexity) of developing “integrated” innovation policy.
(Task Force, 2008). It was suggested that a new innovation policy approach was necessary for driving regional economic development in the midst of an economic downturn. To this end, a number of research and innovation actors perceived the Agenda as merely a statement of principles delivered “dead on arrival.”

- A “Refresh” of MRI’s Goals

The economic crisis of 2008 was pivotal in raising Ontario’s productivity and competitiveness challenge to the top of the political agenda and problematizing the province’s economic performance. In the effort to determine the most effective way of leveraging innovation to address Ontario’s economic problem, Ministry officials assessed the province’s research and innovation ecosystem, reviewed the suite of programs and commercialization initiatives that supported its activities and concluded that Ontario’s research and innovation underperformance was largely attributed to a perpetually low level of private sector activity. Decision makers acknowledged that increased business involvement in the innovation space would spur economic growth and productivity, and the government could act as a catalyst for encouraging greater industry engagement. Ergo, policy had to be designed to significantly incentivize local entrepreneurship, industry-led innovation, and industry-academia research and commercialization partnerships. New fiscal policy also had to be developed to incentivize private sector partners like banks, pension funds, venture-capitalists and angels to make significant investments in the innovation sector in order to provide local entrepreneurs with the risk-capital they need to build new companies and bring their innovations to market.

The key difference between existing initiatives and those that were proposed after 2008 is that the new set of policies was expected to be premised on the idea that “customer

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209 Comment by an interviewee, a former MRI senior civil servant
need is a driver of innovation as opposed to the concept of generating ideas in a research lab and pushing them out.” In sum, research and innovation policy had to be based on the idea that “the market niche first drives innovation.” From the provincial government’s point of view this meant that it was imperative to first determine the needs of Ontario business, identify how Ontario’s research capacity could respond to those challenges and then connect the demand with the solution. Based on this perspective, the Ministry envisioned creating policies that would not only provide support for innovation-related activities, but would significantly intensify demand for innovations.

Hence, early in the second term of the Liberal government’s mandate, new policies and initiatives were introduced that reflected the tenets of the demand-side model of innovation, including the Biopharmaceutical Investment Program (BIP), the Ontario Networks of Excellence (ONE), and the Green Schools Pilot Initiative. In the effort to rationalize the government’s new approach to resource allocation and articulate the province’s shift to a more demand-side innovation policy orientation, the Liberal administration committed to “refresh” the Ontario Innovation Agenda. On June 14th 2010, in a speech to the Economic Club of Canada, Minister of Research and Innovation John Milloy announced that the time had come to “re-examine [Ontario’s] strategy, to seek fresh advice, to update [the province’s] agenda and ensure that [Ontario has] the right mix of policy and programs to be a leader in a very different global economy” (Milloy, 2010). Minister Milloy provided three “areas of opportunity” in which the government was focused on: intensifying business-led innovation and commercialization; building human capital for the innovation economy; and, renewing government leadership. The minister also stated his intention to meet with different persons from the audience as well as their colleagues throughout the

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210 Comment from an interviewee, a former senior MRI official.
211 Ibid.
province during the next few months to discuss their ideas on how the Ministry might actualize their new goals.

Later that year, Dr. Adalsteinn Brown\textsuperscript{212} joined MRI as the Assistant Deputy Minister for Science and Research, and was principally tasked with leading the refresh of the Ontario Innovation Agenda. An advisory group comprised of representatives from the research community and business sector was convened for five months, and under ADM Brown’s direction, members worked towards repurposing the Agenda to ensure that it reflected Ontario’s new fiscal reality and revised approach to research and innovation. The group has been described as a ministers’ advisory group or reference group rather than a council, and in terms of its size, composition and purpose, it was fundamentally different from the Ontario Research and Innovation Council (ORIC). This new group was smaller and, according to one former MRI official, members were “carefully” selected to ensure a reduced focus on research and university-based inquiry that was commercializable, and a greater focus “on the business perspective and the economic perspective” of innovation policy. While the group was not intended to be as publicly visible as ORIC, a number of meetings were held with other actors across Ontario’s research and innovation policy community including representatives from the research community, CFI, Industry Canada, IIOs, banks, investment companies, seed funds, angel investors, consulting firms, and various high-tech companies.

As part of the OIA refresh, members of the ministerial reference group conducted a thorough evaluation of the province’s suite of research and innovation funding programs to assess whether these initiatives met their objectives, and more specifically whether public

\textsuperscript{212} Dr. Adalsteinn Brown was an associate professor at the University of Toronto, Institute of Health Policy, Management and Evaluation. He was also the principal investigator for the Hospital Report Research Collaborative, which in 2006, released a set of scorecards for acute care, emergency department care, chronic care, rehabilitation and mental health care in hospitals across Ontario as well as for Cancer Care Ontario. His experience with policy evaluation provided him with the background to assume this position.
investments in innovation had an impact; focus was placed on measurable outcomes like job creation and GDP growth. The ministerial reference group benefited from the findings of a list of reports, including those published by the Ontario Network on the Regional Innovation System (ONRIS) (University of Toronto), KPMG and PwC. Refer to Box 8.1 for a summary of these publications. The results of the ministerial reference group’s investigation and its recommendations regarding the next phase of programming were submitted to cabinet just before the provincial election of 2011. The government has yet to release a formal policy statement reflecting these proceedings and recommendations.

Box 8.1 Commissioned Reports Aimed at Assessing the Impact of Public Investment in Innovation in Ontario

The *Ontario Innovation Economy Scorecard 2010* was prepared on behalf of the Ontario Network on Regional Innovation Systems (ONRIS) at the Munk School of Global Affairs, University of Toronto. The Innovation Scorecard 2010 built on the Ontario Science and Innovation Council’s Innovation Index 2002, and included more timely and relevant indicators than its predecessor; twenty-three indicators were grouped into four categories: innovation investment, innovation capacity, innovation performance, and innovation impact (CCA, 2013a: 77). The 2010 Innovation Scorecard was premised on the innovation systems perspective and was intended firstly, to provide the government with an analytical framework for evaluating the performance of Ontario’s innovation economy, and secondly, to enable the government to design and deploy policy and programs that would benefit the region’s innovation system. (See Chapter 3 regarding the innovation systems approach to policy development). To this end, the framework was aimed at assisting decision-makers in isolating problems associated with the province’s innovation system and identifying the successes and failures of its existing innovation policy mix.
During the course of the Agenda refresh, Ministry leadership changed from John Milloy to Glenn Murray. As one informant pointed out, even though each Minister brought a different approach to revamping the Agenda, there were a number of themes that remained constant: the goal of linking programs to measurable results; the effort “to create a pull for
As such, the Ministry had established a set of demand-driven priorities that was expected to improve Ontario’s innovation performance, build on the failures and/or shortcomings of old policy, and realize the ruling party’s economic goals. In order to realize these priorities, policies were developed to (1) renew the existing commercialization framework; (2) attract new risk-capital/private sector investment; (3) support the emergence of lead markets; (4) incentivize private sector R&D and innovation activity; (5) advance talent and commercialization at research institutions.

8.2 The Policy Network Structure and Agency

Since its inception, the Ministry had provided the Ontario government with a heightened degree of state authority vis-à-vis research and innovation policy development relative to predecessor governments. With the onset of the global recession in 2008, public officials within Ontario’s state pluralist network assumed an even more interventionist approach to policy development.

Ministry officials were focused on implementing an alternative strategy for resource allocation decision-making that would intensify demand for innovations in Ontario and enhance private sector engagement. Notably, MRI had the in-house capacity to develop the information necessary for making informed decisions regarding policy development. Senior bureaucrats working in the Policy and Strategy Branch of the ministry conducted research on a breadth of policies and strategies other governments from leading jurisdictions were advancing and/or considering to leverage their research and innovation strengths in an

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213 Interview: former MRI official
attempt to discern whether lessons from international experiences were applicable and transferrable to Ontario. Whatever information the ministry could not generate in-house, the bureau collected that information from other trusted sub-government actors. Moreover, the premier and Ministers Wilkinson, Milloy and Murray had publicly endorsed the Ministry’s demand-side approach to innovation policy development, which further demonstrated a heightened level of state authority.

It worth noting that during this time of research and innovation policy development, in some cases, the number of societal actors invited to the policy-making table was reduced. Indeed, a very select set of societal actors participated in the development of policy that more readily advanced the government’s goal of implementing a market-directed model of innovation policy. These individuals included entrepreneurial members of the research community, investors, as well as representatives from various IIOs and businesses who were proponents of a demand-driven approach to research and innovation. Individuals who were directly involved in the decision-making process had greater potential for influencing policy; some of these persons included members of the ministerial reference group related to the OIA refresh; members of the OCN Review Panel and OCN Steering Committee; and various individual policy entrepreneurs from different sectors of the economy who were long-time advocates for demand-side innovation policy development.

In light of the reduced opportunities for influence, stakeholder groups and other research and innovation actors who were not invited to the decision-making table had to adopt a more sophisticated approach in framing their interests as programmatic ideas that would contribute to the Ministry’s market-oriented, user-driven focus. Indeed, through press releases, various policy publications and ministerial speeches, MRI communicated its intentions to prioritize support for research/innovation initiatives that clearly aligned with
Ontario’s research priorities and objectives. Programmatic ideas that were most readily accepted were those that would advance the government’s efforts at prioritizing job creation and regional economic development, and would significantly contribute to the establishment of a lead market, and/or a local firm or research institution dedicated to driving commercialization.

A number of the research and innovation actors interviewed acknowledged the potential gains of implementing a demand-pull model including those representatives from IIOs who had advanced these programmatic ideas long before the economic downturn. Interviewees from the college sector emphatically stated their support for this approach given that it validated their role in the innovation process to undertake applied research and innovation, and work with industry and public sector partners towards meeting local, regional and global market demands. On the other hand, interviewees from the university sector had a more conservative reaction; many of these actors suggested that efforts to advance the demand-pull model should not come at the expense of the government providing continued support for basic research.

The following section discusses how this new set of state-societal relations influenced the development of a different mix of research and innovation policies and government-sponsored initiatives intended to drive job creation and economic growth.

8.3 Increased Experimentation with the Demand-side Innovation Model

Ministry officials aspired to address five policy priorities that would advance a more demand-side orientation to innovation policy development in Ontario: (1) renew the existing commercialization framework; (2) attract new risk-capital/private sector investment; (3)

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214 Also see Colleges Ontario 2009 Budget Submission, Advancing Ontario’s Economy: Investing in College Education and Training. This publication underscores the capacity of Ontario’s colleges to drive innovation and the commercialization of research, and in turn contribute to the province’s economic recovery.
support the emergence of lead markets; (4) incentivize private sector R&D and innovation activity; and (5) advance talent and commercialization at research institutions. Societal actors had an important role to play in providing government with programmatic ideas that aligned with these priorities and essentially advanced a demand-side, user-driven model of innovation.

8.3.1 MRI Priority #1: Renew the existing commercialization framework

MRI committed to building up the province’s commercialization framework in line with the regional innovation system approach\textsuperscript{215} in order to enhance entrepreneurial activity, improve the province’s capacity to commercialize innovative products and services, leverage innovation strengths, and in turn, bolster regional technology-based economic development. Upon assessing the condition and performance of the Ontario Commercialization Network (OCN), Ministry officials concluded that the existing model suffered from a number of shortcomings. The OCN was largely criticized for being a “fragmented collection of organizations” (MRI, 2009e: 2). While a number of the OCN members exemplified service delivery best practice, this quality of resource distribution was not spread uniformly across the Network. Generally, there was a lack of centralized direction and coordination between the Network members which resulted in inconsistent roles and responsibilities. The OCN also suffered from a lack of measurable objectives and performance metrics for member organizations.

In September 2008, MRI launched the Ontario Commercialization Network Review to assess the operations and impact of the existing commercialization framework, and develop an alternative service and delivery model. The review was overseen by the OCN Steering Committee, chaired by Deputy Minister Alastair Glass, and comprised of members

\textsuperscript{215} See Chapter 3 for a detailed overview of this approach
of Ontario’s research community and the private sector. The deliberations of the OCN Steering Committee were informed by the work of two other sources: (1) an OCN Review Expert Panel consisting of members from industry and academia, and (2) an external audit conducted by PricewaterhouseCoopers (MRI, 2009e). The final report on the OCN Review was drafted by the steering committee and delivered to then Minister John Wilkinson for his consideration.

The OCN Review established structural linkages between the state and society that enabled the state to retain a high degree of authority and a notable level of autonomy. To demonstrate state authority, the review came under the purview of MRI. Ministry officials drew up terms of reference documents for the Expert Panel and the Steering Committee; these documents outlined the scope, purpose and proposed outcome of the Review as well as the roles and responsibilities of the members of the sub-government. The purpose of the Review was to:

- Establish a clear vision for a commercialization “ecosystem” in Ontario which will:
  o Improve the transfer of knowledge and intellectual property (IP) from research institutions to the private sector;
  o Transform industry-led research into innovative products and services for a global marketplace;
  o Accelerate the development of high growth potential start-ups, and small- and medium-sized enterprises (SMEs);
  o Align with Ontario’s Innovation Agenda.
- Develop a program implementation model that will provide a:
  o core set of commercialization programs and services from the OCN hub;
  o clear access point to programs and services, primarily at the regional level;
  o common approach to diagnose client needs and deploy appropriate resources;
  o method by which frontline organizations are empowered to achieve timely service delivery.
- Achieve full government accountability and transparency in the OCN programs/delivery model with a focus on performance standards and results that will ensure OCN resources meet the needs of both government and clients.²¹⁶

²¹⁶ MRI, 2008h
By establishing a terms of reference which clearly separated the activities of the PwC, the Expert Panel and the Steering Committee from the decision-making responsibilities of the Ministry, government officials exemplified a notable level of state autonomy. The defined roles of these actors are as follows:

- **PwC**: to provide the Panel and the Steering Committee with an objective assessment of the state of Ontario’s existing commercialization framework; options for an alternative service delivery model; advice on transitioning the existing OCN into the new model; and feedback on how the new model would align with the Ontario government’s goals vis-à-vis commercialization as well as the Ministry’s mandate for developing an integrated approach to innovation.

- **Expert Panel**: to validate or suggest changes to the OCN models proposed by PwC in conjunction with input from the Steering Committee and MRI staff, as well as provide the Ministry with a best practices strategy (MRI, 2008h).

- **OCN Review Steering Committee**: to provide advice to MRI throughout the review process; consider the alternative service delivery models proposed by PwC; provide feedback regarding the re-tooling of the funding programs associated with Ontario’s commercialization framework and identify program gaps; and, identify overlap and duplication across the OCN\(^{217}\) (MRI, 2008i).

The structure of the policy network demonstrated a high concentration of state authority given the leadership role the Ministry assumed on the OCN Review Steering Committee. The committee was designed to promote a collaborative, horizontal style of governance where societal members from a diverse set of groups within Ontario economy could promote their ideas for revamping the commercialization infrastructure. However, the

\(^{217}\) MRI staff provided secretariat support for the OCN Steering Committee (MRI, 2008i)
agenda was set solely by the Ministry. Furthermore, by assigning now former DM Glass as the Chair of the Steering Committee, this assured the government that the recommendations offered in the final report would reflect and support MRI’s mandate. Finally, even though ideas were pooled at the policy formation and implementation stages of the policy process, the final decision-making power remained in the hands of MRI, thereby demonstrating a concentration of authority by the state. Indeed, the Ontario government – and by extension, Minister Wilkinson – retained the prerogative to accept or decline parts or all of the Review.

In terms of the agency of the policy network actors, the OCN Expert Panel primarily relied on its own knowledge and expertise to come up with a set of ideas for influencing the policy formation process. As for the steering committee, this group conducted a number of interviews with research and innovation actors from across the province\(^\text{218}\) (MRI, 2009:e: 1). Interviewees responded to a list of questions designed to provide the committee with a better understanding of the goals/objectives, operations and successes of the members of the OCN. In particular, these respondents were asked to offer ideas regarding the most ideal future direction and structure of the OCN. Several interviewees also gave suggestions on the type of metrics the provincial government should implement to measure the performance and impact of the new commercialization framework. The Steering Committee also met with experts from around North America to receive advice on how the province could improve on the existing commercialization framework; representatives from San Diego, Boston and Kansas provided input during the early stages of the review process.

Altogether, the Steering Committee received a long list of policy ideas from persons it met with, the Expert Panel, and PwC. The ideas that were seriously considered and/or

\(^{218}\) There were a number of societal actors that took part in these consultations, including Communitech, Ottawa Centre for Research and Innovation (OCRI), Ontario Centres of Excellence (OCE), MaRS Discovery District (MaRS), the Ontario Council on University Research (OCUR), the Council of Academic Hospitals of Ontario (CAHO) – Council of Ontario Research Directors (CORD) and Colleges Ontario.
accepted had to be economically feasible in light of MRI’s budgetary constraints. Unable to dedicate a significant amount of new funding to the commercialization framework as a result of reduced levels of government spending, policy ideas that promoted a substantive increase in resources were less likely to be accepted.

Stakeholders ideas that were most readily accepted were those that demonstrated the potential for contributing to economic recovery and addressing the political pressure MRI was under to realize a return on the investments made to advance the innovation and commercialization activities of its research and innovation partners. To this end, ideas that intensified private sector engagement in the innovation space were most attractive to MRI officials. According to a senior MRI official, the potential for injecting an enhanced level of private sector expertise into the operations of the new commercialization framework was most valuable and as such, the input from a number of private sector participants on how to achieve this goal was sought after and taken seriously. The investment community in particular emphasized the importance of incentivizing investment in locally-based, Canadian-owned companies associated with the new commercialization framework. In turn, ideas for creating programs that would increase entrepreneurs’ access to risk-capital to support different stages of technology development were prioritized.

One interviewee from an IIO in Waterloo commented on the Ministry’s openness towards ideas that would contribute to the creation of a commercialization framework that embodied “an entrepreneurial-driven strategy.” The informant explained that this strategy “is focused on the individual – providing resources to the individual entrepreneur because he or she can’t afford to get it any other way.” During the consultation process, representatives from this IIO advised the government on the value of establishing programs premised on this strategy; the roll out of the ONE’s Business Acceleration Program reflected this approach.
A number of representatives from the private sector, IIOs, and post-secondary education institutions in Kitchener-Waterloo were actively consulted by the Ministry in light of the exceptionally collaborative, entrepreneurial culture that had developed across that city-region’s innovation ecosystem. One interviewee from another IIO in Waterloo commented on the extensive consultations that took place:

I remember [Deputy Minister] Alastair [Glass] coming in and doing his consultations, so typically the way we’ve always done stuff in this region is a collaborative approach to working with policy makers and funders. So there would have been a lunch round table where we would have brought folks like myself, and the Communitech…people and representatives from Christie and RIM and Dalsa and a bunch of start-ups. So there would have been a combination of round tables talking about how the industry worked together collectively. And typically we would have done one-on-one briefings. So we would have done a tour of the region. We would have taken people to the Accelerator Centre and done an hour there. We would have taken people to RIM for an hour there. To the Centre for Business, Entrepreneurship and Technology at the University. So there would have been a combination and that would have happened with everyone. So whether there were external folks who were providing advice to the government, whether it was ministers, DMs – it would have been a combination of those. Then there would have been a bunch of behind-the-scenes conversations with people like the DMs or ADMs putting together policy papers…I think we’ve done a pretty good job in the community of inventorying and telling the story so we spend a lot of time feeding them material. [We think the successes of the Kitchener-Waterloo region] were deliberate – they weren’t just accidental. There are a bunch of things that happened here around the university’s IP policy, the way the community helps each other – it all contributes to the success.

Finally, ideas that reduced levels of systemic uncertainty associated with policymaking and that advanced the existing regional innovation system approach to commercialization policy were also more readily considered. Based on the ideas that undergirded the OCN Review, the successor to the OCN was a commercialization framework that advanced a market-pull strategy, with supply-side programs the supported the activities of the research and innovation actors associated with the new framework.

In February 2009, Alastair Glass presented the *Ontario Commercialization Network Review Steering Committee Report* to the Minister. A list of recommendations was made for
improving the OCN’s governance model, delivery model and the set of programs and services associated with it. Many of these recommendations evinced the adoption of ideas various societal actors promoted as members of the policy-making apparatus and as advocates participating outside of the decision-making circle. It is also apparent that a number of the recommendations were intended to address the provincial government’s economic goals, political objectives and policy preferences, thereby evincing the capacity of the state to drive its own agenda. However, given that many of the sub-government members held many ideas in common and promoted a shared vision for advancing commercialization, many of these recommendations suited the interests of multiple stakeholders, making it difficult to clearly distinguish which recommendations came from a particular set of research and innovation actors.

The Ministry took seriously the recommendations enumerated in the final report, and in April 2009, the government responded to the OCN Review by agreeing to evolve the OCN into the new Ontario Network of Excellence (ONE). Additionally, the government created the Ontario Network of Excellence Advisory Board intended to “provide advice to ensure that Ontario’s sophisticated network of delivery partners and company acceleration programs is one of the best in the world operates with maximum efficiency and is focused on getting results – ensuring Ontario companies can get their innovative products to markets around the world” (MRI, 2010a).

- A Closer Look at the Policy Design Stage of the ONE

The new ONE was framed as an initiative that would enhance the province’s commercialization efforts and successes “from good to great” (Wilkinson, 2009). It is within this context, MRI officials engaged with the research and innovation community to discuss

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219 MRI, 2009e
the set of ideas envisioned for the successor of the OCN and to articulate the intended policy outcomes. One senior MRI officer commented on the Ministry’s approach as follows:

So we had our cover from Cabinet and Minister and I pulled people into a room and said: here’s what we found, here’s where we’re going, here’s how we’re changing the programs.

In their communications with OCN members, Ministry staff articulated their intentions to employ an integrated, systems approach to strengthening the existing commercialization framework. Ultimately, the Ministry wanted to enable local business and entrepreneurial leaders to leverage their regional assets in order to drive innovation within and across city-regions. Regional Innovation Centres (RICs) would connect entrepreneurs with the services and support they needed to bring an idea to market as well as act as a portal into the broader commercialization ecosystem spanning the province. To this end, the architecture of the proposed commercialization framework was intended to intensify collaborative ties between research and innovation actors within a given region as well as other actors across the province in order to ensure that the client received the resources needed to grow.

The Ministry intentionally designed the RICs as independent entities. According to one senior MRI official, the government wanted to build “a partnership vehicle” that could collaborate with local economic development agencies, federal agents (i.e. the Industrial Research Assistance Program, FedDev, FedNor, etc.), universities but was sufficiently separated from those agents to ensure that the problems, challenges or institutional priorities of those other entities did not consume the RIC and cause it to deviate from its original purpose. OCN members accepted this vision of the RIC. However, power struggles emerged as a number of proximate actors vied to secure a single RIC status.
The Ministry opted not to pick the leadership of RICs and instead directed regional innovation actors to organize themselves, agree on a set of regional strengths, and determine which actors were most suitable for driving the delivery of services associated with a RIC. Some regional actors were more capable of cooperating than others. A number of interviewees commented on the complexity involved in the selection of the RICs as well as the efficacy of the Ministry’s approach in making regional innovation actors work together during this early stage of ONE’s development:

ONE Member #1:

The Ministry told the group of actors to work out how they wanted to organize themselves. The example of Markham comes to mind – eventually things sorted itself out and a “shot-gun” marriage was established with Jeremy Laurin leading what is now called ventureLab.

ONE Member #2:

So when we look at Guelph, there were about 5 organizations that were all in the innovation business but they all had a relatively narrow slice of that and they operated fairly independently. Taking the step back and reviewing gave the opportunity to allow communities to find their own coherent solutions. The province didn’t say – hey Guelph, we’re going to fund this one and not those 4. The province said – hey Guelph, you figure it out. You sort out who the right actor is, you come to us with a solution that works in your community, and then we’re here for you. And so that was easy in some places and tough in other places but the end result is a good one. You now have a set of regional actors who are truly representative of their region and they’re plugged into one another in a way that allows us to share and cross-refer opportunities throughout the network.

The following informant described the deliberative process between regional partners as an opportunity for the actors to reconfigure themselves in a way that best ensured that a broader range of regional strengths would be harnessed rather than overshadowed by one or two more dominant focus areas:
One Member #3:

It was also a mess in the beginning because with the RIN, we – [here in St. Catharine’s] – were also a part of Hamilton…with the Golden Horseshoe. And what happened was that the Golden Horseshoe was for medical research and very specific research from McMaster University, so the smaller players like us didn’t have a lot of say. So we said we need to have something here, for the Niagara region. But I remember the phone call in the office here, there [were] people from Niagara College and from other places, and Bill Mantel was on the phone, and [his message] was clear – get your act together if you want to be out of the Golden Horseshoe. You need to show what you have to give and to push.

In the case of ONE Member #3, Niagara was successful in securing a RIC status separate from the Golden Horseshoe; NGen[220] was established as a new RIC with the launch of the ONE in 2009.

An interviewee affiliated with the Northern Ontario Commercialization Initiative (i.e. the Northern RIN) discussed her and other regional partners’ efforts at defining the unique challenges service providers faced in providing resources to entrepreneurs and advocating for increased support from the provincial government to more effectively deliver resources to innovation actors located across an expansive landmass:

One Member #4:

We tried. Really, it was difficult. But one thing we did for Northern Ontario when I was there was to tell them that Thunder Bay is not half an hour drive from Sudbury… And when at the beginning we had the [Northern Ontario Commercialization Network], it was just a mess. It was hard because it’s such a large region with so many different emphases that it didn’t work. And we told them – you need to split the place because Northern Ontario is huge. So under ONE, we were telling them, get the stuff differentiated.

Under the ONE, the Northern Ontario RIN was reconstituted. The new RIC, called Northern Technology Alliance, was established and consisted of four organizations located in different areas of Northern Ontario (i.e. Sudbury, Sault Ste. Marie, Thunder Bay and North

[220] In 2013, NGen was rebranded as Innovate Niagara.
Bay) intended to provide entrepreneurs with easier access to the resources they need (Carmichael, 2010).

The selection of the Sectoral Innovation Centres (SICs) was more structured and Ministry-driven. MRI officials sought to align the ONE with the tenets of the Ontario Innovation Agenda, which identified four sectors that were believed to have high growth potential in Ontario. In turn, the Ministry sought out four organizations that advanced research and commercialization in these areas and that had the capacity to support other research and innovation actors with strengths across these sectors: HTX, Coral CEA, Communitech Hub: Digital Media and Mobile Accelerator and GreenCentre Canada.

Another important policy design issue that garnered a great deal of attention across the research and innovation community related to the government’s decision to more clearly delineate the roles and responsibilities of MaRS and OCE. By 2008, there was a significant degree of overlap between OCE’s strategic focus and MaRS’ mandate; indeed “mandate creep” had intensified. The Ministry valued the contributions these organizations had made as the OCN’s Provincial Innovation Networks (PINs), coordinating the delivery of funding to the RINs. To inform their efforts at redefining their mandates, the Ministry consulted with a range of actors from the private sector as well as academia. In particular, MRI officials met with the COU-OCUR group (i.e. Vice-Presidents, Research) to discuss the renewal of the OCE mandate. Representatives from other IIOs were also consulted. One of the key points of agreement almost all of the members involved in the deliberative process shared was that the OCE and MaRS should continue to work collaboratively to deliver funding to regional offices that support the activities of researchers and innovators across the province. Moreover, proponents of this collaborative partnership emphasized the importance of ensuring that these organizations did not work at cross-purposes and in competition with one
another. In order to facilitate an integrative policy, the Ministry, with the support of the research and innovation policy community, decided that the OCE would coordinate the delivery of the Industry-Academic Collaboration Program and services that would support research universities and colleges build working relationships with industry in order to accelerate mind to market transfer. On the other hand, MaRS was mandated to deliver the Business Acceleration Program which would support the small company-business start-ups. The Ministry promoted this model of program delivery as one that would help to streamline funding, build connections across Ontario’s innovation ecosystem and ultimately contribute to economic development.

8.3.2 MRI Priority #2: Attract new risk-capital

One of the most pervasive concerns expressed across Ontario’s entrepreneurial community was the continued lack of sufficient risk-capital available. Indeed, between 2007 and 2008, investments dropped by 36%. With $570 million invested in 119 companies in 2008, Ontario’s VC activity had fallen by 40% from $950 million in 2007 (Thomson Reuters, 2009: 4). To address Ontario’s risk-capital shortfall – which was now exacerbated by the economic downturn – Ministry officials continued to advance an interventionist approach to catalyzing VC growth. MRI civil servants once again received strong support from political leadership to develop policy initiatives that would help to resolve the persistent shortage of risk-capital. This level of support added to MRI’s authority to explore policy alternatives for stimulating venture capital in Ontario in order to create the best climate for growing an innovative firm in Ontario despite the downturn in the economy.

221 It is worth noting that even though Canada and Ontario suffered from a lack of VC financing relative to other leading jurisdictions, before the economic downturn venture capital investment across Canada was actually growing; in 2007 VC activity stood at $2.1 billion (i.e. $2.1 billion of capital was invested), representing an increase of 21% up from $1.7 billion invested in 2006 (Thomson Financial, 2008: 3; BDC, 2011: 8).
By mid-2008, the Ontario government had prioritized the deployment of two initiatives intended to provide entrepreneurs with increased access to risk-capital: the direct investment program called the Innovation Accelerator Fund, and the privately managed fund-of-funds initiative, the Ontario Venture Capital Fund (OVCF). Later that year, the Ontario government passed the Ontario Capital Growth Corporation Act 2008 which established the Ontario Capital Growth Corporation (OCGC) – an agency of MRI mandated to manage the interest of the Ontario government vis-à-vis the OVCF (OCGC, 2009a: 14). The corporate governance structure of this agency guaranteed that MRI would remain closely involved with the Fund – i.e. the CEO of the OCGC was accountable to the Chair of the Board of Directors, who was the Deputy Minister of MRI. Moreover, the four members of the Board of Directors were public servants, three of whom were senior MRI officials (OCGC, 2009a: 19, 21). However, the appointment of a third-party Fund Manager, selected to construct a focused portfolio of high-potential fund managers capable of delivering the best returns on investments, provided the government with the separation it needed from the market and helped to mitigate the possibility of a politically-oriented, biased selection process influenced by societal actors from the business sector with a vested interest in benefiting from the OVCF. Despite the government’s best intentions, those initiatives alone were not enough to close Ontario’s innovation investment gap and critically contribute to the province’s competitiveness.

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222 By June 2008, the OVCF closed with $205 million in capital commitments. The Ontario government provided $90 million and the remaining portion came from other Lead Investors. Source: OVCF website: www.ovcf.com
223 This Act was a part of Bill 114 which was proclaimed in force as of February 1, 2009. OCGC was launched on February 27, 2009.
224 According to a senior civil servant with expert knowledge in government VCs, Ontario’s decision-making was largely influenced by the Scottish Enterprise model.
225 According to an interviewee, the government did not want to be seen as picking winners. So the acquisition of a third party manager with expertise in private equity fund of funds was highly desirable.
Venture capital investments were at a 10-year low, with VC fund managers either maintaining existing investments or winding down their investment portfolios (OCGC, 2009a: 6). The precipitous decline of VC activity in Ontario around this time became a plausible causal story for the government’s renewed efforts to find an alternative source of capital for local entrepreneurs. Moreover, Ministry officials promoted the idea that without a strong VC industry Ontario’s best opportunities and most vibrant companies would seek investment outside of the province and eventually re-locate proximate to the available funding sources before they could generate the revenue and jobs that would have benefitted Ontarians (MRI, 2010). This narrative effectually rationalized the need to develop a new Fund.

Policy-makers called on the expertise of a small membership of the sub-government consisting of representatives from IIOs, local investors, and serial entrepreneurs from different parts of the province. A number of individuals with expertise in VC and/or experience in growing start-ups were “consulted quietly”\(^\text{226}\) by the Ministry and OCGC, providing decision-makers with additional programmatic ideas for developing a long-term risk-capital strategy that would realize a return on public investments aimed at stimulating the local VC industry. It was also during these consultations the government confirmed stakeholder support for developing another government-sponsored venture capital fund that advanced a market-based, returns-driven approach to intensifying investment activity across the province.

The Ontario Emerging Technologies Fund (OETF) was launched on March 18\(^{\text{th}}\), 2009. This $250 million co-investment fund was intended to rapidly deploy capital directly into high-growth Ontario-based companies, particularly firms in clean technology, life sciences

\(^{226}\) Comment by an interviewee with experience in acquiring VC for multiple start-ups.
and advanced health technology, and digital media and information and communications technology (OCGC, 2009a: 7; MRI, 2009f). The government appointed a third-party fund manager – Covington Capital Corporation – to evaluate applications related to the OETF and provide ongoing administration and monitoring of co-investments under the Fund. Once again, this best practice avoided the perception that the government was picking winners, and investors benefited from the expertise and market know-how of the private sector manager as it relates to the selection of the most ideal set of private sector teams. Finally, like the OVCF, the OETF was managed by the OCGC. The OETF was one of the few supply-side innovation policy initiatives introduced during this time period.

8.3.3 MRI Priority #3: Support the emergence of lead markets

In light of budgetary constraints, the Ministry of Research and Innovation intensified efforts at strategically targeting investments in a small group of high demand sectors. A number of Ontario-based firms and institutions across these sectors had demonstrated the potential for developing more advanced products and services than their global competitors as a result of “sophisticated” customers who apply increased pressure on these producers to innovate more quickly. It was expected that the innovative activity generated would attract increased levels of international investment and build up Ontario’s global brand. In employing this strategy, the Ministry hoped to leverage the province’s innovation strength, build up a strong competitive advantage, and ultimately realize the goal of “renewing government leadership on global opportunities.”

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228 Under these demand conditions, firms are more likely to produce service and products that can be used by local consumers as well as transferred onto the global market. See Izak and Edler, 2011: 4.

229 See MRI Results-based Plan 2010-11: [http://www.mri.gov.on.ca/english/about/ResultsBased_1011.asp](http://www.mri.gov.on.ca/english/about/ResultsBased_1011.asp)
While the government aspired to compete at a world-class level and bring Ontario-made ideas, discoveries and breakthroughs to customers around the world, other leading jurisdictions were also concerned with improving their global position in innovation and speeding up local economic recovery. A number of regional and national governments were working towards defining their competitive international advantage and/or intensifying efforts at building on existing lead markets. According to the *Global Innovation Index 2008-2009*, the United States was the global leader in innovation, and despite the formidable impact of the subprime mortgage crisis, this nation maintained its position as an international innovation leader in sectors such as communications, semiconductors, and pharmaceuticals. During this time, China was also emerging as a global innovation leader, demonstrating a competitive advantage in mobile and fixed communications, aviation, vehicle manufacturing, pharmaceuticals and foodstuff (*GII, 2009:41*). Finland and South Korea had also exemplified innovation strength and global leadership in ICT, and in terms of telecom, India in particular had achieved a notable competitive advantage by 2008-09 (*Ibid; Godavarkar, 2010*). As for the EU, the European Commission had made a systematic effort at developing the region’s innovation strengths with the launch of the Lead Market Initiative (LMI) in 2006. The LMI’s long-term goals were to remove obstacles to enable European enterprises to enter new and fast growing global markets and to facilitate the faster uptake of new products, services and technologies. Within this competitive environment, Ministry officials developed policy to establish Ontario’s position as a global innovation leader.

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230 MRI 2009g
231 *The Global Innovation Index 2008-2009* provides an analysis of the innovation performance of one hundred thirty nations. The report evaluates the progress of innovation readiness in these countries and discusses the obstacles that prevent innovation actors from capturing the full benefits of innovation.
232 The EU identified six lead markets: construction, technical textiles for intelligent personal protective clothing and equipment, bio-based products, recycling, eHealth and renewable energy (*Ernst & Young, 2011*).
• Biopharmaceutical Investment Program

For decades, local research and innovation actors made significant advances in the life sciences and by 2008, the industry generated more than $11 billion in annual revenues and employed over 40,000 people at more than 800 companies (MaRS, 2008: 5). Ontario had grown into the largest hub of biomedical activity in Canada and the fourth\(^{233}\) largest biomedical research centre in North America with approximately 10,000 scientists employed at twenty-five research and academic hospitals, conducting $850 million in research annually (MRI, 2008). In particular, the biopharmaceutical industry in Ontario had been integral in attracting researchers and scientists to the province, and this migration of human capital helped to create and strengthen Ontario’s biopharma cluster over time. The Liberal government acknowledged that talent alone was not enough for Ontario to compete effectively at a global level (Wilkinson, 2008b). MRI officials worked closely with the pharmaceutical industry to determine what was needed to bolster biopharmaceutical innovation capacity in Ontario, to establish a global leadership role in biopharma, and most fundamentally, to ensure that the policy-making process was well informed on the challenges and opportunities the industry faced (Ibid).

A small group of MRI officials, leaders from the pharmaceutical industry and MaRS worked together to develop a strategy to leverage Ontario’s biopharmaceutical strengths. Government officials retained a high degree of state autonomy and authority, which was enabled by the Ministry of Research and Innovation, while the interests of most industry representatives were largely represented by Canada’s Research-based Pharmaceutical Companies (Rx&D). The industry association capably articulated its programmatic ideas to the government, urging decision-makers to provide a sufficient level of funding that would

\(^{233}\) Ontario is the fourth largest hub of biomedical activity in the world in terms of the number of people employed in the sector – not based on outcomes.
support the research and innovation activities of more locally-based global biopharmaceutical companies and entrepreneurial firms, and in turn, draw increased investment from the global economy into Ontario’s biopharmaceutical industry. From these consultations, the Biopharmaceutical Investment Program (BIP) was developed. MRI worked with the MaRS Discovery District communications teams to develop the Biopharma Cluster Report (2008), a publication used as part of the Ontario government’s marketing plan to attract biopharmaceutical industry investment.234

BIP was promoted as a means “to ensure that Ontario is a global destination for biopharmaceutical research and development.” Through this program, the provincial government intended to advance biopharmaceutical R&D and advanced manufacturing in Ontario by providing eligible applicants with conditional grants of up to 20% of the cost of a project, thereby sharing the financial risk associated with the project (MaRS, 2008:6). According to the Biopharma Cluster Report, BIP was “adapted to the unique business needs of the biopharmaceutical industry as a priority area of focus” which signaled the significant degree to which the programmatic ideas offered by Rx&D and other industry advisors was taken seriously. Indeed, these ideas aligned with MRI’s mandate; the stimulus policies the government had launched to date to speed up economic recovery; as well as the objectives of the Ontario Innovation Agenda. By 2010, the Ontario government had also framed the BIP as part of the provincial government’s Open Ontario strategy (MRI, 2010f). Moreover, ideas that led to the creation of BIP were had administrative viability given that the government had the capacity to direct this program; resources were made available to manage the

234 Collaboration between MaRS and the Ontario government reinforced MaRS’ position as a strategic partner in the development and implementation of BIP. See MaRS, 2008: 1.
235 Milloy, 2009.
 adjudication process of applications and a portion of the Ministry’s budget was dedicated to finance the program.

It is worth noting that the discourse on intensifying demand across this particular industry was not new to Ontario. Indeed, in 2004 the Institute for Competitiveness and Prosperity raised attention to the latent innovation potential of Toronto’s biopharma cluster and provided decision-makers advice on how to improve its demand conditions to enhance the city-region’s global competitiveness. While the government did not readily embrace the ideas of the Institute—a long-time member of Ontario’s research and innovation policy network—MRI officials took seriously and implemented those offered by industry representatives, long-term members of the sub-government. Arguably, this particular case demonstrates the extent to which societal actors who are participants in the policy-making process are more likely to have their ideas accepted relative to those societal actors that do not actively participate in the policy-making process.

- Water Technology Acceleration Project (WaterTAP)

The programmatic ideas that fed into the development of the WaterTAP were similar to those that influenced the establishment of BIP. Like BIP, WaterTAP was created to support the innovation activities of globally competitive Ontario-based businesses in a particular sector, to create jobs in that field, and contribute to the growth of a lead market. As such, both BIP and WaterTAP were framed as part of the government’s Open Ontario Plan (MRI, 2010i).

The development of WaterTAP was driven by the Ontario government in consultation with industry leaders. Decision-makers acknowledged the growing global market demand for

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236 For more detail, see Martin, R. and Milway, J. (2004). *Assessing the Strength of the Toronto Biopharmaceutical Cluster*, Toronto: The Institute for Competitiveness and Prosperity

237 In line with the Open Ontario Plan, WaterTAP was expected “to build on Ontario’s expertise in clean water technology and make the province a world leader in water innovation to help address global water challenges.” (MRI, 2010g)
water and wastewater technology which was as the time estimated at over $400 billion, doubling every five to six years (MRI, 2010g; MRI, 2010h). In light of the existing research talent and expertise Ontario water technology companies possessed, the government identified the potential for establishing a new lead market by providing local companies with the support they needed to harness these strengths and become major suppliers of technologies and services to the global market (Ibid.) Participation in the policy-making process was restricted to a small group of individuals, with industry representatives and government officials working closely together to define the parameters of the initiative. In regards to the development of WaterTAP, a noteworthy degree of horizontality was achieved between MRI and the Ministry of Environment, and success in “joined-up policy-making” was achieved as a result of a shared commitment to realize the goal of harnessing Ontario’s water innovation strengths and advancing the government’s market-driven approach to innovation.

- Business Ecosystem Support Fund

The set of programmatic ideas that influenced the development of the Business Ecosystem Support Fund were the same ones that undergirded the Strategic Opportunities Program (SOP) – a program that was announced in 2008 as part of the Next Generation of Jobs Fund, but never delivered funding. The SOP was a matching program expected to incentivize private sector actors to invest in Ontario and launch projects that could capture an international market. Projects in bio-economy and clean technologies; advanced health technologies; and digital media and ICT were eligible (MRI, 2008a). SOP also came under the purview of the Ministry of Research and Innovation, and senior civil servants within the

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238 Comment from an interviewee, a former senior level MRI official
239 Projects approved for funding under the program had to have secured a minimum contribution of 30% of the total project costs from participating industry partners. MRI would commit 25% of the total eligible project costs. Source: MRI website, archived webpage, “Strategic Opportunities Program (SOP).”
Ministry took the lead in establishing the goals and expected outcomes of the program. MRI officials promoted the proposed program as an initiative that was focused on “strategic opportunities” where\(^{240}\):

...a large scale global market opportunity exists, coupled with a unique strategy to deal with the competition, or a niche global market opportunity where Ontario has significant capacity and little competition and; Ontario has a demonstrated competitive advantage such as strong private sector strengths including global market leadership, and globally competitive research strength.

The Ministry established a short list of goals for the SOP which focused on ensuring that Ontario industry would lead sales and job growth; lead technology development and commercialization for the long term; capture or maintain significant global market share; and have sufficient scale and focus to position Ontario at the forefront of international research and commercialization.\(^{241}\)

The Ministry reached out to private sector leaders in order to ensure that the process of identifying strategic opportunities was driven by the same set of innovation actors the government hoped to incentivize. A small group of policy network actors consisting of MRI officials and a cross-section of industry representatives from each focus area emerged, and these individuals committed to address the dual tasks of (1) identifying the highest priority strategic opportunities within each of the three focus areas and (2) developing a high level strategy in each of the focus areas to steer investment under the SOP as well as to help align other areas of the government investment and policy.\(^{242}\) The Ministry planned a series of consultation workshops to bring these policy network members together to enable industry input into the policy making process. Separate workshops were organized for each of the focus areas, and these forums were expected to be limited to approximately fifty persons.

\(^{240}\) MRI website, archived webpage, “Strategic Opportunities Program (SOP).”

\(^{241}\) Ibid.

\(^{242}\) Ibid.
During these meetings, MRI anticipated presenting industry leaders with a draft summary of a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis and strategic opportunities. Participants would then provide feedback to confirm or alter the SWOT analysis and potential direction of the program. Once these workshops were complete, the strategy for SOP was expected to be posted on the Ministry website along with a call for proposals.

With a comprehensive industry outreach plan arranged, the Ministry set out to engage the private sector. Weeks later, industry-led consortia submitted SOP proposals, and upon receipt and adjudication, it was anticipated that SOP would support up to about fifteen initiatives. However, before the funds could be fully distributed, the Ministry of Research and Innovation made the following statement in its *Results-based Plan Briefing Book 2009-10* (2009a: 4):

> The Strategic Opportunities Program was an innovative program that generated a great deal of interest from industry. However, the downturn in the economy has radically altered the climate for growing an innovative company in Ontario. Accordingly, the government is shifting its resources to other more pressing programs and initiatives.

One senior MRI official commented that SOP did not have the full support of then Minister of Economic Development and Trade Sandra Pupatello, and once the decision was made to delay the program, a portion of the funds dedicated to SOP were redirected towards the launch of the Ontario Emerging Technologies Fund (OETF). However, SOP eventually emerged under the new name, Business Ecosystem Support Fund. Monies were distributed between 2009 and 2011 to launch the following four innovation centres, each of which had expertise in one of the three focus areas the SOP was intended to promote (Ibid):
- $13.6 million to GreenCentre Canada to develop the next generation of green industrial products;
- $9.3 million to Coral CEA to help Ontario companies compete in the global Communications Enabled Applications market;
- $26.4 million to The Communitech Hub: Digital Media and Mobile Accelerator to ensure Ontario maintains a leadership position in the rapidly growing market for digital media and mobile computing applications, across a range of industries; and,
- $21 million in The Health Technology Exchange (HTX), which will help HTX partner with innovative companies, research institutions and health providers to develop cutting-edge medical and assistive technologies that can be marketed to the world.

8.3.4 MRI Priority #4: Incentivize private sector R&D and innovation activity

The provincial government acknowledged that more business-led innovation and commercialization was necessary if Ontario expected to increase productivity, economic growth and job creation. Indeed the government maintained that it had an important catalytic role to play in establishing “the right business climate”243 to ensure that Ontario would compete effectively. Moreover, the government remained resolute in providing support to innovative SMEs and start-ups with technologies in any of the 4 focus areas it had identified as integral for economic growth in a knowledge-based economy. To this end, MRI officials deliberated over which set of publicly funded instruments could be – and should be – added to the existing suite of government-sponsored programs and initiatives to enable these companies to conduct R&D and intensify innovation activity. Public procurement, tax incentives, and direct government grants and subsidies were the main policy alternatives considered. Upon conducting cross-national comparative research on the efficacy of these instruments in other countries and consulting with different governmental and non-governmental actors within the sub-government, the Ministry implemented two initiatives – an R&D tax credit and public procurement.

• Ontario Tax Exemption for Commercialization

OTECE was promoted by the Ontario government as an innovative measure that would incentivize new firms to engage with Ontario colleges and universities in order to acquire and commercialize intellectual property generated by those institutions (Duncan, 2008; Wilkinson, 2008c). According to then Finance and Revenue Minister Dwight Duncan, this new initiative would create “a better environment for business to generate more well-paying jobs”; “assist the culture of innovation for the creation of jobs in high-priority areas of the economy”; “provide for flexibility so that other innovative technologies can be added in the future”; “[complement] existing programs that support commercialization innovation, such as the commercialization investment fund administered by [MRI]”; and, “build on [Ontario’s] existing measure to cut taxes for business...”(Duncan, 2008b). The tax credit was introduced by Minister Duncan as part of Bill 100, Ideas for the Future Act 2008 which upon receiving royal assent on December 10th, amended the Corporations Tax Act, 2007. The OTEC was an initiative both Ministers Wilkinson and Duncan agreed to advance jointly.

There is no evidence to suggest that MRI consulted a wide range of societal actors before the introduction of Bill 100. Officials from the Ministry of Finance, Ministry of Revenue and Ministry of Research and Innovation worked together to craft this policy with limited input from industry partners and members of the research community during the pre-decision stages of policy development. It is also worth noting that during the 2008 pre-budgetary consultations, representatives from various subsectors across the business community made submissions to the government, emphasizing the adverse impact Ontario’s
existing tax structure continued to have on business activity and productivity, and suggesting new forms of fiscal policy to spur business-led innovation activity.244

Despite concerns raised, the Ontario government introduced an R&D tax credit that was designed to benefit a very small sector of the business community. The Official Opposition and dissenting industry representatives pointed out that not only was the OTEC narrowly targeted towards new companies commercializing innovative technology in a handful of sectors, but a firm’s eligibility was further restricted based on whether it would commercialize research specifically from colleges and universities (Hudak, 2008). According to some observers, OTEC appeared to be undergirded by the same outdated ideas associated with the government’s Ideas to Market Strategy (2006), which advanced a supply-push model of commercialization245 over the demand-pull alternative. Overall, with a large part of Ontario’s business community disconnected from the benefits associated with OTEC, it is assumed that the initiative was conceived without substantive feedback from a cross-section of industry representatives.

The government’s willingness to establish a new R&D tax credit may have been influenced by the province’s long-standing policy experience with creating supply-side innovation policies like tax incentives to encourage business R&D. Indeed, up to this point, the province maintained a suite of fiscal measures to stimulate this kind of activity, including the Ontario Innovation Tax Credit, and the Ontario Research and Development Tax Credit.

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244 Roger Martin, Dean of the Rotman School of Management at the University of Toronto submission to the Standing Committee on Finance and Economic Affairs was particularly compelling. Martin urged the provincial government to lower the cost of investment by implementing changes to corporate income tax policy to drive down marginal rates on business investment. He also suggested that the government index tax brackets to inflation. Notably, he encouraged the government to expand its support of innovation beyond “scientific research” to ensure that innovation policy did not perpetuate the idea that innovation is “all about scientists working on technology.” Martin also encouraged the government to create initiatives that would incentivize a broader range of companies to innovate – not just start-ups in the high-tech sector.

245 According to the OECD (2012a) this linear model of commercialization is “characterized by supply-push forces whereby universities and [public research institutions] transfer academic inventions via the sale, transfer or licensing of intellectual property, often on an exclusive basis, to existing firms or to new ventures (e.g. academic spin-offs)” p. 192.
The OTEC aligned with the government’s existing approach for incentivizing private sector R&D and innovation as well as the government’s focus on accelerating the commercialization efforts of Ontario’s universities and colleges. Moreover, the initiative demonstrated economic viability; due to the program’s narrow eligibility criteria, the government could afford to develop an initiative where only very few companies would be qualified to take advantage of this tax holiday.

- Green Schools Pilot Initiative and GreenFIT

Compared to the other programs MRI established between 2008 and 2011, Green Schools Pilot Initiative (GSPI) and Green Focus on Innovation and Technology (GreenFIT) had a much larger number of governmental and non-governmental policy entrepreneurs intent on influencing policy development. Programmatic and policy ideas that fed into these two initiatives not only originated from MRI and industry partners from across Ontario’s green sector, but also from other government ministries including the Ministry of Energy and Infrastructure, the Ministry of Education, and the Ministry of Environment. Indeed, the influence of an increased number of government officials at the pre-decision making stages of policy development reflected the fact that the province had achieved some success in advancing a government-wide effort at building up a green culture across Ontario. To this end, the ideas that fed into GSPI and GreenFIT had to align with the ruling party’s goals as well as the green policies already implemented.

In February 2009, the government introduced Bill 150, *The Green Energy and Green Economy Act*. The bill was framed as a measure to foster the growth of renewable energy projects as well as promote and expand energy conservation by all Ontarians (Green Energy

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and Green Economy Act, 2009, Schedule A, p. 3 – 4). Under this legislation, public schools were among the list of government institutions that had committed to improving energy efficiency and were actively promoting environmental education in the classroom (Ministry of Education, 2009a; Ministry of Education, 2009b).

As these initiatives were rolled out, MRI sought out new ways to support the innovation activities of Ontario-based clean tech businesses, attract more global investment into the province’s green sector, and advance the government-wide goal of creating a culture of conservationism. The Ministry consulted with a number of cleantech companies to solicit ideas. Around this time, the 2009 OCETA SDTC Cleantech Growth and Go-to-Market Report, representing the input of sixty leading Ontario clean technology companies in Ontario, was released. The report identified a number of opportunities for Ontario’s clean technology industry; among them, procurement was deemed a suitable means of creating domestic demand for clean technology companies (Ibid: 74). The Ontario government welcomed the report and acknowledged the recommendation to develop a clean technology procurement strategy (MRI, 2009i).

In the meantime, the Ministry of Education and MRI agreed to work together to develop and administer the GSPI – an initiative that capitalized on the proactive efforts of Ontario’s public schools to create more energy efficient institutions, as well as the willingness of green technology entrepreneurs to supply these institutions with their innovations. One year later the GreenFIT program was launched and the GreenFIT Strategy was established. The government promoted the Strategy as an ideal mechanism for piloting
innovative clean technology in a government setting and helping to reduce Ontario’s environmental footprint.\textsuperscript{247}

While the two procurement programs and the GreenFIT Strategy aligned with the Ministry’s efforts at shifting towards a demand-side innovation model, it is worth noting that these policies were substantively influenced by a multiplicity of actors from outside the Ministry. As such, in the case of GSPI and GreenFIT, it is difficult to determine the level of influence MRI actually had during the pre-decision stages of policy development.

8.3.5 MRI Priority #5: Advance talent and commercialization at research institutions

Between 2008 and 2011, MRI did not introduce any new research funding programs to advance knowledge generation and talent development. However, a number of important first-order changes were made to its existing suite of initiatives. In 2008, the Ministry circulated a discussion paper to key partners across the research community which outlined decision-makers’ new policy direction; the government’s intended actions were framed as efforts to align Ontario’s research and innovation programs with the Ontario Innovation Agenda. It is important to note that the distribution of the discussion paper and the exchanges that followed between the Ministry and the research community occurred after ideas for policy change had already been formulated. Hence, a number of members research community members perceived this round of discussions as one-sided, with MRI informing the group about the changes that would be implemented and expecting compliance.

Through the discussion paper, the Ministry advised members of Ontario’s research community of its decision to alter research program criteria, reviewing processes, and delivery. Most notably, MRI maintained that increased emphasis would be placed on

\textsuperscript{247} See presentation by the Ministry of Research and Innovation and the Ministry of Government Services, “Green Focus on Innovation and Technology (GreenFIT) Strategy” (Online) Available: http://www.doingbusiness.mgs.gov.on.ca/mbs/psb/psb.nsf/English/GreenFIT
realizing the value and impact of public investments in research and technology transfer, the potential for commercialization and the opportunity to establish a position of global leadership across and within certain sectors. The Ontario Research Fund was significantly affected by the intensified focus on actualizing a return on public dollars invested. The commercialization section of the Ontario Research Fund-Research Excellence (ORF-RE) application form was reinforced by requiring institutions to include a commercialization plan and financial strategy with their funding proposals. The Ministry also advised the research community of its decision to enhance targeted investments in areas where it was believed that Ontario had a global advantage – or the potential for establishing lead market status. On these grounds, proposals that advanced research in the innovation agenda’s focus areas were prioritized over proposals relevant to other disciplines. The aforementioned policy decisions demonstrated the Ministry’s commitment to advance its flagship funding program and ultimately maintain an important supply-side innovation policy. However, the anticipated program modifications were primarily driven by the government’s efforts at addressing the political and economic pressures of realizing a return on public investments, and as such the government opted to establish a demand-side component within the ORF-RE.

In 2011, the research community welcomed an MRI announcement regarding another significant change to the ORF-RE: the Ministry had committed to launch a special round of funding for social sciences, arts and humanities in recognition of “the importance of the arts, the humanities and the social sciences to innovation, the development of social knowledge, and the advancement of social and economic well-being in [Ontario]” (MRI, 2011c). Indeed, for decades the research community had advocated for increased funding to support

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248 Other proposed modifications to the ORF-RE included the introduction of an on-line contract template to help institutions complete applications; the introduction of a guarantee that applicants will receive a decision within six months after the application deadline.
initiatives outside of the traditional STEM disciplines, and this special round was deemed a valuable support for advancing the work of researchers and innovators in these fields. In line with the existing ORF-RE tenets, the Social Sciences and Humanities (SSAH) round focused on quality of research, strategic value to Ontario, and attraction, retention and fostering of talent (Ibid.) Researchers could receive between $200,000 and $1 million for projects that were expected “to produce results that may have a beneficial impact on Ontario’s quality of life and economy and may raise its profile in the global academic community” (Ibid.). However, within months, MRI cancelled the proposed round of funding – along with round six and seven of the ORF-RE – “in light of current fiscal challenges.”

The Ontario Research Fund-Research Infrastructure also underwent substantive modifications. Similar to the ORF-RE, the ideas for these changes were principally driven by the Ministry and motivated by an attempt to strategically target limited financial resources. The decision to alter the ORF-RI research program criteria and reviewing process was particularly critical given that CFI had launched another round of funding competition, and in the absence of a significant top-up from the Treasury, MRI could not automatically match federal funding secured by Ontario institutions. In the effort to address this issue, Ministry officials conceptualized the “Ontario First” approach – an alternative resource allocation decision-making process for evaluating research and innovation funding proposals requiring that projects provided “strategic benefits” to Ontario (Auditor General of Ontario, 2011, p. 377). One senior MRI civil servant described the “Ontario First” policy as follows:

249 MRI website
250 The Ontario First approach was also applied to the HTX’s Health Technology Commercialization Program (HTCP) – a funding program administered by HTX, made possible through an agreement with the Ministry of Research and Innovation. The HTCP was designed “to strengthen Ontario’s Medtech cluster by supporting, through pertinent partnerships, research, development and commercialization of Medical Technologies emerging from Ontario’s publicly funded academic institutions, development of start-up companies, growth of small to medium sized enterprises (SMEs) and expansion of export markets for Ontario’s Medtech sector” (HTX, 2011:1). In line with the tenants of the Ontario First approach, proposals submitted for funding have to demonstrate “that subsequent commercial development of the technology is carried out in Ontario” (Ibid:5)
So “Ontario First” was a way for us to recalibrate the decision-making process – the review process over research projects – so we could have a strategic discussion with the institutions and have projects screened for their relevance for Ontario’s priorities before they went into the big funding system at the federal government – I’m talking about CFI. So Ontario First is a kind of policy construct that underpinned our work with CFI.

Similar to the ORF-RE changes, the new policy that applied to the ORF-RI was framed as aligning the program with the Ontario Innovation Agenda. To help determine how best to roll out the Ontario-First strategy, the Ministry convened the Ontario First Working Group, a small set of representatives (Vice-Presidents Research and their equivalents) from universities, research hospitals and colleges of arts and technology.251 During the consultations with the Working Group, the Ministry prioritized the importance of building in a “strategic review” of Ontario institutions’ Notices of Intent before they were sent to CFI. In return, members of the Working Group underscored the significance of the Ministry providing early feedback to institutions on Ontario’s strategic value criterion so that this information could be incorporated into the institution’s application to CFI.252 Both of these elements were integrated into the new ORF-RI adjudication process and implemented for CFI’s 2012 Large Infrastructure Fund round of competition. The revised program review process consisted of four stages.253 See Appendix 8.1 for the adjudication process flow chart.

Members of the research community who were interviewed provided mixed reactions to the Ontario First policy. A number of these interviewees viewed the policy action as the government’s attempt to reassert its control over resource allocation decision-making for projects co-funded with the federal government, i.e. CFI. The following statements made by

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252 Ibid.
Informants from two higher education institutions reflect this perspective and demonstrate the need for a policy solution to this issue:

Senior administrative staff, University:
We don’t want to be the handmaiden to the federal government in determining the research priorities. We want to have a say in what are the priority areas and the projects [that will be] funded, and we’re not going to just sit back and just wait for the federal government to decide and then match.

Senior administrative staff, College:
In the early days of the CFI, Ontario was the tail of the dog and they didn’t like that very much. And over time there was a desire within the province to have a say on what’s being done because if you’re allocating provincial dollars you want to know the provincial dollars are going to support the provincial agenda and that’s when things started to shift.

However, research community interviewees were less agreeable regarding the Ministry’s decision to consult with them only after a resolution – the Ontario First Strategy – had been conceived. Given that MRI had defined the problem and formulated a solution before consulting with its non-governmental partners, members of the Working Group that were interviewed as well as other staff from the different research institutions, maintained that they could only provide limited input for changes to a policy that the Ministry had already planned to initiate.

MRI also made changes to the Early Researcher Award (ERA). Like the ORF, ERA proposals had to demonstrate strategic value to Ontario, i.e. applicants were expected to show potential for economic impact, social impact and increased visibility. Moreover, MRI added a commercialization component to the rest of its research talent programs “to help build a culture of commerce.” Once again, even though these program modifications were mentioned in the discussion paper and members of Ontario’s research community were requested to provide their feedback on these ideas before implementation, policy action was largely pre-
determined – MRI had already decided to introduce a demand-side component into these supply-side innovation policies.

8.4 Conclusion

Between 2008 and 2011 the Ministry established a new policy direction for the province. Notably, government-wide efforts to implement macroeconomic policy to address the economic downturn overshadowed the development of long-term, strategic, integrated, place-based innovation policy. This new ideational approach to innovation policy informed the programmatic ideas undergirding the small number of innovation policy initiatives established during the Liberal government second term.

It is also worth noting the extent to which MRI’s working relationship with other sub-government actors changed substantively during this period; government officials drove the pre-decision stages of policy development, exerting a great deal of authority over the problematization of Ontario’s research and innovation performance and the framing of a market-driven, results-oriented approach as the most ideal policy solution. Moreover as of 2008, MRI officials invited a smaller number of non-governmental actors to the decision-making table. Societal actors from the research community in particular had fewer opportunities to participate in the policy-making process. One senior administrator from a higher education advocacy group commented on the nature of the working relationship between the state and societal actors as follows:

I don’t think the universities [had] as much influence as they would have wanted. I think the personal view of the DM, the people on the advisory council and the ministry staff [was more influential]. I don’t think there was a particular private sector or organization driving it because they were all so diverse. So I think it was largely driven by the government – in terms of influence.
A number of other interviewees from the research community responded in kind. They maintained that policy solutions were more often presented as *fait accompli*, leaving many of them with the sense that follow-up meetings were largely perfunctory and merely a means for the government to create the impression that meaningful consultation had taken place. While the interviewee above believed that industry had a limited influence over policy direction, other respondents argued that a number of individual policy entrepreneurs from the private sector (i.e. investors, IIOs and other industry leaders) enjoyed a greater deal of access to the decision-making apparatus. Indeed, the policy initiatives introduced during the McGuinty administration’s second term were largely intended to bolster private sector innovation activity – particularly technology-based start-ups operating in one of the focus areas identified in the OIA – and as such, feedback from these members of the policy community became more prioritized relative to input provided by other non-governmental actors from the policy community.
Chapter 9
Conclusion

9.0 Overview

This dissertation was inspired by a keen interest in Ontario’s research and innovation ecosystem, i.e. the full range of actors, rules, resources and policies that support Ontario’s research and innovation efforts. With the creation of the Ministry of Research and Innovation (MRI) in 2005 – the province’s first stand-alone ministry dedicated to advancing research and innovation – and the Premier as the inaugural minister, it appeared as though policy development in Ontario had entered a new and exciting era. Paying close attention to the ministry’s evolving mandate, the breadth of policies and programs it delivered, the scope of governmental and societal actors that were involved in the policy-making process, and the different views these actors held regarding innovation as well as their role in harnessing the province’s innovation potential, a core research question was formed: Why did Ontario’s research and innovation policy develop the way that it did between 2003 and 2011?

Policy network analysis was used as a framework to identify the range of variables that impacted the policy-making process. Special attention was paid to the set of programmatic ideas different members of Ontario’s research and innovation sub-government promoted in the attempt to influence the pre-decision stages of policy development. The scope of analysis was restricted to the research and innovation funding programs delivered by MRI with the intention of addressing three supplementary research questions: Why did MRI’s research and innovation policies have a predominantly supply-side innovation orientation between 2003 and 2011? Why were more demand-side innovation policies introduced during the Liberal government’s second term in office (i.e. 2008 to 2011),
compared to its first term (i.e. 2003 to 2007)? What factors constrained the development of a more demand-side innovation oriented policy mix?

The dissertation discussed the role of the state in the research and innovation ecosystem, the provincial government’s attempt to develop policy that would address its economic and political goals, as well as the effort made to rationalize and legitimize its ideas and actions. The range of non-governmental actors involved in the pre-decision stages of policy development was identified, along with the set of interests and ideas they held, and the strategies they employed to influence policy-making. The dissertation also accounted for the nature of the relationship between state and societal actors, how the state interacted and consulted with non-governmental stakeholders, as well as the extent to which input from some non-governmental groups and individuals was more readily accepted than input from others. By focusing on the dynamics of the agenda-setting and the policy formation stage, the dissertation brought to bear the complexity of identifying and defining Ontario’s research and innovation problem/challenge and the difficulty of selecting a mix of research and innovation policies that would address the provincial government’s goals of intensifying economic growth, enhancing job creation and driving regional economic competitiveness.

The first part of this chapter summarizes the answers to the research questions that drove the dissertation and discusses the extent to which the following two hypotheses were validated:

\[ H_1: \] The structure, context and agency of the policy network influenced the development of the Ontario Ministry of Research and Innovation’s mix of policies between 2003 and 2011.
$H_2$: Research and innovation programmatic ideas that promoted a demand-side innovation approach became more acceptable to decision makers due to changes in the structure, context and agency of the policy network that occurred between 2008 and 2011; these changes influenced the balance of MRI’s policy mix.

An analysis of the government’s success at developing research and innovation policy that addressed their political and economic goals is offered. The chapter also includes an epilogue to discuss the political and economic shifts that occurred between 2011 and 2013 and to review the extent to which Ontario’s research and innovation ecosystem has changed during this time. The last section of this chapter considers the future of research and innovation policy development in Ontario.

9.1 Why did MRI’s suite of research and innovation policies have a predominantly supply-side innovation orientation between 2003 and 2011?

Hypothesis 1 ($H_1$) posits that the dimensions of Ontario’s policy network influenced the development of the Ministry’s research and innovation policies between 2003 and 2011. The section that follows summarizes how the policy network’s structure, context and agency facilitated the establishment of a suite of research and innovation policies and funding programs that advanced a supply-side orientation. In the process of addressing the first supplementary question, it will be shown how the research has validated $H_1$.

Firstly, it is important to note the extent to which the historical, economic and political context of the policy network influenced research and innovation policy established between 2003 and 2011. As demonstrated in Chapter 4, past government’s attempts to advance S&T (science and technology), R&D (research and development) and technological innovation clearly included the establishment of a number of policies and support programs
with a supply-side innovation orientation. Between 1971 and 2003, these policies and programs became more deeply embedded in the organizational structure of Ontario’s economy, and while a few programs were terminated over time, many of them continued to be delivered by successive governments. As Chapter 5 discussed, during the McGuinty era in many cases, programs were expanded and rebranded, and in other cases, the policy was merely restructured or redesigned rather than replaced with new policies.

Even though the McGuinty government demonstrated a notable degree of policy innovation with the creation of MRI, the stickiness of the policies (including funding programs and institutions) it inherited influenced the orientation of the majority of the resource allocation programs that were developed over time. Constrained by policy decisions of the past, yet enabled by the political will to harness Ontario’s research and innovation strengths as well as the financial/budgetary capacity and administrative capability to establish new funding programs, under the McGuinty government, Ontario’s policy mix was expanded to include even more supply-side innovation programs. Notably, many of the programs and institutions that were placed under the purview of MRI were subject to “layering” while many others were redesigned, i.e. remnants of earlier policy efforts were maintained.\(^{254}\) Both of these processes ultimately contributed to the continuance of a supply-side innovation policy mix. Finally, the Ontario government’s historically risk-averse approach to policy development in this sector limited policy experimentation, and as such, it also contributed to the continuance of research and innovation funding programs that aligned with existing institutional arrangements.

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\(^{254}\) Howlett (2011) discusses the tendency for policy-makers to employ a process of layering and/or redesign in instances when an existing policy mix is in place (p. 144-145). Layering occurs when instruments and goals are simply added to existing ones without abandoning the previous ones. When policy-makers choose to redesign a policy mix, remnants of earlier policy efforts are left in place and attempts are made to patch or restructure the existing policy elements.
The structure of the policy network and the agency of its actors supported the continuance of a predominantly supply-side innovation mix of policy. Ontario’s state pluralist network meant that decision making power regarding research and innovation policy development was concentrated in the hands of the government. The Ministry of Research and Innovation drove the development of initiatives that aligned with its supply-side innovation approach to policy development – particularly between 2003 and 2007 – and hence had the authority to perpetuate a predominantly supply-side innovation mix of policies. While a plurality of interests existed within the research and innovation sub-government, MRI had sufficient authority to ensure that the status quo remained in place. Any changes made to Ontario’s mix of research and innovation policies were largely restricted to the level of Hall’s (1993) first- and second-order changes as mentioned in Chapters 7 and 8. In terms of agency, different levels of influence demonstrated by non-governmental actors and opposition party MPPs also helped to maintain a supply-side innovation policy bias in Ontario.

- The influence of a dominant societal group

Ontario universities had a significant impact on the development of research and innovation policy. These sub-government actors were well organized and employed a highly coordinated advocacy strategy to ensure that they continued to receive a large share of research and innovation money. Indeed, between 2003 and 2007, Ontario universities not only acquired increased funding for the commercialization of public research, but they were also successful in advocating for the expansion of research funding programs that supported their roles as generator of transformative research and producer of best-in-class research talent. It is within this context that millions of dollars in funding flowed from an expanded suite of supply-side innovation support programs.
Notably, Ontario universities demonstrated a high degree of political acumen by positioning its institutions as partners in the government’s efforts to harness Ontario’s research and innovation capacity between 2003 and 2011. Chapter 5 described the various policy statements and platforms MRI established to legitimize policy action (e.g., *Ideas to Market Strategy* and the *Ontario Innovation Agenda*). Ontario universities that received research funding during this time period – along with the Council of Ontario Universities – helped to legitimize the policy direction of the government by using various framing techniques, and springboard and causal stories to publicly endorse the value of the existing mix of research and innovation policies and funding programs that MRI delivered. This strategy helped to define universities as strategic collaborators and continued to provide them with a place at the consultation table during the research and innovation policy formation stage. Personnel exchanges also offered research community members the opportunity to promote their programmatic ideas to the government. Arguably research community members seconded to MRI stood a better chance at influencing policy development compared to some other research and innovation actors. In light of their proximity to the decision-making apparatus, the universities capably used their position to push for the continued development of supply-side innovation initiatives.

While the universities demonstrated a formidable lobbying effort throughout the Liberal government’s term in office, it is worth recalling that between 2008 and 2011, the government made a number of cuts to several supply-side innovation policy initiatives. In an effort to focus more on increasing demand for innovation, some of the limited amount of public money available was redistributed to initiatives that advanced this policy direction.

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255 Examples of academics seconded to the Ministry include Kamiel Gabriel (Assistant Deputy Minister at the Ministry of Research and Innovation, and UOIT’s Vice-President Research) and Adelstein Brown (Assistant Deputy Minister and the Ministry of Research and Innovation, and an associate professor at the University of Toronto.)
Nonetheless, the universities capably reasserted the critical role they play in the innovation process in the effort to ensure that their researchers continued to receive some of the funding government had committed during its first term. Indeed, according to Budget 2011, the Ontario government spent $3.6 billion on research and development between 2003-04 and 2010-11 (p. 136). Nearly 80% of this funding was committed to R&D performed by universities, colleges and hospitals (Ibid). Overall, the Ontario universities had a significant role to play in influencing the balance of funding deployed by Ontario’s support programs and ultimately contributed to the persistence of a predominantly supply-side innovation mix of policies.

- The (limited) influence of other societal actors

There were a number of sub-government actors outside of the research community who advocated for the establishment of policies that were not intended to support public research, but nonetheless fit into the rubric of Ontario’s supply-side innovation policy mix. Members of the business community (i.e. entrepreneurs, private firms, private investors), a handful of innovation intermediary organizations, and a few individual policy entrepreneurs advocated for policies and programs that would attract private investment in Ontario and ensure that entrepreneurs had access to the financial capital they needed to launch their innovations onto the market. Initiatives like the Angel Network Program, the Market Readiness Program, Ontario Venture Capital Fund (OVCF), and the Ontario Emerging Technologies Fund (OETF) were established to meet this need, and inevitably actually contributed to the expansion of Ontario’s mix of supply-side innovation policies.

It is worth noting that not all business community members promoted strictly supply-side innovation programmatic ideas. Some of these players also advocated for demand-side innovation policies that would intensify market demand for the innovative products and
services they developed, and hence drive exports and sales. However, there were two factors that limited their agency. First, as mentioned in Chapter 7, the business community in Ontario’s research and innovation ecosystem is comprised of a broad range of sectors – including automotive, information and communications technology, biotechnology, green technology, etc. – each with different innovation challenges and priorities. Efforts to push a demand-side innovation orientation would have been compromised due to the low level of associational organization and mobilization relative to the research community. Moreover, even when industry representatives served on government-commissioned advisory boards and panels on innovation (e.g. ORIC), many of them were not speaking on behalf of the business community, but rather they would articulate the interests of their own sector and/or the interest of their organization.²⁵⁶ This uncoordinated advocacy effort had a detrimental effect on their ability to influence policy. The second factor that limited the agency of these actors was fear that if they publicly criticized the existing resources allocation model and advocated for more demand-side innovation policies, they would risk offending the government and possibly compromise their chances of receiving grants in the future.

- Opposition Party Members – Forgone opportunity to influence policy

As discussed in Chapter 7, without substantive contestation from the Ontario Progressive Conservatives and the NDP, the Ministry continued to develop a predominantly supply-side innovation oriented mix of policies and funding programs. There are few reasons why the NDP and PC MPPs were not more critical of the policies established during this time. Firstly, it is worth noting that at the beginning of the Liberals’ term in office, the Official Opposition was “weak”, and in a period of transition; it had undergone multiple

²⁵⁶ Source: Interviewee
leadership turnovers by 2005\textsuperscript{257} and was faced with the challenge of developing refreshed policy positions on a range of issues. Research and innovation policy was simply not high on their political or policy agendas. Secondly, a number of re-elected former cabinet ministers from the PC party had demonstrated a profound awareness of the importance of innovation between 1995 and 2003, and these members were disinclined to obstruct policy that would enhance levels of innovation, entrepreneurial growth, and productivity. Generally, there was a lot of buy-in from opposition party members regarding the benefits of linking the government’s economic strategy to research and innovation. Without poignant criticism from opposition party members, political and bureaucratic officials had a much easier time setting policy direction and driving the policy process.

9.2 Why were more demand-side innovation policies introduced during the Liberal government’s second term in office (i.e. 2008 to 2011), compared to its first term (i.e. 2003 to 2007)?

As discussed in Chapter 6, during the McGuinty government’s first term in office, decision-makers maintained that Ontario had a productivity challenge, and innovation could be used as an “enabling paradigm” for increasing productivity, economic growth and job creation. Government authorities defined the issue as a “commercialization problem” that impeded the transfer of ideas from mind to market and adversely affected the province’s competitiveness. In turn, between 2003 and 2007, the government remained partial to programmatic ideas that promoted the development of policies and funding programs aimed at supporting the commercialization efforts of entrepreneurs, private sector firms, and public research institutions. A few of these policies and programs had a demand-side innovation

\textsuperscript{257} During the first two years of the Ontario Liberal administration, the leadership of the PC party was held by Ernie Eves from October 2003 to September 2004. Bob Runciman became the interim Leader of the Official Opposition between September 2004 and March 2005, while an unelected John Tory assumed the leadership of the Ontario Progressive Conservative Party during that time. In March 2005, John Tory won a by-election and assumed his place in the legislature as Leader of the Official Opposition.
orientation, including the Regional Innovation Network program, the Ontario Fuel Cell Innovation Program and the Ontario Commercialization Network. However, most of the policies and programs developed advanced the province’s supply-side innovation approach.

In light of the new political and economic pressures precipitated by the economic crisis of 2008, a second round of problem definition and policy design took place; to this end, the economic context in which policy was being developed had changed. Ontario’s problem was redefined as having a low level of industry engagement and private sector activity, and government officials believed that increased business activity in the innovation space would spur economic growth and productivity. This new interpretation of the problem called for policy solutions aimed at supporting entrepreneurship, promoting initiatives that would increase the demand for innovations, and improving the conditions for the uptake of innovative products, processes and services. Chapter 8 details the specific set of demand-driven priorities the Ministry established to improve Ontario’s innovation performance. Almost all of these priorities aligned with a demand-pull model of innovation, thereby making demand-oriented solutions appear more appropriate for addressing Ontario’s innovation problem.

It is important to note that no significant changes took place in the structure of Ontario’s research and innovation policy network. The state pluralist policy network remained in place, and enabled the Ministry to adjust its policy direction in light of the new economic and political pressures the 2008 crisis introduced. Indeed, decision-making power continued to be concentrated in the Ministry, allowing government officials to exercise its authority and limited autonomy from societal interests, and focus more on developing a demand-side innovation policy approach. To this end, MRI intensified efforts at consulting with members of the sub-government who advanced demand-side innovation programmatic
ideas; many of those consulted were entrepreneurs and investors from the business community as well as a small number of IIOs who over the years had capably demonstrated their capacity to bring a number of innovations to market. In turn, the agency of these actors increased relative to those who favoured a supply-side innovation approach.

This series of events demonstrates that H₂ is only partially valid. Changes in the context of the policy network and the increased agency of some of its actors influenced policy formation, however no significant changes took place in the structure of Ontario’s state pluralist network. Arguably, the stability of the policy network structure actually enabled the state to maintain its decision-making authority and shift resources towards developing new demand-side innovation initiatives in the effort to advance its enhanced focus on driving demand for innovations.

9.3 What factors constrained the development of a more demand-side innovation oriented policy mix?

In responding to the first supplementary question, it was demonstrated that the context, structure and agency of Ontario’s research and innovation policy network impacted the development of a mix of predominantly supply-side innovation policies. The second supplementary question teased out the extent to which changes in the policy network conditioned the acceptance of some programmatic ideas over others and in turn facilitated the introduction of more demand-side innovation policies and programs. The response to the final supplementary question brings to bear the degree of change the policy network structure, context and agency had on MRI’s mix of research and innovation policies. As such,

258 Interviews conducted with different members of the sub-government revealed that that while the majority of societal groups promoted programmatic ideas that supported the continuance of a supply-side innovation policy orientation, there were a number of actors who had for many years held programmatic ideas that promoted the development of more demand-side innovation policies and support programs. Between 2003 and 2007, those programmatic ideas were acknowledged by decision-makers; the development of a few of Ontario’s demand-side initiatives could be attributed to this fact (e.g. the RIN Program, the Ontario Commercialization Network).
the answer to the third question also validates H₁ by demonstrating the influence of the context, structure and agency of the policy network in constraining the development of research and innovation policy with a demand-side innovation orientation.

In terms of the influence of context, as discussed earlier, Ontario’s historical experience with developing policy in this sector impacted the province’s future policy trajectory; path dependency ensured that a strong supply-side innovation orientation remained in place. In particular, the provincial government’s inexperience in designing and implementing a broader range of demand-side innovation policies in Ontario significantly influenced the policy-making process. As shown in Chapter 4, Ontario has had a long history of building up a supply-side oriented mix of policies to support research excellence, and advance commercialization and innovation. Moreover, uncertainty regarding the political and economic implications of introducing unfamiliar policies also impacted the decision-making process; indeed, as pointed out in Chapter 3, a risk-averse culture in government significantly mitigates policy experimentation. To this end, demand-side innovation policies and programs introduced between 2008 and 2011 remained at a relatively small scale and those that existed before 2008 expanded in small increments. The economic and political context within which the policy network was located also constrained the introduction of new demand-side innovation policies, particularly between 2008 and 2011. In light of the economic crisis, the Ontario government employed some degree of fiscal restraint by committing a limited amount of new funding to government agencies and ministries between 2008 and 2011. This policy action placed budgetary constraints on MRI, requiring decision-makers to develop policy solutions that did not involve a significant increase in government spending but would still realize their objective of intensifying the demand for innovation across Ontario. As such, MRI could afford to implement only a handful of new demand-side innovation initiatives.
The structure and agency of Ontario’s policy network also constrained the development of a mix of policies with a more demand-side innovation orientation. As mentioned earlier in this chapter, a state pluralist structure significantly influenced the policy-making process; policy continuity and incremental policy change is typically associated with a policy network where power is concentrated, and a large number of societal actors are involved in the policy making process. Chapter 8 discussed MRI’s “refresh” of its policy objectives in 2008 which signaled the government’s decision to intensify its focus on developing policy that would enhance demand for innovation in Ontario. To realize these goals, the Ministry introduced a handful of demand-side innovation policies and expanded a few of its existing initiatives. However, this effort was conditioned by the agency of a highly mobilized, well-organized group of societal actors from the research community – in particular, the Ontario universities – who capably problematized the expansion of demand-side innovation policies and initiatives. These actors publicly acknowledged the benefits of demand-side innovation policies, yet skillfully crafted and promulgated the message that these initiatives should not be introduced to the detriment of policies and programs that supported the province’s greatest strength – its research capacity. By drawing attention to the limited amount of public resources available and the shortcomings of throwing the proverbial baby out with the bathwater by reducing funding for R&D, these societal actors were influential in ensuring that the Ministry remained accountable to its commitment to sustain research excellence. In turn, support for these supply-side research funding programs was maintained.

The Ministry’s decision to maintain a predominantly supply-side innovation mix meant that a smaller portion of funding was left to establish new demand-side innovation initiatives and to expand existing demand-side innovation programs. Moreover, a small cadre
of business sector groups and other private sector actors continued to advocate for the expansion of existing supply-side innovation policies aimed at supporting the innovative efforts of entrepreneurs and firms. To this end, it is important to underscore the extent to which groups of societal actors from the sub-government influenced the policy-making process and ultimately constrained the development of a more demand-side innovation oriented policy mix in Ontario.

9.4 Evaluating Policy Outcome

Between 2003 and 2011, the McGunity administration invested over $3 billion of public money to harness the strength of Ontario’s research and innovation ecosystem, and between 2008 and 2011, the Ministry of Research and Innovation focused its efforts on developing policy that would realize a significant return on investments made. To what extent were the province’s research and innovation policies effective in achieving the government’s most basic economic goals of increasing productivity, stimulating job growth and enhancing economic well-being? More broadly, to what degree did the Ministry of Research and Innovation demonstrate a high degree of state capacity, i.e. the ability of the state to draw on adequate resources (i.e. financial and administrative resources and skills) to design policy instruments and implement policies that will realize its policy objectives? At the end of the McGuinty administration’s second term, was Ontario’s research and innovation policy a success?

According to the Ministry of Research and Innovation’s Results-based Plan Briefing Book 2011-12, research and innovation policy established between 2003 and 2011 successfully supported a range of research and innovation activities. For instance:

259 From the comparative politics literature, Weiss (1988) defines state capacity as the ability to anticipate and respond to economic change. In Ontario’s case, economic change occurred with the 2008 financial crisis.
- Between 2007-10 the Ontario Network of Excellence helped more than 2,000 clients to create/retain more than 25,000 jobs; protect over 5,700 new ideas through licenses, disclosures, patents and copyrights; sell to more than 9,800 new customers; develop over 2,100 prototypes, etc.

- The Ontario Research Fund-Research Excellence program has supported 91 leading edge research projects across the province, leveraging $737.2 million from over 430 industry, institutional and federal partners.

- 568 recently appointed researchers have received $79.5 million from MRI through the Early Researcher Awards (ERA) program to help them build their teams and support them early in their careers. Since 2003, ERA award recipients have engaged over 61,494 youth through 596 outreach events.

- $3.8 million from the Innovation Demonstration Fund was committed to Vive Nano – a spin-off from the University of Toronto’s Institute for Optical Sciences with expertise in developing an environmentally-friendly process for creating products and materials using nanotechnology – to help the company build a pilot plan, refine its processes and come to full production levels. The company is creating 19 new high-skills jobs over the next two years.

- The Investment Accelerator Fund has invested a total of $19 million in 34 early stage companies.

- Since 2005-06, ISOP has provided $4.1 million in funding to support 29 international research collaborations.

These are useful anecdotes for demonstrating how public money was deployed, and how those funds were being used by research and innovation recipients. However, the
accumulation of these achievements – and others like them – does not allow the Ontario government to rightfully claim that the province’s innovation priorities have been addressed and Ontario’s economic goals are being (or have been) met. A more systematic, parsimonious analytical framework is necessary for earnestly assessing the effectiveness of the province’s research and innovation policy developed between 2003 and 2011. This framework was created by the Ontario Network on the Regional Innovation System (ONRIS) by Drs. Tijs Creutzberg and David Wolfe, and presented to the Ministry of Research and Innovation on November 2010: *The Ontario Innovation Economy Scorecard 2010.*

According to the 2008 Ontario Innovation Agenda, this Scorecard was to be used “to assess Ontario’s progress and provide comparisons between Ontario and its peer jurisdictions.” (p. 27). The results of the Scorecard were not publicly disclosed, arguably because of the lukewarm assessment it offered of Ontario’s research and innovation ecosystem’s innovation performance and innovation impact.

The *Scorecard* based its assessment on 23 indicators in four key areas: innovation investments, innovation capacity, innovation performance and innovation impact (See Appendix 9.1). In terms of innovation investments, the Scorecard indicated that Ontario demonstrated high levels of public investments (i.e. public research institutions’ expenditure on R&D), but low levels in private investment in R&D (BERD), which according to OECD research on innovation, compromises growth in real GDP per capita (p. 14). Notably, the Scorecard indicated that declining levels of venture capital in Ontario was a key obstacle to Ontario universities’ efforts at commercializing their research.

The innovation capacity of Ontario was defined as the ability of the province to carry out innovation, and this was determined by (a) the people and organizations engaged in the innovation process and (b) the extent to which they interact with each other. According to the
Scorecard, higher education institutions demonstrated a strong capacity, companies demonstrated a satisfactory capacity and on the whole, the linkages that existed between firms and research organizations were satisfactory. There are a number of notable findings associated with this area of focus. In regards to the performance of higher education institutions, it was determined that Ontario had a high number of R&D personnel in higher education and government. Linkages and support between firms and research institutions were deemed satisfactory because of the variable degrees of collaboration across different sectors, i.e. collaboration was high in sectors like pharmaceuticals and medicine and low in other sectors including machinery and information and communications technology sectors (p. 24). The Scorecard also pointed out that Ontario leads the country in the number of R&D intensive firms, but lags at an international level (p. 32).

On the issue of innovation performance, the Scorecard reported that Ontario’s research system is generally strong, “yet this is not translating to technology development and transfer.” This finding suggests that the millions of dollars invested through supply-side innovation policy initiatives to support the research and innovation activities are not netting a significant return if levels of research commercialization remain low. Moreover, the report found that commercialization on the private sector side is also weak. Notably, when it comes to product innovation, close to 60% of manufacturing firms in Ontario are either weak innovators or have not carried out any innovation activities in the past three years. The Scorecard also pointed out that there has been a net decline in the number of firms in virtually all technology-intensive and manufacturing sectors.

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260 In Chapter 6, one interviewee discussed this issue and identified it as the crux of Ontario’s “prosperity problem.”

Arguably, the Scorecard’s assessment of Ontario’s innovation impact is most interesting given the link the report makes to innovation and the province’s economic performance. Three indicators are used to assess Ontario economic performance: level of productivity, employment growth and economic well-being – these are key economic goals of the Ontario government. The Scorecard points out that Ontario’s productivity performance was somewhat mixed – while labour productivity growth in Ontario compared favourably to other provinces, it was lacking against its international comparator regions. In terms of employment, the report confirms that growth has been concentrated in the service sector, with two innovation clusters experiencing the most growth between 2008 and 2009: finance and information and communications technology (p. 51). Resource and manufacturing sectors of the economy all experienced the most significant declines. Overall, the Scorecard does not attribute significant employment growth to innovation activity. As for improvements in Ontario’s economic well-being, Ontario has lagged behind the other large provinces since 2003; this finding is based on the Index of Economic Well-being developed by the Centre for the Study of Standards. The Scorecards suggests that different factors may account for this underperformance, but the relatively low levels of innovativeness across Ontario’s industries and the revenues generated by growth of the economy are clearly a contributing factor. (p. 53)

Overall, it would appear as though the McGuinty administration did not achieve the economic and political goals it set out to accomplish. While it certainly advanced a number of supply-side innovation oriented priorities – like supporting research excellence; advancing the development of high quality personnel; supporting the early stage development and growth of knowledge-based firms, etc. – it was largely unsuccessful in other areas, including ensuring increased levels of commercialization (in both the public and private sector),
enhancing demand for Ontario’s innovative products and services, attracting significant levels of venture capital, increasing the exports of made-in-Ontario innovations etc. Moreover, the Ministry certainly did not contribute significantly to the broader economic goals of increasing productivity, employment growth and enhancing economic well-being. In light of these lukewarm results that ultimately demonstrated limited state capacity, the Ontario government must consider an alternative course of action.

9.5 Epilogue

In October 2011, the Ontario Liberals secured their third mandate, returning to Queen’s Park with a minority government. The 2011 Economic Outlook and Fiscal Review and the 2012 Ontario Budget reconfirmed the McGuinty administration’s commitment to prioritize efforts at improving economic growth, eliminating the deficit and increasing job creation in spite of ongoing global economic uncertainty. In particular, Budget 2012 underscored the government’s focus on encouraging businesses to enhance their productivity, intensify research and development (R&D), and invest in innovation. To this end, the Budget announced plans to establish a Jobs and Prosperity Council that would identify Ontario’s innovation challenges and provide feedback on how to improve productivity and global competitiveness (Ministry of Finance, 2012b: 34). In lockstep with the government’s focus on encouraging businesses to participate in the innovation space, the Council’s final report,

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262 In June 2012, the Ontario government announced the launch of the Jobs and Prosperity Council. The Council was chaired by Gord Nixon, President and CEO of the Royal Bank of Canada, and comprised of 13 other business leaders: Bonnie Brooks - President, Hudson's Bay Company; George Cope - President and CEO, BCE Inc. and Bell Canada; Linda Hasenfratz - CEO, Linamar Corporation; Nitin Kawale - President, Cisco Systems Canada; Genevieve Knauff - Owner, gck Consulting Ltd. and hme Enterprises Ltd.; Darryl Lake - Founder and former CEO, Northern Centre for Advanced Technology; Mike Lazaridis - Founder and Vice Chair, Board of Directors, Research in Motion Limited; Kevin Lynch - Vice-Chair, BMO Financial Group; Michael McCain - President and CEO, Maple Leaf Foods Inc.; Joe Repovs - Founder and CEO, Samco Machinery; Reza Satchu - Managing Partner, Alignvest Capital Management; Jim Stanford – Economist; and Jeff Westeinde - Chair, Windmill Development Group. Source: Ontario. Ministry of Economic Development and Trade, 2012a.
Advantage Ontario (2012), provided advice on how the provincial government could facilitate business-led innovation in order to realize its economic goals.263

It is within this political context that a number of changes were made to the research and innovation portfolio during the McGuinty administration’s third term. The Ministry of Research and Innovation (MRI) and the Ministry of Economic Development and Trade (MEDT) were merged in 2011 to form the Ministry of Economic Development and Innovation (MEDI)264. Under the leadership of the inaugural minister, Hon. Brad Duguid, and Deputy Minister Wendy Tilford (the former DM of MEDT), MEDI was intended to:

[drive the development of] a strong, innovative and competitive economy that provided jobs and prosperity for all Ontarians by: supporting regional growth in key strategic sectors; implementing research and innovation policies to deliver an agenda which focuses on excellence, performance and results; strengthening Ontario, nationally and internationally as a premier location for investment, trade, research, innovation and commercialization; and promoting the modernization of government.265

Notably, the fragmented maze of research and innovation funding programs that existed made it difficult for researchers and innovators to navigate, and as such one of the core objectives of the new ministry was to streamline its suite of research and innovation programs. Moreover, government officials maintained that efforts to restructure and consolidate some of those initiatives aimed at supporting research talent and business would

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263 Advantage Ontario represents a continuation of some of the key themes raised in this dissertation. Notably, the Council’s report emphasized that research and innovation actors across Ontario needed to work together to expand and connect the innovation ecosystem; secure more private investment in R&D; increase patent and commercialization activity; and attract increased levels of risk capital. Additionally, the Council advised the government to “rigorously” review the results of commercialization programs to ensure that strategic outcomes are met and continue to explore other measures that can increase Ontario’s pool of risk capital (p. 14).

264 Charles Conteh (2013) describes this merger as an example of the government’s effort at aligning “the machineries of government with the imperatives of strategic policy governance in highly fluid and changing economic systems” (p. 210).

result in an estimated $76 million in cost savings for the government over a period of three years, i.e. between 2012-13 and 2014-15\(^\text{266}\) (Ministry of Finance, 2012b: 62).

Over the course of approximately five months, the Ministry also had to address myriad policy, operational and administrative challenges related to its new mandate and the merger. A MEDI Integration Team was established to facilitate the merger; it was expected that the team would address overlaps and inconsistencies across the Ministry that frustrated communication and the sharing of resources, as well as identify opportunities for increased collaboration between the different departments. Despite the efforts made to integrate the ministries, for the most part bureaucrats continued to operate in their respective silos, with former MRI and MEDT staff remaining unaware (or under informed) about the work and objectives of their colleagues. This in turn often resulted in the duplication of policy efforts and/or teams of individuals working at cross-purposes with one another. In general, the future of the Ministry remained uncertain. However, few could predict the momentous political predicament that unfolded by Fall 2012 and the impact that it would have on the bureaucracy’s capacity to formulate and implement Ontario’s research and innovation policy.

9.5.1 A New Political Reality for the Ontario Liberals

On October 15 2012, Premier Dalton McGuinty called an emergency caucus meeting at Queen’s Park to announce his resignation as Leader of the Ontario Liberal Party.\(^\text{267}\) Months prior, the provincial government had been plagued by the tumultuous relations between the Ontario government and teachers regarding wage freezes, as well as the cost of the Liberal government’s cancellation of the construction of gas plants in Mississauga in

\(^{266}\) Notable cuts announced in Budget 2012: Next Generation of Jobs Fund contracts were not extended; funding was capped on the ORF-RE and ORF-RL; transfer payments to a select set of recipients were reduced (p. 29 – 30)

2011\textsuperscript{268} and Oakville in 2010\textsuperscript{269}. The premier confirmed that the escalating tensions with the teachers influenced his decision to request Lieutenant Governor David Onley to adjourn the legislature so that the government could use the prorogation period to negotiate with the unions.\textsuperscript{270} As the government worked towards resolving this highly publicized issue with the teachers – which precipitated province-wide teacher-led protests, strikes and school closures – the Ontario Liberal Party’s leadership race took place.\textsuperscript{271}

On January 26\textsuperscript{th}, 2013 the Ontario Liberals elected Kathleen Wynne as their new leader and on February 11\textsuperscript{th}, 2013, Wynne became the first female Premier of Ontario. Under Premier Wynne’s leadership, the Ministry of Economic Development and Innovation was rebranded the Ministry of Economic Development Trade and Employment/Ministry of Research and Innovation. This new administrative arrangement was led by two different ministers; Reza Moridi was appointed Minister of Research and Innovation and Dr. Eric Hoskins was named Minister of Economic Development, Trade and Employment. DM Wendy Tilford continued to serve both Ministers of MEDTE and MRI. Arguably, this unique ministerial structure had the potential to realize an enhanced degree of horizontality between these two ministries which could have facilitated the flow of policy ideas and resources and contributed to the development of integrated initiatives capable of realizing the province’s research and innovation policy goals and broader economic objectives, i.e. job creation, economic growth, and increased competitiveness. However given that MRI was left without a

\textsuperscript{268} In April 2013, Ontario’s auditor general, Jim McCarter released a special report confirming that the 2011 decision to stop construction of a gas-fired power plant in Mississauga and relocate it in Lambton would result in a net cost of $275 million. Source: Ontario. Office of the Auditor General. Mississauga Power Plan Cancellation Costs. Special Report, Toronto: Queen’s Printer for Ontario, p. 14


\textsuperscript{271} There were six candidates on the day of the Leadership Convention, January 26\textsuperscript{th}, 2013: Dr. Eric Hoskins, Gerard Kennedy, Sandra Pupatello, Charles Sousa, Harinder Takhar and Kathleen Wynne.
policy secretariat dedicated exclusively to advancing the province’s research and innovation policy goals, synergistic policy-making was challenging. Overall, the state of MRI as of 2013 signaled a de-prioritization of research and innovation on the government’s political agenda, and perhaps even worst, the end of a great policy experiment initiated by the McGuinty Liberals.

9.5.2 A Reflection on the Recent Past

Despite the aforementioned organizational shortcomings of the new MRI, the Ministry delivered a major policy commitment aimed at advancing health innovation in Ontario. As discussed in Chapter 7, the Council of Academic Hospitals of Ontario and other individual research hospital representatives advocated for the creation of a Health Research Council that would work with the provincial government develop a health research strategy for Ontario; leverage and distribute funding; and facilitate innovation across the health care sector (CAHO, 2008: 1). In November 2013, the new Ontario Health Innovation Council (OHIC)\(^272\) was launched with a mandate to “identify opportunities for evidence-based innovation and strategies in health care” for the purpose of “improve[ing] health, health care and well-being in Ontario; spur[ring] innovation that lowers health care costs; increase[ing] quality of patient care; stimulat[ing] the environment needed for job creation [in the health sector]…and attract[ing] the best and brightest researchers and entrepreneurs to Ontario”

\(^272\)The OHIC is comprised of experts from the health care, home care, medical device, non-profit, mental health, research, academic and business sectors: Dave Williams, President and CEO of Southlake Regional Health Centre; Richard Dicerni, Adjunct Research Professor at the Richard Ivey School of Business, Western University; Robert Bell, President and CEP of University Health Network; Adalsteinn (Steini) Brown, Director of the Institute for Health Policy, Management and Evaluation at the University of Toronto; Neil Fraser, President of Medtronic of Canada Ltd.; Sarah Friese, President of Central Ontario Health Care Procurement Alliance; Rafi Hofstein, President and CEO of MaRS Innovation; Jeffrey Lozon, President and CEO of Revera Inc.; Peter Robertson, Vice-President and General Manager of GE Healthcare; Anne Snowdon, Chair of International Centre of Health Innovation at the Richard Ivey School of Business; Shirlee Sharkey, President and CEO of Saint Elizabeth; Leslee Thompson, President and CEO of Kingston General Hospital; Peter van der Velden, Managing General Partner of Lumira Capital Investment Management Inc.; Theodore Witek, President and CEO of Boehringer Ingelheim (Canada) Ltd.; Catherine Zahn, President and CEO of Centre for Addiction and Mental Health (MRI, 2013).
Moreover, OHIC will identify opportunities for Ontario’s small and medium-sized businesses to participate in global and domestic markets for health innovations as well as develop recommendations regarding Ontario’s adaption of best practices employed by other jurisdictions with overarching health technology innovation strategies (COU, 2013).

In regard to the status of MRI’s suite of research funding programs, between 2011 and 2013, funds flowed through a number of its talent programs and the Ministry continued to provide targeted grants to various research and innovation institutions across Ontario including hospitals, universities, colleges, and innovation intermediaries. During this timeframe, the Ministry also added a small handful of new supply-side innovation policy initiatives, including the Ontario-China Research and Innovation Fund, the Ontario-India Research Collaboration Fund and the Ontario-Israel Collaboration Fund. While these new programs are critical for supporting Ontario researchers and innovators in establishing robust linkages with international partners, new rounds of competition for a range of Ontario’s long-standing research excellence programs – in particular, the ORF-RE – were delayed.

The provincial government also demonstrated a continued commitment to enable high-growth firms access to the risk capital they need to grow. Efforts to attract venture capital through the Ontario Emerging Technologies Fund (OETF) and the Ontario Venture Capital Fund (OVCF) were sustained under the management of the Ontario Capital Growth Corporation (OCGC). In order to secure a wider range of capital sources, the OCGC also marketed the OETF and OETF portfolio companies outside of Ontario, in particular, to US funds and other Canadian investors, and by 2012, 41% of its levered capital came from outside Ontario (OCGC, 2012: 17). On March 19 2013, the Liberal government launched a

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new $300 million venture capital fund aimed at building on the OVCF (Office of the Premier, 2013). Premier Wynne announced that the provincial government would commit $50 million, which would be matched by the federal government; remaining funds are expected to come from private investors. However, despite the government’s efforts, between 2011 and 2013, the demand for venture capital funds in Ontario – and more broadly across Canada – continued to outweigh supply.  

While a predominantly supply-side innovation policy mix remained in place, the government turned its focus towards strengthening its technology-based innovation ecosystem, the Ontario Network of Excellence (ONE). In 2013, the Ministry of Research and Innovation rolled out an action plan to review and renew the ONE. This Strategic Review was led by Assistant Deputy Minister Bill Mantel and was intended to further enable Ontario’s entrepreneurs to more readily access ONE services; strengthen collaboration between entrepreneurs and other stakeholder organizations (i.e. the Industrial Research Assistance Program, the Business Development Bank of Canada, regional chambers of commerce, research institution, etc.); ensure a system-wide employment of innovation best practices; and maximize an economic return through the improved performance of innovation and entrepreneurship networks. In February, the Ministry worked with the regional innovation network (RIN) offices to draw out information regarding each region’s program performance and strengths (i.e. scope of talent, degree of inclusiveness, best practices, etc.), the range of challenges faced by their entrepreneurs, and ongoing initiatives to enhance

275 Canada has a long way to go in attracting the level of venture capital investment it sustained before the dot-com bubble burst in March 2000. According to Thomson Reuters, in 2000, $5.9 billion of venture capital funds was invested in 1,007 Canadian startups (Kiladze, 2011). However, the tech bubble burst in March of that year and seriously impacted confidence in the asset class in Canada as well as other advanced economies (Bitti, 2013). Ten years later, venture capital investments totaled $1.1 billion with only 357 companies financed (Kiladze, 2011). Canada’s VC industry is showing some small signs of improvement; in 2013, venture capital investments totaled $1.8 billion (Ibid).
regional collaboration. Staff from each RIN worked with a facilitator and liaised with other stakeholders from their region to develop their input into the ONE Strategic Review.

After assessing the information collected, in May 2013, the Ministry rebranded the network, and the Ontario Network of Entrepreneurs was launched, complete with a new website that featured an E-business toolkit intended to provide entrepreneurs with information regarding the range of resources available to them for starting, building and financing their businesses. Resources for advancing youth entrepreneurship were also included on the new ONE website. Notably, more time is needed to assess the ONE’s capacity to intensify innovation in Ontario. However, to ensure its success – and that of the other research and innovation support programs and initiatives – the Ontario government must establish a successor to the 2008 Ontario Innovation Agenda (OIA) that will build on the province’s existing strengths, identify new opportunities, and address the challenges of the province’s research and innovation ecosystem.

9.6 Moving Forward

A new research and innovation action plan is urgently needed if Ontario expects to become more competitive, particularly relative to other regions that have more recently established new multi-year policy platforms\textsuperscript{276} to support and leverage their research and innovation capabilities.

\textsuperscript{276} On October 16, 2013 the Quebec government released the \textit{Politique nationale de la recherche et de l’innovation (PNRI)}, i.e. the National Research and Innovation Policy (PNRI). Under this five year initiative, the provincial government will invest $3.7 million (Government of Quebec, 2013) between 2014 and 2019 to address three major challenges facing the province: an ageing population, sustainable development and the Quebec identity (Ibid). The Policy prioritizes investments in seven strategic areas where Quebec has demonstrated research and innovation strengths: aerospace, biofood, biotechnology, renewable energy and transportation electrification, creative industries, personalized health care and information and communication technologies (Ibid). $1.3 billion (35\% of the total government investment) will be targeted directly towards research, and it also apportions funding to support new and small companies through various direct and indirect tax-based measures (Henderson, 2013). Most notably, the Policy announces the government’s intentions to create the Réseau recherche innovation Québec (RRIQ) network, i.e. the Quebec Research and Innovation Network (QRIN) (Gouvernement du Québec, 2013:44). Similar to the Ontario Network of Entrepreneurs (ONE), the RRIQ is expected to strengthen partnerships between researchers, businesses,
9.6.1 Wanted: A Research and Innovation Action Plan for Ontario

At best, the Ontario Innovation Agenda was a framework for an action plan that is now sorely overdue. A new multi-year research and innovation action plan for Ontario would not only identify the goals and priorities of the provincial government – i.e. indicating what research and innovation policy in Ontario aims to achieve – but would also include an implementation strategy that explains how, when and why the Ontario government would intervene in the innovation process. Most notably, the implementation strategy would, in more detail than the agenda, tease out the intended outcomes of the government’s policy interventions in the form of measurable targets. For instance, Quebec’s PNRI (2013) sets a bold yet attainable objective of increasing government expenditure on R&D (GERD) levels to 3% of GDP – a target that most advanced Western societies have established in an effort to achieve their higher-level goals of stimulating economic growth and job creation in knowledge-based sectors (p. 38, 51).

The Ontario government continues to promote “results-based planning” - an approach to governance that aligns with the province’s longstanding operative norm requiring public officials to demonstrate managerial efficiency. In line with this operative norm, the new Ontario Research and Innovation Action Plan should include an up to date assessment of Ontario’s research and innovation ecosystem as well as a means for evaluating the impact of and a host of intermediary organizations across the province in order to advance the results of applied research at an international level; make these results available to local public and private research and innovation stakeholders, particularly SMEs; and develop the competencies of a new generation of researchers and enable them to collaborate on multi-disciplinary projects (Ibid). The Quebec government has committed to invest $130.2 million over 3 years in the RRIQ, and once fully operational, it is anticipated that the network will bring together 120 Quebec organizations dedicated to knowledge mobilization (Henderson, 2013). Most notably, the new network is promoted as a vehicle for providing “a single entry point to those seeking to collaborate with universities and colleges” (Henderson, 2013). As such, the RRIQ will accept research hospitals, research centres and companies as members (NB. a portion of the members’ funding will be based on their performance and their ability to collaborate) and companies seeking to benefit from the members’ expertise may acquire an “Innovation Passport” (Gouvernement du Québec, 2013: 44-45). According to the PNRI, the RRIQ is modelled on Germany’s Fraunhofer Society, France’s network of Carnot Institutes and the Catapult Centres in the UK (p. 44). See the PNRI for more detail on these and other initiatives launched.

277 See Chapter 4 for an overview of the operative norms that have historically impacted policy development in Ontario.
Ontario’s research and innovation policy over the course of the Plan’s implementation. This would help decision-makers to determine the extent to which policy action guided by the plan had a transformative effect on the province’s research and innovation ecosystem. The Ontario Innovation Economy Scorecard 2010 may be used as a guideline for establishing a more up to date set of indicators for measuring Ontario’s innovation performance and the government’s rate of return on investments. Moreover, to ensure transparency, accountability and managerial efficiency, the government should commit to publicizing these results – no matter how well/poorly the province performed.

The proposed research and innovation action plan should also be endorsed by all political parties represented in the Legislature and include provisions that would reduce the possibility of its wholesale termination due to a change in government. Public resources are wasted when new administrations change and/or wind down inherited policies and programs before they can realize an impact and/or merely because these initiatives are a part of a former administration’s legacy. In particular, myopic decision-making compromises the research and innovation activities of Ontario’s research institutions; threatens the growth of entrepreneurial ventures; and, makes Ontario less attractive to investors. As such, public policy must be developed with the understanding that an investment in innovation is a “high road strategy,” the only long-term, sustainable growth alternative of an advanced economy (Asheim, 2013). Moreover, given that an Action Plan would directly impact the design of Ontario’s suite of research and innovation policy instruments and the deployment of public funds, it is critical for decision-makers to ensure that the Plan is strategic, place-based and integrated.

Chapter 3 provides an overview of the importance of a leading jurisdiction developing strategic, place-based and integrated research and innovation policy.
• Strategic

A strategic research and innovation action plan would articulate the government’s high-level goals (i.e. enhanced economic well-being, increased productivity and employment growth) and priorities. The OIA identified the provincial government’s vision and research and innovation goals, tying them closely in with the five-point economic plan for Ontario\textsuperscript{279} that was aimed at “investing in skills and education, accelerating provincial investments in infrastructure, lowering business costs and strengthening key partnerships to maximize Ontario’s potential, as well as supporting innovation” (MRI, 2008d: 3). However, the OIA was missing a key feature that is present in an action plan. Attainable short-, medium- and long-term targets should be put in place in order to keep the government on course to achieving its objectives in the timeframe in which the multi-year Plan is intended. These time-based targets can also be used to evaluate the government’s performance intermittently which would help decision-makers select the course of action that is most effective for ensuring that the established objectives are met, and justify changes to the existing mix of research and innovation support programs implemented to achieve research and innovation-oriented objectives. A 12 to 18-month review of a five year Action Plan would provide some insight into whether certain policy levers need to be adjusted, strengthened or replaced.

A strategic Action Plan would also demonstrate that the government has a comprehensive understanding of the economy’s current research and innovation strengths and weaknesses, the range of opportunities that its regional research and innovation ecosystem actors across different sectors have available to them, as well as the breadth of factors that threaten the growth and sustainability of that ecosystem. Moreover, an Action Plan would include the list of policy alternatives necessary for sustaining and/or enhancing

\textsuperscript{279} Chapter 8 provides details re. the Ontario government’s five-point economic plan (2008).
those strengths, addressing weaknesses and threats to regional innovation activity, and ensuring ecosystem members have the resources (e.g. financial and/or knowledge-based capital) necessary to take advantage of opportunities to develop their innovations and bring them to market. For instance, in the case of weaknesses affecting the innovation ecosystem, the conditions and circumstances that hinder entrepreneurial growth and/or mitigate the impact of research and innovation activity should be identified in the Action Plan. To date, some of these weaknesses include low levels of business innovation activity across different sectors, perpetuated by the absence of innovation-oriented business strategies; insufficient venture capital funding; and lack of incentives aimed at encouraging the growth of SMEs rather than merely ensuring their sustainability.\textsuperscript{280} While the OIA discussed a range of challenges Ontario research and innovation actors faced at the time, a new Action Plan would offer a more up-to-date overview of the most pressing issues, establish performance targets that would demonstrate an improvement in the performance of the regional innovation ecosystem, and provide a set of policy alternatives to address those challenges.

A new Action Plan would also provide a blueprint for developing a regional advantage. As such, it would include a proposal for building up Ontario’s comparative advantages and/or turning comparative advantages into competitive advantages. It is important to note that the OIA discussed the government’s commitment “to focus on areas where Ontario has a demonstrated competitive advantage in industry, the research community or both” (MRI, 2008d: 12). Funding was to be apportioned “to support strategic opportunities - that is, ones where a large-scale global market opportunity exists, coupled with a unique strategic position that favours Ontario” (Ibid). To this end, the OIA committed

\textsuperscript{280}The Institute for Competitiveness and Prosperity (2013) raises attention to the unintended adverse effect small business tax reductions have on SMEs. The Institute maintains that this kind of policy alternative “discourag[es] growth beyond the small business income threshold,” and in turn, “rewards ‘smallness’” (p. 5, 11).
to target funding towards industry-led programs and projects from four “strategic areas” of the economy: bio-economy and clean technologies; advanced health technologies; pharmaceutical research and manufacturing; and digital media and information and communications technologies. In light of limited public resources, this “smart specialization”\textsuperscript{281} approach is a strategic, practical alternative to spreading funding across a broader range of research areas and sectors (Wolfe, 2011; Foray et al, 2012). However, a strategic Action Plan for Ontario would go several steps beyond identifying areas of smart specialization. It would discuss the mix of policy instruments that would be employed to provide innovation actors with a broad range of knowledge resources that is necessary for achieving the province’s economic goals. While the OIA emphasized the importance of investing in knowledge generation and highlighted the value of the Ontario Research Fund in supporting this priority, the discussion on policy aimed at supporting Ontario businesses’ development and deployment of “knowledge-based capital” (KBC) was lacking. The OECD (2013) recognizes KBC as a new source of economic growth that includes three categories of intangible sources: computerized information (software and databases); innovative property (patents, copyrights, designs, trademarks); and economic competencies (including brand equity, firm-specific human capital, networks of people and institutions, and organizational know-how that increases enterprise efficiency) (p. 22). An Action Plan focused on resolving one of Ontario’s most critical innovation system challenges – low business innovation activity – would discuss the economic value of Ontario businesses acquiring and employing knowledge-based capital\textsuperscript{282} and offer a range of policy levers to incentivize corporate

\textsuperscript{281} The “smart specialization” concept was introduced in Chapter 3. According to the Foray et al (2012) the smart specialization concept promotes the idea that a concentration of knowledge resources can be linked to a limited number of priority economic activities to improve a national and regional jurisdiction’s competitiveness in a global economy.

\textsuperscript{282} The OECD (2013) maintains that business investment in KBC helps boost growth and productivity. Studies conducted have shown that business investment in KBC in the EU and the United States have contributed to 20% to 34% over average labour productivity growth (p. 17).
investment in KBC. By applying a smart specialization approach to policy development efforts\textsuperscript{283} aimed at encouraging investments in KBC, the provincial government can play a catalytic role in supporting and incentivizing business-led innovation activity in areas where Ontario can build on existing comparative advantages and/or create a competitive advantage.

- Place-based

An Action Plan that promotes policy development based on smart specialization is not only strategic, but it is also sensitive to the distinct industry structures and knowledge bases of its innovative city-regions (Foray et al, 2012). Policy-makers who recognize that (a) different modes of innovation co-exist in regional economies and (b) knowledge creation and innovation can occur across a range of industries in different ways\textsuperscript{284} will implement a place-based Action Plan that incorporates a mix of public policy support designed to address the unique research and innovation needs and capabilities of these locales. For instance, as discussed in Chapter 6, the priorities and concerns of research and innovation actors from Northern Ontario are substantively different from those actors from other parts of the province. Moreover, Northern Ontario researchers and innovators working in one sector will have fundamentally different needs from others conducting research and innovative activity in another sector. The OIA does not offer any indication of how it will meet the unique, context-specific needs of its city-regions. However, a place-based Action Plan will not only address this important issue, but will discuss the range of policy options the government should establish to ensure that a mix of support programs are developed to support the full

\textsuperscript{283} These policy efforts may include improving the design of R&D tax credits to provide Ontario businesses with incentives for developing and employing KBC. The OIA mentions the launch of the 10-year Ontario Tax Exemption for Commercialization (OTEC) initiative which was intended to incentivize new corporations to acquire and commercialize intellectual property from Canadian research institutions. However, MRI interviewees indicated that Ontario businesses have not taken advantage of this initiative. See Chapter 8 for a discussion on the OTEC.

\textsuperscript{284} See Asheim and Parrilli, 2012: 5.
range of the province’s innovation ecosystem’s highly differentiated, constantly evolving needs.

It is worth noting that the provincial government’s investments in Northern Ontario to support innovation activity should not be perceived as merely an exercise in demonstrating fairness to the regions or an attempt to maintain political support across the region. Public funding targeted towards enhancing the research and innovation strengths of the north is a worthwhile investment given the commercialization potential the region has demonstrated across a number of sectors, including mining, mineral processing, health and biotechnologies, viticulture, biofuels and environmental technologies. Innovation activities in Northern Ontario must continue to be supported by public funding if the province expects to establish an environment that will attract talent and significant levels of private sector investment to the region. As such, while the lion’s share of Ontario’s innovation is concentrated in Southern Ontario, efforts to harness the innovation potential of key sectors in the north should remain a critical part of a place-based Action Plan for the province.

- Integrated

An integrated Action Plan would identify a range of policy levers for promoting long-term policy synergies at an institutional level (i.e. between research and innovation actors within the same sector as well as across different industries); horizontally (i.e. between provincial ministries and agencies with research and innovation priorities incorporated into their mandates); and vertically (i.e. between municipal leaders, and provincial and federal government ministries, departments and agencies with research and innovation incorporated into their mandates). Indeed, policy coordination and priority alignment across these levels are critical for ensuring that Ontario actualizes its research and innovation objectives and

285 Critics may argue that the government’s decision to invest a larger proportion of funding than is believed necessary to support innovation activity in the north is motivated by political leaders’ intent to secure the rural vote.
economic goals. Moreover, the proposed Action Plan could include a range of deliberative mechanisms research and innovation actors can access to provide decision-makers with insight into their rapidly changing needs and concerns as well as the feedback regarding the strengths and shortcomings of existing support initiatives. A bold move at developing standing deliberative forums on research and innovation policy development would potentially open up Ontario’s policy-making process to more creative ways of harnessing the province’s research and innovation capacity in order to ensure economic growth, intensify job creation in knowledge-based sectors and improve levels of productivity.

9.7 Conclusion

This dissertation has demonstrated that there are many factors that contributed to the development of Ontario’s research and innovation policies between 2003 and 2011. In light of Ontario’s current priorities, strengths, challenges, and opportunities, a new mix of policy instruments should be developed that incorporates more demand-side innovation policies. This study has also emphasized that innovation policy for regional economic growth requires ongoing, focused public investment guided by an innovation ecosystem approach. Given that the needs of Ontario’s researchers and innovators are constantly changing and the ecosystem itself is continuously evolving, policy leaders must be vigilant and quick to identify system problems and have in place policy instruments that are nimble enough to address those issues. The provincial government has a leadership role to play in establishing policies that will cultivate the promise of economic development and job creation in knowledge-based sectors of the economy. It also has a catalytic role to play in driving the region’s innovation goals by developing support programs that enable the activities of its research and innovation ecosystem actors. While policy experimentation is often risky and may result in failure, many lessons can be learned from efforts to improve Ontario’s mix of research and innovation
policies. Despite the unknown outcome of the decision-making process, policy inertia is not a viable option.

Overall, the development of research and innovation policy in Ontario, as well as across other provinces, is an under-researched area. More investigatory work into why policy has developed differently across time and space is needed. In particular, a comparative approach to policy development would help distil the variables that are more likely to promote a certain balance of supply-side and demand-side innovation policy mixes. For instance, a comparative analysis of policy development between Ontario and the other provinces could provide insight into a broader range of variables that have a critical influence on decision-making at the agenda-setting and policy formation stages of policy development. This level of study could also help to isolate the set of explanatory factors that are unique to Ontario and would have substantively impacted the development of a predominantly supply-side innovation policy mix. Likewise a cross-regional comparative analysis of jurisdictions outside of Canada could be conducted. By controlling for certain variables – for example, political institutional organization, industrial structures, state-societal relations – the analyst could identify which set of factors were causal to a certain policy outcome as opposed to those that may have had an intermediary effect. This type of investigation could help to pinpoint which factors are necessary and sufficient for the development of a predominantly supply-side or demand-side innovation policy mix.

A study on the implications of decision-makers experimenting with demand-side innovation policy is another fruitful line of investigation. An analysis of policy change in regions with a history of predominantly supply-side innovation policies could offer important policy lessons for other jurisdictions intent on developing a mix of policies that diverge from its existing policy development trajectory.
Finally, research and innovation policy evaluation in Ontario is another challenging yet important area of study. Evaluation requires the collection of information – strategic intelligence – about a given R&I ecosystem as a basis for making policy and improving existing public initiatives (OECD, 2008: 85-86; OECD, 2005a: 10). To this end, policy evaluation helps government determine whether public interventions are capably addressing policy problems as intended. Moreover, evaluation provides a significant “feedback loop,” which enables research and innovation ecosystem actors to make use of the information acquired, adapt to changes in their environment, and ultimately engage in policy learning (OECD, 2008: 86, 91). In particular, that information is crucial for informing policy-makers on the type of changes that must be made to ensure that the government’s limited resources are employed as effectively and efficiently as possible. Across Ontario’s research and innovation policy community, scholars, analysts, and other members of the research and innovation stakeholder community have commented on the complexity of evaluating the performance of Ontario’s innovation strategy, and efforts have been made to develop indicators that measure the impact of the suite of support programs the provincial government has established to advance research excellence, commercialization and innovation. However, more work needs to be done towards developing a set of indicators that the provincial government will use to evaluate the performance of the full range of initiatives created to support the province’s research and innovation ecosystem.
Appendix 2.1 Questions used to assess the structure of Ontario’s research and innovation policy network

State Authority

Does a single agency or ministry dominate relations in the research and innovation sector?

Was the Ministry of Research and Innovation (MRI) capable of generating the information, technical or otherwise, required for the pursuit of their mandate?

Did MRI have the ability to draw information from different sectoral actors (i.e. firms or associations)?

What task forces, coordinating committees or working liaison groups were developed to encourage independent thinking and broader perspective required for longer-term policy planning?

What arrangements were put in place to encourage the formation of informal alliances between members of the political executive and the MRI bureaucrats?

State Autonomy

Did MRI officials have a clear conception of their role? Was a value system established that was consistent with and supportive of that mandate? Was there strong political support for the Ministry’s mandate?

Did the MRI bureaucracy possess a professional ethos distinct from professionals in society at large?

Did the bureaucracy administer guidelines that defined their responsibilities and those of societal groups?

Organizational development of societal actors

Is there a horizontal division of labour within Ontario’s research and innovation sector?

Does one association speak for the research and innovation sector? Is there evidence of subsectoral organizations belonging to a sector-wide association?

These questions were premised on the analysis of Atkinson and Coleman (1989) and Coleman and Skogstad (1990).
Do both the sectoral and subsectoral associations (i.e. from the research community, the business sector, etc.) have a high density? Will a high proportion of the firms/organizations in a given sector be represented by the association?

Do the organizations and associations possess considerable in-house capacity to generate information, both technical and political?

Do associations have the capacity to bind member firms to agreements negotiated with the state and to offer assurances of individual firm compliance with policy decisions?
Appendix 2.2 Questions developed to guide an assessment of the agency of Ontario’s research and innovation policy network

What kind of strategies did government and non-governmental agents employ to influence the development of research and innovation policy?

What strategic actions were used to raise Ontario’s innovation problem/challenge/imperative onto the political agenda?

How did these strategic actions influence problem definition?

How did non-governmental actors attempt to influence the way government officials interpreted the province’s innovation problem/challenge/imperative?

What kinds of causal stories, framing techniques, etc. were used by governmental and non-governmental agents to legitimize their ideas regarding innovation, and how did these strategic actions impact the development of the suite of research and innovation funding programs the government needed to advance its goals?

What kinds of “strategic alliances” emerged? Why?

How did the government/MRI consult with societal actors from different sub-sectors?

Which groups participated in the policy making process and how? (i.e. through open consultations? Closed, private consultations? Secondments?)

Identify the formal and informal ties government established with stakeholders for information gathering and consultation purposes. Was there any evidence of collaboration and trust ties between government officials (political and bureaucratic) and non-governmental actors?

Which societal groups appeared to have influence on the development of policy?

What kind of evidence existed to suggest that some agents were successful in influencing the policy process, i.e. to what extent were their ideas and interests reflected in the development of research and innovation policy?

Which groups maintained an advocacy role? Which groups appeared to be the least successful at influencing the policy process?

Did power struggles emerge between groups within and outside the government apparatus? If so, how did these power struggles affect policy development?
Appendix 4.1 A Selection of Federal Government R&D and S&T-support Programs and Funding Initiatives, pre-2003

Before 2003, a number of Canada’s federal government labs and departments deployed initiatives to support science and technology and advance research and development, including the Department of National Defense, Agricultural Canada, Atomic Energy Canada, the Department of Energy Mines and Resources, the Department of Communications the Department of Fisheries and Oceans, Environment Canada, Health and Welfare Canada, Transport Canada, and Industry, Science and Technology Canada.287

The table below provides a sample of R&D and S&T funding agencies, crown corporations and support programs the federal government established before 2003. The table also includes two non-profit organizations – the Canada Foundation for Innovation and Genome Canada – that have received federal research dollars that are used to invest in R&D, scientific discovery, and technological innovation. Ontario researchers and innovators were eligible to receive funding from all of these initiatives. All of these agencies, crown corporations and programs remain active as of 2013.

<table>
<thead>
<tr>
<th>Programs</th>
<th>Details (Description, Funding information)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Development Bank of Canada (BDC)/Formerly known as: Industrial Development Bank (IDB)/Federal Business Development Bank (FBDB)</td>
<td>Established in 1944, the Industrial Development Bank (IDB) served as an arm of the Bank of Canada and its core function was to help small manufacturers that produced military equipment convert their facilities to peace-time operations after WWII. Overtime, the operations of the bank were extended to provide loans for entrepreneurs in other sectors including transportation, mining, construction, hotels and motels, fishing, etc. By 1973, the Bank offered a broader range of services to SMEs (i.e. advisory services). It also officially severed from the Bank of Canada, was made a separate Crown corporation. As of 2013, the Business Development Bank of Canada continues to complement private sector financing of innovative Canadian SMEs. The BDC’s operations include lending, subordinated debt and venture capital financing (Canada. Department of Finance, 2003: 129)</td>
</tr>
</tbody>
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287 These ministries have conducted patents and licensing activity (Premier’s Council, 1988b: 117).
| **Canadian Space Agency** | The CSA was established in 1989 and created through an Act of Parliament passed in 1990. The CSA’s mandate is “to promote the peaceful use and development of space, to advance the knowledge of space through science, and to ensure that space science and technology provide social and economic benefits for Canadians.” (Canadian Space Agency Act S. C. 1990, c. 13).

CSA’s budget for 2013-14 is $488.7 million. |
| --- | --- |
| **Federal Economic Development Initiative for Northern Ontario (FedNor)** | FedNor is an economic development organization established in 1987 to promote and support job creation and economic growth in Northern Ontario by working with community partners and other organizations to improve small business capital, information and markets (Industry Canada website, “Audits and Evaluations”).

As of 2013, FedNor’s main funding program is the Northern Ontario Development Program (NODP) which has three priorities: community economic development, business growth and competitiveness; and innovation. (Refer to Conteh, 2013 for an overview and critical analysis of FedNor’s regional development policy framework.) |
| **National Research Council Canada (NRC)** | Established in 1916, this federal crown corporation initially funded research committees for special needs (e.g. from tuberculosis to railways) and provided science fellowships at Canadian universities. During the WWII, NRC performed R&D, and after the war, it intensified support for basic and applied research in science and engineering.

As of 2013, NRC’s areas of R&D include aerospace; aquatic and crop resource development; automotive and surface transportation; construction; energy, mining and environment; human health therapeutics; information and communications technologies’ measurement science and standards; medical devices; national science infrastructure; ocean, costal and river engineering; and, security and disruptive technologies. |
| **Networks of Centres of Excellence (NCEs)** | The NCE program was launched in 1989 as a joint initiative of NSERC, SSHRC and the MRC/CIHR, Industry Canada and Health Canada. It began with 14 projects and involved scientists from 30 universities, government agencies and the private sector. The purpose: to bring together partners from academic, industrial, public and non-profit sectors to conduct cutting-edge research and knowledge transfer activities in areas of strategic growth and opportunity for Canada. The NCE annual budget is leveraged by funds received from outside sources, including private firms.

As of 2013, NCE includes 4 national programs that support research and talent development in the natural sciences, engineering, social sciences and health sciences: the Networks of Centres of Excellence (includes the NCE Knowledge Mobilization and the Canada-India Research Centre of Excellence); the Centres of Excellence for Commercialization and Research; the Business-led Networks of Centres of Excellence; and the Industrial Research and Development Internship. |
| **TRI-COUNCILS OF CANADA** | The Tri-council of Canada is comprised of three separate funding agencies: the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council (SSHRC). Each agency has its own mandate, budget, and suite of funding programs. |
| **Canadian Institutes of Health Research (CIHR)** | CIHR supports health research. It was created in 2000 and is accountable to Parliament through the Minister of Health. The purpose of the CIHR is “to excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and a strengthened Canadian health care system” (Canadian Institutes of Health Research Act S. C. 2000, c. 6). |
| **Formerly known as:** Medical Research Council (MRC) |  |
| **Natural Sciences and Engineering Research Council of Canada (NSESRC)** | Funds from the CIHR are distributed through a competitive peer-review system. Applicants from research hospitals and other health-research institutions receive grants to cover operating and infrastructure related expenses. Funding may also be provided for symposia, scientist exchanges and international scientific activities. The CIHR is the successor to the Medical Research Council which was created in 1969 to support medical research. As of 2013 CIHR provides leadership and funding support to more than 14,000 health researchers and trainees across the country. Research themes include (1) Biomedical, (2) Clinical, (3) Health systems services, and (4) Social, cultural, environmental and population health. CIHR’s budget for 2013-14: $979 million |
| **Social Sciences and Humanities Research Council (SSHRC)** | NSERC was established in 1978 with a budget of $112 million. With the creation of NSERC, research funding in the natural sciences and engineering was transferred from the NRC (Wolfe, 2005: 328). NSERC is currently the largest funder of science and engineering research in Canada, providing support to 41,000 students and professors at universities and colleges across the country (2011-12). Most notably, NSERC provides funding in 5 S&T Priority Areas (information and communications technologies; natural resources and energy; manufacturing; environmental sciences and technologies; health and related life sciences and technologies) and 6 Strategic Areas (aerospace; automotive; forestry and wood products research; Northern research; oil sands and heavy oil; and water-related research). For 2013-14, the NSERC budget is approximately $1.1 billion. SSHRC was created in 1977 by an Act of Parliament and reports to Parliament through the Minister of Industry. This federal research funding agency promotes and supports research and training in the humanities and social sciences across Canada’s post-secondary education institutions. As of 2013, funding is distributed under 3 types of programs: Insight, Talent and Connection and while competitions are open to all disciplines, areas and approaches across the humanities and social sciences, SSHRC has identified five priority areas: (1) aboriginal research; (2) Canadian environmental issues; (3) digital economy; (4) Northern communities and (5) innovation, leadership and prosperity. In 2012-13, SSHRC’s grants and scholarships budget was $339.1 million (excludes the Indirect Costs Program budget which is approximated at $330 million) – Talent (51%), Insight (39%) and Connection (10%). In 2012-13, the total value of all grants, fellowships, and scholarships SSHRC funding was $337 million. |
| **Support Programs** | In the 2003 Federal Budget, the Canadian government proposed the creation of the CGS program to support the development research talent across Ontario; funding for the program was to be allocated among the three granting councils in proportion to the graduate student community: 60% to SSHRC, 30% to NSERC and 10% to the CIHR (Canada. Department of Finance, 2003: 125-126). In 2000, the Canada Research Chairs program was created to establish 2,000 research professorships to eligible degree-granting institutions across the country. Chairholders are expected to achieve research excellence in the discipline in which the Chair is assigned (i.e. engineering and natural sciences, health sciences, humanities and social sciences); improve the breadth and depth of knowledge in a particular field of study; strengthen Canada’s international competitiveness; and help to train the next generation of knowledge workers through student supervision, teaching and the coordination of other researchers’ work. |
As of 2013, the Canada Research Chair program invests $300 million per year to attract and maintain Chairholders across 72 universities. The program is funded by SSHRC (20%), CIHR (35%) and NSERC (45%).

| **Indirect Costs Program (ICP)** | The Indirect Costs Program was introduced in 2003 to provide Canadian universities and colleges with an annual grant to help pay for a portion of their indirect costs of research. In 2012-13, the ICP budget was $332 million. Funding is apportioned to about 126 postsecondary Canadian institutions. The ICP is managed by SSHRC. |
| **Industrial Research Assistance Program (IRAP)** | The NRC established IRAP in 1946 to provide support to small and medium sized businesses that will assist in the development and employment of new innovations (Canada. Department of Finance, 2003: 129). IRAP has a network of Industrial Technology Advisors (ITAs) that deliver services (e.g. technical and business advisory services; financial assistance; networking and linkage services; service relevant to their youth employment program) to IRAP clients and establish long-term working relationships in the effort to encourage and support innovation in Canadian SMEs. These ITAs have expertise in a number of industrial sectors and many of them are veteran R&D professional. They are located in technology communities, local associations, universities and colleges across the country. |
| **Scientific Research and Experimental Development (SR&ED) Program** | From 1944, Canadian companies could deduct 100% of current expenditures related to scientific research from their taxable income. As of 2013, the SR&ED program is administered by the Canada Revenue Agency (CRA) to support the R&D activity of Canadian businesses in all sectors. It is the largest single source of federal government support of federal government support for industrial R&D (CRA website, “Scientific Research and Experimental Development Tax Incentive Program”). |
| **Canada Foundation for Innovation (CFI)** | CFI was created by the federal government in 1997 as a not-for-profit corporation to support the modernization of research infrastructure across Canadian research institutions. This organization was established with an initial endowment of $800 million (Cameron, 2005: 282); CFI provides 40% of the cost of an approved research project and the remaining 60% is provided by the recipient institution, private partners and the province. Between 1997 and 2003, the federal government invested $3.15 billion in CFI, which awarded research grants to more than 2,400 projects (Canada. Department of Finance, 2003: 127) Between February 1997 and June 2013, CFI has invested a total of $6 billion to support 8,132 projects. |
| **Genome Canada** | Genome Canada is a not-for-profit corporation created in February 2000 and is the primary funding and information resource for genomics and proteomics research in Canada. The federal government invested $160 million in funding to Genome Canada and over the years has continued to support the activities of this organization and its regional Genome Centres. As of 2013, the Ontario Genomics Institute is one of the six regional centres in Canada developing genomics projects with a number of Ontario’s public and private research institutions in the life sciences. Other centres include Genome British Columbia (est. 2000), Genome Alberta (est. 2005), Genome Quebec (est. 2000), Genome Prairie (est. 2000) and Genome Atlantic (est. 2000). |
Appendix 4.2 The Ontario Centres of Excellence – The Development of the Original Seven

The Ontario Centres of Excellence (OCE) program was intended to create cooperative R&D networks in order “to stimulate advanced scientific research, to train and develop world class researchers and to encourage the transfer and diffusion of technology” (Abbott and Jones, 1988: 1). This brief overview of the OCE will discuss (1) the formative stages of the Centres, identifying the breadth of actors, ideas and other environmental factors that influenced the early stages of the initiative’s development, between 1986 and 1987; and (2) the Centres’ evolution between 1987 and 2003.

- The Formative Stages of the OCE, 1986 – 1987

During the agenda-setting stage, decision-makers acknowledged the need for government action that would facilitate an increased level of cooperation between Ontario’s research community and industry in order to leverage the benefits of R&D activity across the province. Before the government could formulate a set of policy alternatives to resolve this problem, Board members and Presidents of several Ontario universities met with Premier Peterson and some of his ministers to discuss their institutions’ financial shortfalls (Abbott and Jones, 1988). The Centres of Excellence program was conceived to address the dual imperative of strengthening R&D collaborations and providing increased levels of funding to universities; indeed, this policy innovation was a means for the new government to fulfill election promises to support education and stimulate the provincial economy (Abbott and Jones, 1998).

Premier Peterson established a committee – chaired by the new deputy ministry of the Ministry of Colleges and Universities Alan Adlington – comprised of University Presidents and Chairs to make recommendations on how the government could stimulate university-
based research relevant to the Ontario economy. While the Adlington Committee produced a report in January 1986, it was never published due to controversial tax proposals. Nonetheless, some of the recommendations that were made influenced the design of the Centres of Excellence program; most notably, it was advised that the government should provide support for the sectoral allocation of funds to reinforce research areas of excellence relevant to Ontario’s economy; the Centre should facilitate the networking of researchers; and, peer review should be used as the basis of judging research excellence (Abbott and Jones, 1998).

In the summer of 1986, the Council of Ontario Universities (COU) submitted two papers to the government — one of which was drafted at the request of the Premier’s Council — in order to influence the design stage of the Centres. There were a few standout recommendations: the Centres should be limited in number; interdisciplinary; located at universities; based on proposals from individual universities or groups of universities; and evaluated by an independent expert body consisting of university, government and industry representatives (Abbott and Jones, 1998: 8). A number of the recommendations COU offered were accepted, including the idea of creating a limited number of intermediary centres performing medium to long-term research (Abbott and Jones, 1988).

In September 1986, the Premier’s Council prepared the groundwork for legislation creating the Centres of Excellence, and analysis from a working subcommittee chaired by Ed Clark of Merrill Lynch informed the policy formation stage of the Centres. The Clark subcommittee established the parameters of program, concluding that the Centres should be performers of long-term strategic research of maximum economic benefit to Ontario; university-industry consortia; located in either universities or industry; and flexible and

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288 The COU papers were entitled, “Some Considerations Regarding the Creation of Centres of Excellence at Universities in Ontario” (June 1986) and “Guidelines for the Creation of Centres of Excellence” (August 1986).
creative in their form and substance (Ibid: 10). By December 1986, a call for proposals was
issued and circulated to universities and industry across Ontario. Applicants were advised
that only six centres would be financed and proposals were due to the Ministry of Industry,
Trade and Technology by March 31, 1987. Fraser Mustard, the President of the Canadian
Institute for Advanced Research served as Chair of the Evaluation Panel mandated to review
the proposals (Ibid: 12).

• The Establishment of the Seven Centres of Excellence

Twenty-eight proposals were submitted. Participants involved in these proposals
included 28 colleges, universities and hospitals; 160 firms; 6 industry associations and 3
government departments (Abbott and Jones, 1988: 26). Of the 28 proposals submitted, seven
were successful; these were focused on (1) space, (2) integrated manufacturing, (3)
telecommunications, (4) materials, (5) information technology, (6) groundwater and (7)
lasers.²⁸⁹ None of the proposals initiated by industry won a competition (Ibid: 17). Five of the
seven successful proposals were driven by universities that agreed to cooperate with other
institutions, while the remaining two were driven by individual institutions.²⁹⁰

By the 1990s, the Centres had emerged as “valuable infrastructure,” critical for
creating linkages between university and industry (OCE: 1993). Research priorities were
shaped by the priorities of each Centre’s industrial members, and projects had to demonstrate
excellent research, contribute to the training of graduate students, and be relevant to the needs

²⁸⁹ Four essential factors and three ancillary factors influenced whether a proposal won a competition. Essential factors
included the caliber of researchers, the caliber and focus of the research program; the strategic importance of the
research; and networking possibilities exploited. Ancillary factors included industrial linkages, quality of presentation,
²⁹⁰ Waterloo was successful in securing a Centre focused on groundwater. University of Toronto’s proposal to advance
research excellence in lasers was accepted. (Abbott and Jones, 1988: 16)
of industry in the long run (OCE: 1993: ii). While the Centres of Excellence shared these features in common, each was unique from the other:

- Information Technology Research Centre (ITRC): promoted fundamental and applied research in information and technology and transferred the results of the research program to Ontario industry.

- Institute for Space and Terrestrial Science (ISTS): focused on space and planetary research. In 1993, the ISTS included 5 educational and 21 industrial business partners/members and a special partnership with Toronto’s Marc Garneau Collegiate Institute.

- Manufacturing Research Corporation of Ontario (MRCO): facilitated the transfer of technological advances from the research community to the manufacturing sector. MRCO

- Ontario Centre for Materials Research (OCMR): supported a range of technology transfer activities and funds industrially relevant research at Ontario universities in: polymers and plastics, biomaterials, metals and ceramics, electronic and optoelectronic materials.

- Ontario Laser and Lightwave Research Centre (OLLRC): performed and promoted laser and lightwave research in Ontario, trained world-class researchers and encouraged the transfer and diffusion of technology to industry.

- Telecommunications Research Institute of Ontario (TRIO): focused on creating world class telecommunications technology relevant and transferable to Canadian industry, while increasing the flow of trained researchers in relevant areas. Special attention

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291 OCE, 1993: 1, 6, 12, 16, 25, 27, 30, 33
was given to expanding and enhancing the educational infrastructure to achieve a permanent increase in the quality and capability of TRIO university members.

- Waterloo Centre for Groundwater Research (WCGR): this university-based institute focused on the development and protection of groundwater resources and the implications of substance waste management on groundwater quality. The Centre promoted the development of the Ontario advanced technology groundwater industry, and fostered international awareness of Ontario and Canadian groundwater technology and expertise.

Between 1987 and 1996, the Centres of Excellence worked with more than 1,000 companies in Ontario. During this time, the Centres were also responsible for issuing 355 patents and 252 licenses (OCE, 1996: 1). In 2004, the seven Centres were reduced to four: the Communications and Information Technology Ontario (CITO), the Centre for Research in Earth and Space Technology (CRESTech), Materials and Manufacturing Ontario (MMO) and Photonics Research Ontario (PRO).
Appendix 4.3 The Biotechnology Cluster Innovation Program – An Early Effort at Establishing a Commercialization Network in Ontario

In 2003, the Conservative Ontario government committed approximately $30 million to launch the Biotechnology Cluster Innovation Program (BCIP). BCIP was delivered by the Ministry of Enterprise, Opportunity and Innovation and was intended to build up an active cluster of research facilities and private sector bioscience companies, maximize biotechnology investment in Ontario, and create up to 3,000 jobs in regions across the province (Chudleigh, 2002; MEOI, 2003a). Groups of research and innovation actors organized into regionally-based “partnerships” or “consortia” in order to apply for BCIP funding (McMaster University: 2003). These regional consortia were comprised of a mix of the following partners: industry (biotech and convergent industries), entrepreneurs, municipalities (economic development agencies), universities and other research institutions, researchers, colleges, venture capital firms/investors, federal government agencies, school boards and industry/grower associations; each group of partners could include international representation. Every consortium was required to form a legal entity (MEOI, 2003a).

In order to qualify for BCIP, applicants had to demonstrate a critical mass of biotech and related R&D; articulate how BCIP funding would advance biotechnology activity that would drive economic growth; evince broad support and commitment from regional and other partners; and demonstrate private sector leadership (MEOI, 2003a). Altogether, 11 regional biotechnology consortia were funded (Rosiello and Mastroeni, 2010).

The Ministry specified that successful applicants would receive funding in two phases. Phase 1 funds ($2.2 million) were dedicated to support consortia’s innovation planning, and as such, recipients were expected to use the funding to develop strategic
innovation plans that would help build biotechnology capacity in their region. BCIP provided matching funds of up to 50 per cent of the cost of developing these regional innovation plans to a maximum of $200,000 (MEOI, 2003a). Phase 2 funding ($27.8 million) was to be used by consortia to invest in innovation infrastructure (i.e. commercialization centres, research parks and regional innovation networks) as well as initiatives that would accelerate cluster growth (i.e. skills training and entrepreneurship development, venture capital/angel investor networks, business mentorship and support services, and biotechnology awareness and education programs (Ibid).

Overall, BCIP was expected “to enhance the commercialization of new research discoveries and new company creation” in the biotechnology sector, “support the diffusion of biotechnologies into other knowledge-based industries and traditional industry sectors (eg. Chemicals, plastics, fuels, forestry), and build an internationally recognized corridor of biotechnology clusters with linkages to neighbouring US states (eg. Michigan, New York)” (Ibid). In realizing these goals it was anticipated that BCIP would maximize investment in Ontario’s biotechnology sector and contribute to job creation.

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292 As part of the BCIP eligibility criteria, applicants were required to demonstrate their ability to meet the matching fund requirement of $200K for Phase 1 (MEOI, 2003a).
Appendix 4.4 The Development of the Medical and Related Sciences (MaRS) Discovery District

MaRS Discovery District is a large-scale, mission-driven innovation centre, situated in downtown Toronto, established to connect science, business and government in order to foster innovation and advance the creation of global enterprises that contribute to Canada’s competitiveness and prosperity. Today, this nonprofit, public-private partnership provides Ontario’s entrepreneurs with the educational tools, advisory services, market intelligence and access to talent customers and capital that they need to bring innovative products to market and/or grow and expand their businesses. MaRS works closely with companies in a targeted set of sectors: life sciences and health care, information technology, communications and entertainment, cleantech, advanced materials and engineering, and social purposes businesses. Since its inception in 2000, MaRS has grown into Ontario’s largest urban innovation hub.

- The Early Years of MaRS, 2000 – 2005

In May 2000, Dr. Cal Stiller and Ken Knox attended the BIO Conference in Boston. While walking through Kendall Square, they agreed that Toronto needed a comparable infrastructure and collaborative platform to support the growth of biotechnology. Inspired by the geographical location and organization of Kendall Square, the two men envisioned that the new venture should be located proximate to academic and financial interests. Upon returning to Toronto, Knox and Stiller consulted with Dr. John Evans who had learned of the

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University Health Network’s (UHN) plan to sell its College Street property. Subsequently, Evans approached the Chairman and the President of the UHN regarding the possibility of acquiring that land.\textsuperscript{296}

According to Dr. Stiller, the new institution that he and his partners had in mind was “a concept of convergence and commercialization and translation of [the region’s] discoveries into economic activity.”\textsuperscript{297} The corner of College and University was the ideal location given that it was within walking distance to Toronto’s financial district, provincial government offices, hospitals and the University of Toronto. By situating MaRS close to research and innovation actors and policy makers, it was believed that MaRS would “achieve the benefits of a cluster, as defined by Porter and Martin” and contribute to the mutual growth and development of [nearby] businesses, academic enterprises and financial institutions (Evans, 2005: 279). Dr. Evans became the “community leader”\textsuperscript{298} of the group, assuming principal responsibility for galvanizing political and financial support for the construction of the MaRS Centre. Joseph Rotman also played a critical role in raising funds, and was exceptionally successful in light of his credibility in both the business and government sectors in Ontario and across Canada\textsuperscript{299}. Within two to three weeks, these visionaries raised $11 million by December 2000\textsuperscript{300}.

Altogether, a total of $13.7 million in philanthropic donations was committed by a group of leaders from Canada’s academic, business and scientific communities who became known as “the College of Founders.”\textsuperscript{301} The College of Founders was formed in 2001 and included AIC Limited, AstraZeneca Canada Inc., Mr. Lawrence S. Bloomberg, Cancer Care

\textsuperscript{296} “The Making of MaRS: A Tribute to Civic Entrepreneurship” (2009).
\textsuperscript{298} Ibid.
\textsuperscript{299} Ibid.
\textsuperscript{300} Ibid.
\textsuperscript{301} PricewaterhouseCoopers, 2011a: 9.
Ontario, Eli Lilly Canada Inc., Dr. John R. Evans, Mr. Arthur S. Labatt, Mr. Wilf Lewitt, MDS Inc., Mr. Peter Munk, Mr. Joseph L. Rotman, RBC Financial Group, Mr. Allan Slaight and Mr. William P. Wilder.\textsuperscript{302} With this level of financial support, MaRS signed an agreement with the UHN for the purchase of the College Street property in April 2001.

Financial contributions continued to flow from other public and private sector organizations, demonstrating a level of the “civic entrepreneurship”\textsuperscript{303} that ultimately drove the growth and development of MaRS. In June 2001, the Ontario Innovation Trust (OIT) contributed $10 million\textsuperscript{304}; the University of Toronto contributed $5 million in April 2002\textsuperscript{305}; and the Toronto Biotechnology Commercialization Centre (TBCC) invested $8.9 million\textsuperscript{306}. The Ontario and Canadian governments also provided significant funding. In June 2002, the Ontario government announced its first investment of $20 million towards the construction of the MaRS Centre.\textsuperscript{307} Minister Flaherty and David Lindsay are credited for providing a formidable degree of political support at a provincial level.\textsuperscript{308} In February 2003, the federal government announced a $20 million investment for building construction, and Minister John Manley was instrumental in galvanizing support for MaRS at the federal level.\textsuperscript{309} The City of Toronto has also provided MaRS with funding through the Toronto Economic Development Corporation (TEDCO) (Evans, 2005: 281).

Overall, a number of people played an integral role in the formative stages of MaRS between 2000 and 2005. In 2009, Dr. John Evans, former Chair of the MaRS Board of

\textsuperscript{302} Ibid.
\textsuperscript{303} “The Making of MaRS: A Tribute to Civic Entrepreneurship” (2009).
\textsuperscript{304} Ibid.
\textsuperscript{305} Ibid.
\textsuperscript{306} PricewaterhouseCoopers, 2011b: 9.
\textsuperscript{307} “The Making of MaRS: A Tribute to Civic Entrepreneurship” (2009). NB. In December 2002, MaRS issued a $100 million bond enabling construction of the Toronto Medical Discovery Tower.
\textsuperscript{308} “The Making of MaRS: A Tribute to Civic Entrepreneurship” (2009).
\textsuperscript{309} Ibid.
Directors, summarized the collaborative approach these persons employed to ensure the organization’s success:

I’m inclined to look back nine years on the early development of MaRS and the image that comes through to me is the one of an unrehearsed opera. One has the Chief Executive Officer, Ken Knox, who is concert master. You have Heather Munroe-Blum and Suzanne Smith who are angels of unwavering commitment to the MaRS dream. You have Joseph Rotman trying to sell tickets that no one would want to take the risk for. John Cook as the Chief Operating Officer who has building the sets without any play to guide him. Nina Gazzola…she had a vast experience. She had never seen the opera before, and she was the director of operations. Cal Stiller – a booming, belligerent baritone who sets the pace for the opera. And you have a large host of other players who perform magnificently not only on their own but as a team to deliver a spectacular operatic result. And then you had John Evans who was in charge of make-up, because he was the one who needed it most.

- The Expansion of MaRS during the McGuinty era, 2005 – 2011

MaRS opened its doors in the Fall 2005, signifying Phase 1 of its existence. Dr. Ilse Treurnicht, who was appointed CEO of MaRS in December 2004, led the organization into this new era. She played an integral role in advancing the vision of the MaRS founders as well as maintaining political support for the organization’s growth and expansion, while remaining accountable to the MaRS Board of Directors, chaired by Dr. John Evans (2005 – 2009) and Gordon Nixon (2009, onward).

In April 2006, the McGuinty government committed more than $16 million in new funding of for the MaRS Centre, and the following year, MaRS announced Phase 2. During Phase 2, MaRS demonstrated its capacity to mobilize talent and resources in support of academic investors and startups. Phase 2 also entailed implementing plans to build a 20-storey MaRS Centre adjacent to the MaRS Heritage Building that included “state-of-the-art...
laboratory and office space in a co-location environment, advanced communications and information technology capabilities, access to a large multifunction conference/collaboration centres and collaboration opportunities with other MaRS tenants and partners across Canada and around the world.” 316 The Ontario government and Alexandria Real Estate Equities Inc. entered into a strategic partnership with MaRS to bring Phase 2 to completion in the Fall of 2013. 317

A noteworthy addition to the MaRS Discovery District is the MaRS Innovation (MI). MI was incorporated in 2008 as a non-profit Centre of Excellence for Commercialization and Research (CECR) with a mandate, board of directors and staff separate from MaRS. 318 It is the official commercialization agent for the market-disruptive intellectual property generated by researchers from Baycrest Centre for Geriatric Care, Centre for Addiction and Mental Health, Holland Bloorview Kids Rehabilitation Hospital, MaRS Discovery District, Mount Sinai Hospital, OCAD University, Ontario Institute for Cancer Research, Ryerson University, St. Michael’s Hospital, Sunnybrook Health Science Centre, The Hospital for Sick Children, Thunder Bay Regional Research Institute, University Health Network, University of Toronto, Women’s College Hospital, York University. Since its inception, MI members, the federal and provincial government have provided funding319 to building up MaRS Innovation’s capacity to bundle technologies into more marketable products, to launch companies and to develop market expertise in areas of shared strength will have a formidable impact on advancing collaborative research and supporting Toronto’s commercialization efforts. 320

316 MaRS website, “MaRS Centre Phase 2” http://www.marsdd.com/facilities/office-facilities/phase2/
317 MaRS, 2011.
319 MaRS Innovation website, “We are an agent of change,” http://marsinnovation.com/about/ [Accessed September 26, 2013].
320 Treurnicht, 2008.
During the McGuinty era, MaRS continued to play a key role in promoting entrepreneurship, and strengthening networks between research and innovation ecosystem actors through the delivery of a range of resources. In 2011 alone, 130 entrepreneurship education events were held with approximately 10,500 people in attendance.\(^{321}\) Most notably, the organization has been instrumental in supporting the activity of its startup clients. By 2011, MaRS had 1,054 clients with total client revenue earnings of $146 million (representing a 26% increase in client revenue from 2009).\(^{322}\) A great deal of this success has been attributed to MaRS providing the intellectual services, risk capital, and networking opportunities its clients required to launch and/or to grow their businesses.

\(^{321}\) MaRS, 2012. \\
\(^{322}\) Ibid.
A Description of Ontario’s Regional Innovation Centres

Communitech is an enabling organization located in Waterloo, Ontario, with offices in Kitchener and Cambridge, Ontario. Founded by a group of dedicated entrepreneurs in 1997, Communitech is the regional hub for the commercialization of innovative technologies, supporting and building a Southwestern Ontario tech cluster of close to 1,000 companies that generates more than $30B in revenue. Communitech supports tech companies at all stages of their growth and development to create global businesses for Ontario and for Canada.

Launch Lab is a “one-stop shop” for technology based startups and growing companies. The organization consists of a team of entrepreneurs, investors, ex-CEO’s, and professional analysts to assist companies grow and bring innovative, technology based products to the marketplace. Launch Lab supports tech based companies in Eastern Ontario in four main industries: information technology, life sciences and healthcare, cleantech, and advanced manufacturing.

Innovation Guelph has been a member of the Ontario Network of Excellence (ONE) since October 2010. The organization delivers programs and services that address the needs of entrepreneurs, community organizations, researchers and business leaders. Innovation Guelph help their clients access funding available through Provincial, Federal, or other sources; provide strategic business advice through experienced entrepreneurs and business experts; and organize and host events focused on business training, networking, and community initiatives. Most notably, Innovation Guelph’s client focus is shaped by the character of its local industry sectors, and as such, it has developed in-house expertise to assist clients in Clean Tech; Food and Agriculture; Health and Wellness; Social Entrepreneurship; Creative and Digital Media; and Advance Manufacturing.

HalTech Innovation Centre was launched in March 2011 through a partnership between the Halton Region and Communitech. HalTech assists Halton’s technology entrepreneurs and companies develop their ideas, commercialize their products and establish and expand their businesses. HalTech provides its clients with comprehensive business advisory services, access to capital, entrepreneurship training and networking opportunities. HalTech is located within the SPARK Centre for Research and Innovation at the Sheridan Institute of Technology and Advanced Learning, Oakville, Ontario.

Spark Centre helps start and grow innovative technology-based companies in Durham Region and Northumberland County. The organization helps start-up companies find the best path to market and assists existing companies in developing relationships and create strategies that can drive faster growth. This RIC provides coaching and mentorship, learning tools, connections to business and research networks, and assistance with access to investment. The Ontario Ministry of Economic Development and Innovation, Durham Region, the Durham Strategic Energy Alliance (DSEA) and the Northumberland Manufacturer’s Association (NMA) fund the Spark Centre’s initiatives. The Spark Centre has offices in Whitby, Ontario; Oshawa, Ontario and Cobourg, Ontario.

Innovation Factory: is an incubation centre for startups and good ideas, located at McMaster Innovation Park. This RIC enables active collaboration between the city’s communities of science, business, government, academia and finance to accelerate the innovation process and
amplify the economic and social impact of key new ideas and discoveries. Innovation Factory has two main branches of programming – The Acceleration Program (which includes the Flight Program for startups and the Enterprise Program for growing businesses) and the Cultivation Program which focuses on community development.

MaRS Discovery District is a large scale, mission driven innovation centre, located in Toronto and networked across Canada, focused on building Canada’s next generation of technology companies. MaRS connects and enables active collaboration between the communities of science, business and capital to accelerate the innovation process and amplify the economic and social impact of important new ideas and discoveries. As a RIC, this organization helps entrepreneurs bring new and innovative ideas to the marketplace and offers a range of education, events and business services in various sectors including advanced materials and engineering; cleantech; information technology, communications and entertainment; life sciences and health care; and social innovation.

Niagara Interactive Media Generator (nGen) is Niagara’s Regional Innovation Centre which connects technology-based business, entrepreneurs and researchers with services and programs to help innovate and gain a competitive advantage. nGen provides innovative entrepreneurs with training programs, tools and resources, and advisory services to enable them to successfully commercialize their ideas.

Northern Technology Alliance: This RIC represents an alliance between four organizations: the Northern Centre for Advanced Technology (NORCAT) Inc. (Sudbury, Ontario), the Sault Ste. Marie Innovation Centre (Sault Ste. Marie, Ontario), the Northwestern Ontario Innovation Centre (Thunder Bay, Ontario) and the Northern Technology Alliance (North Bay, Ontario). NORCAT leads this alliance.

Invest Ottawa delivers economic development programs and initiatives that increase entrepreneurial momentum, wealth and jobs in the City of Ottawa and its surrounding region. This RIC’s services include startup incubation and mentorship, acceleration for existing companies, global business attraction and local business retention, targeted sector development, commercialization, and marketing Ottawa’s diversified economy and high quality of life. Entrepreneurial development, foreign direct investment, and business retention and expansion are the top three priorities for the organization.

Research Innovation Commercialization Centre (RICC) is a not-for-profit organization created through partnership with the municipalities and the Boards of Trade in Mississauga, Brampton and Caledon; The Ministry of Economic Development and Innovation; Region of Peel; Sheridan College; University of Toronto Mississauga; MaRS; etc. RIC has become a portal for small-to-medium enterprises, linking entrepreneurs and investors, and offering businesses a path towards commercialization of products and services.

We-Tech Alliance is Windsor-Essex’s Technology Accelerator; an industry-led non-profit organization focused on driving the growth and success of Windsor-Essex’s technology centric companies & entrepreneurs through, mentoring, programs and connections. WEtech strives to identify, find solutions and foster the development of the technology industry and innovation sector, as well as companies who utilize technology. Programs offered by this
RIC include Entrepreneur In Residence; Peer to Peer Networks; Volunteer Mentor Network; Service Provider Network; Entrepreneur’s Toolkit Workshops; Market Intelligence; and Desk UP & VentureStart Programs.

*TechAlliance of Southwestern Ontario* is committed to growing the tech community in London, Ontario and Southwestern Ontario by providing the support infrastructure to foster innovation and accelerate growth. This RIC works with community partners, entrepreneurs and established companies in Digital Media/Information & Communications Technology, Life Sciences, Advanced Manufacturing, Agritech and Clean Tech and brings key stakeholders together from these industries to collaboratively drive regional success.

*ventureLAB* is a single point-of-entry for advancing new opportunities in technology. Located at the Markham Convergence Centre, the ventureLAB provides leadership in connecting business, academia, government and industry to create a strong network of interconnectivity that fosters global excellence in innovation. This RIC’s activities are aligned with its “BUILD program framework” which helps technology entrepreneurs Begin, EdUcate, Invest, Launch and ExpanD global enterprises. BUILD’s success is measured through meaningful job creation, sales expansion, and other key metrics essential to be the leading Regional Innovation Centre in North America. ventureLAB works towards making the York Region a global leader in the ICT and Life Sciences sectors and a hub for attracting multinational enterprises.

*Source: websites of each RIC, Accessed April 2013.*
Appendix 8.1 ORF-RI “Ontario-First” Adjudication Process

1. Pre-application Stage: Strategic Value Review of NOIs: Based on applicant’s strategic value plan, and provincial priorities.

2. MRI Application Submission: To be eligible for provincial funding, institutions must submit proposals to MRI.

3. Scientific Review: Scientific review process to inform discussions on provincial/federal priorities.

4. Strategic Value Review: Based on applicant’s strategic plan, provincial priorities AND scientific review.

5. Interaction with CFI: The province will not automatically co-fund CFI awards. Investments will be based on scientific excellence AND value to Ontario.

6. Ontario Decisions

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Appendix 9.1: Innovation Economy Scorecard Framework and Corresponding Indicators

<table>
<thead>
<tr>
<th>Measurement Framework</th>
<th>Indicators</th>
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<tbody>
<tr>
<td><strong>Innovation Impact</strong></td>
<td><strong>Economic Performance</strong></td>
</tr>
<tr>
<td></td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td>Employment growth</td>
</tr>
<tr>
<td></td>
<td>Economic well-being</td>
</tr>
</tbody>
</table>

| **Innovation Performance** | **Research and Education** | Skilled graduates |
|                           | Research publications |
|                           | **Technology Development and Transfer** |
|                           | Patents |
|                           | University technology transfer |
|                           | **Commercialization** |
|                           | Product innovation |
|                           | High wage employment |
|                           | Firm entrants and exits |

| **Innovation Capacity** | **Higher Education and Public Research** | Highly-cited scientists |
|                        | Stock of public sector R&D personnel |
|                        | Level of collaboration |
|                        | **Linkages and Support** |
|                        | Stock of industry R&D personnel |
|                        | **Companies** |
|                        | Employment by industry clusters |
|                        | Creative economy |
|                        | Leading R&D companies |

| **Innovation Investment** | **Public Investment** |
|                          | Gross expenditures on R&D |
|                          | Federal and provincial research support |
|                          | Research infrastructure |
|                          | **Private Investment** |
|                          | Venture capital investments |
|                          | Investments in ICT, machinery and other equipment |
|                          | Business R&D |

List of Abbreviations

ANP  Angel Network Program
BAP  Business Acceleration Program
BCIP Biotechnology Cluster Innovation Program
BILD Board of Industrial Leadership and Development
BIP  Biopharmaceutical Investment Program
BMEP Business Mentorship and Entrepreneurship Program
CAHO Council of Academic Hospitals of Ontario
CCA Council of Canadian Academies
CERC Centres of Excellence for Commercialization and Research
CFI  Canada Foundation for Innovation
CIHR Canadian Institute of Health Research
CONII Colleges Ontario Network for Industry Innovation
COU  Council of Ontario Universities
CRIBE Centre for Research and Innovation in Bio-Economy
CSR  Common Sense Revolution
ERA  Early Researcher Awards
HTX  Health Technology Exchange
IACP Industry-Academic Collaboration Program
IAF  Investment Accelerator Fund
IDEA Innovation Development for Employment Advancement
IDF  Innovation Demonstration Fund
IIO  Innovation Institute of Ontario
IRAP Industrial Research Assistance Program
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISOP</td>
<td>International Strategic Opportunities Program</td>
</tr>
<tr>
<td>LSIF</td>
<td>Labour Sponsored Investment Fund program</td>
</tr>
<tr>
<td>MaRS</td>
<td>Medical and Related Sciences</td>
</tr>
<tr>
<td>MEDI</td>
<td>Ministry of Economic Development and Innovation</td>
</tr>
<tr>
<td>MEDT</td>
<td>Ministry of Economic Development and Trade</td>
</tr>
<tr>
<td>MEDTE</td>
<td>Ministry of Economic Development, Trade and Employment</td>
</tr>
<tr>
<td>MEOI</td>
<td>Ministry of Enterprise, Opportunity and Innovation</td>
</tr>
<tr>
<td>MRI</td>
<td>Ministry of Research and Innovation</td>
</tr>
<tr>
<td>NCE</td>
<td>Networks of Centres of Excellence</td>
</tr>
<tr>
<td>NSERC</td>
<td>Natural Sciences and Engineering Research Council of Canada</td>
</tr>
<tr>
<td>OCE</td>
<td>Ontario Centres of Excellence</td>
</tr>
<tr>
<td>OCGC</td>
<td>Ontario Capital Growth Corporation</td>
</tr>
<tr>
<td>OCIF</td>
<td>Ontario Commercialization Investment Fund</td>
</tr>
<tr>
<td>OCN</td>
<td>Ontario Commercialization Network</td>
</tr>
<tr>
<td>OCUFA</td>
<td>Ontario Confederation of University Faculty Associations</td>
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<tr>
<td>OEC</td>
<td>Ontario Economic Council</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OETF</td>
<td>Ontario Emerging Technologies Fund</td>
</tr>
<tr>
<td>OIA</td>
<td>Ontario Innovation Agenda</td>
</tr>
<tr>
<td>OICR</td>
<td>Ontario Institute for Cancer Research</td>
</tr>
<tr>
<td>OIT</td>
<td>Ontario Innovation Trust</td>
</tr>
<tr>
<td>OJIB</td>
<td>Ontario Jobs and Investment Board</td>
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<tr>
<td>OMDC</td>
<td>Ontario Media Development Corporation</td>
</tr>
<tr>
<td>ONE</td>
<td>Ontario Network of Excellence</td>
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<tr>
<td>ORCP</td>
<td>Ontario Research Commercialization Program</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>--------------</td>
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<tr>
<td>ORDCF</td>
<td>Ontario Development Challenge Fund</td>
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<tr>
<td>ORF</td>
<td>Ontario Research Fund</td>
</tr>
<tr>
<td>ORF-RE</td>
<td>Ontario Research Fund – Research Excellence</td>
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<tr>
<td>ORF-RI</td>
<td>Ontario Research Fund – Research Infrastructure</td>
</tr>
<tr>
<td>ORFAB</td>
<td>Ontario Research Fund Advisory Board</td>
</tr>
<tr>
<td>ORIC</td>
<td>Ontario Research and Innovation Council</td>
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<tr>
<td>OSIC</td>
<td>Ontario Science and Innovation Council</td>
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<tr>
<td>ORIN</td>
<td>Ontario Regional Innovation Networks</td>
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<tr>
<td>OTAB</td>
<td>Ontario Training and Adjustment Board</td>
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<tr>
<td>OTEC</td>
<td>Ontario Tax Exemption for Commercialization</td>
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<tr>
<td>OVCF</td>
<td>Ontario Venture Capital Fund</td>
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<tr>
<td>PDF</td>
<td>Post-Doctoral Fellowship Program</td>
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<tr>
<td>PIC</td>
<td>Provincial Innovation Coordinator</td>
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<tr>
<td>RIC</td>
<td>Regional Innovation Centres</td>
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<tr>
<td>RIN</td>
<td>Regional Innovation Networks</td>
</tr>
<tr>
<td>SIC</td>
<td>Sector Innovation Centre</td>
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<tr>
<td>SPF</td>
<td>Sector Partnership Fund</td>
</tr>
<tr>
<td>SR&amp;ED</td>
<td>Scientific Research and Experimental Development program</td>
</tr>
<tr>
<td>SSHRC</td>
<td>Social Sciences and Humanities Research Council</td>
</tr>
<tr>
<td>STIC</td>
<td>Science, Technology and Innovation Council</td>
</tr>
<tr>
<td>TRRA</td>
<td>Toronto Regional Research Alliance</td>
</tr>
<tr>
<td>TSTOP</td>
<td>Teachers’ Science and Technology Outreach Program</td>
</tr>
<tr>
<td>WaterTAP</td>
<td>Water Technology Acceleration Program</td>
</tr>
<tr>
<td>YSTOP</td>
<td>Youth Science and Technology Outreach Program</td>
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