



**Bridging the Invention-Innovation Gap  
in the Commercialization of Publicly-Funded Research:  
Four Recommendations**

**Monday, September 10, 2007**

**at the Chateau Laurier Hotel, Ottawa, Ontario**

**Hosted by the  
University of Ottawa and  
McGill University's Centre for Intellectual Property Policy**

This report was prepared by Kate Hoye, Richard Gold, and David Castle.

This document's recommendations and conclusions are drawn from the group discussions during the workshop and do not necessarily represent the opinion of individual participants, their respective organisations nor those of either the University of Ottawa and the Centre for Intellectual Property Policy.

This workshop is supported by the project "Knowledge Management and Global Food Security", which is led by Dr. David Castle. This project is one of four projects conducted in Genome Canada funded program, "Strengthening the Role of Genomics and Global Health", which is administered by the Ontario Genomics Institute at the University of Toronto and the University of Ottawa.

It was the sixth event in a workshop series initiated by the McGill University Centre for Intellectual Property's Intellectual Property Modeling Group ("IPMG") in the context of its research project "Legal models of intellectual property protection: a transdisciplinary approach" funded by the Social Sciences and Humanities Research Council of Canada and the Canadian Institutes for Health Research.

## Executive Summary

This report summarizes the findings of a workshop, entitled “Bridging the Invention-Innovation Gap in the Commercialization of Publicly-Funded Research.” The workshop’s objectives were as follows:

- 1) Create a forum in which leaders in the Canadian innovation system could reflect upon and discuss the ways in which the commercialization of publicly-funded research is supported in Canada.
- 2) Arrive at actionable recommendations on how governments, PROs, and industry can better support commercialization in the near future.

The workshop was designed to elicit expert opinions on the ‘invention-innovation gap’ in Canada. This topic was prompted by a previous IPMG workshop on technology transfer, at which a different set of expert participants concluded that commercialization of publicly-funded research in Canada is constrained by a lack of resources. During the ‘Bridging the Invention-Innovation Gap’ workshop, the participants decided to ‘un-ask the question’ of how to improve gap financing for two reasons:

- 1) ‘Gap funding’ is no longer a significant obstacle for most organizations.
- 2) The ‘gap’ model of commercialization, which frames the process in terms of resource requirements, is inadequate and thus should not shape policy.

The participants identified the following four objectives as critical to the commercialization of publicly-funded research in Canada:

- 1) Identify and communicate clear and appropriate goals for the commercialization of publicly funded-research.
- 2) Create a Canadian focus on international competitiveness.
- 3) Increase the number of innovation champions in business.
- 4) Foster business demand for innovation, such that more Canadian firms seek to compete by offering improved products and services.

The participants also suggested strategies for the implementation of these objectives. Their recommendations are described in detail in the report.

# Table of Contents

1. Introduction .....	1
2. Background .....	2
2.1. The Invention-Innovation Gap.....	2
2.2. Programs in Support of Commercialization.....	3
2.2.1. Provision of Commercialization Project Funding.....	4
2.2.2. Capacity Building through Training and Networking .....	5
2.2.3. Other Support Programs .....	6
2.3. Summary.....	7
3. Workshop Discussions.....	8
4. Recommendations .....	11
4.1. Clarify Goals for Commercialization .....	11
4.2. Focus on International Competitiveness .....	12
4.3. Increase the Number of Innovation Champions in Business.....	12
4.4. Encourage Business Demand for Innovation .....	13
5. Summary .....	17
Appendix A. List of Participants .....	19
Appendix B. Morning Discussion Questions .....	21
Appendix C. Afternoon Discussion Prompts .....	22

## 1. Introduction

On September 10, 2007, the University of Ottawa, in conjunction with the University of McGill Centre for Intellectual Property Policy's Intellectual Property Modeling Group ("IPMG"), convened a workshop entitled "Bridging the Invention-Innovation Gap in the Commercialization of Publicly-Funded Research". Canada's governments support the research and development activities performed by public research organizations, including universities, colleges, and organizations like the National Research Council of Canada. The workshop investigated ways to better support the commercialization of this publicly-funded research, through which research findings are transformed into improved products and services. The workshop convened a diverse group of experts active in Canada's innovation system, including entrepreneurs, government officials, venture capitalists, technology transfer managers from universities and federal laboratories, and academic researchers.

The workshop's objectives were as follows:

- 1) Create a forum in which leaders in the innovation system could reflect upon and discuss the ways in which the commercialization of publicly-funded research is supported in Canada; and,
- 2) Arrive at actionable recommendations on how governments, PROs, and industry can better support commercialization in the near future.

The afternoon discussions and plenary were dedicated to the identification of strategies for developing and implementing these objectives. This report captures the workshop discussions and the resulting recommendations for public dissemination. Section 2 reviews the information distributed to participants prior to the workshop including a brief description of the Canadian 'invention-innovation' gap and a review of the commercialization support programs existing in Canada in September, 2007. Section 3 provides an overview of the workshop by describing the workshop format and the key issues discussed during the workshop. Section 4 details the recommendations drawn from these discussions. The report concludes with a brief analysis of the recommendations.

## 2. Background

The workshop was designed to investigate the ‘invention-innovation gap’ in Canada. This topic was prompted by a previous IPMG workshop on technology transfer, at which expert participants concluded that commercialization of publicly-funded research in Canada is constrained by a lack of resources.<sup>1</sup>

In preparation for the workshop, a brief summary of Canada’s ‘invention-innovation’ gap and the Canadian programs that address the gap was developed and distributed to the participants. This section provides that background information as a context for the workshop’s discussions which are summarized later in the report. The background information is organized into two sections: 1) a brief discussion of the Canadian invention-innovation gap; and, 2) a review of programs which address the invention-innovation gap.

### 2.1. *The Invention-Innovation Gap*

Policy makers around the world increasingly view the commercialization of publicly funded research as a key strategy through which nations benefit from public investments in research, especially in the form of increased competitiveness. The potential to realize social and economic benefits from public investment in research is particularly important in Canada where public research organizations (PROs) perform over one third of all research performed in the country.<sup>2</sup> Publicly-funded research is also an important resource that could be used to improve Canada’s ability to innovate relative to other developed countries. In 2003, Canadian business expenditures on R&D represented only 1.0% of GDP, much less than the U.S.’s 1.8% or the OECD average of 1.5%.<sup>3</sup> In 2005, the World Economic Forum ranked Canadian businesses 27<sup>th</sup> in the world in terms of their propensity to compete based on unique products and processes.<sup>4</sup> Both the 2006 report by the Expert Panel on Commercialization, commissioned by the

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<sup>1</sup> Centre for Intellectual Property Policy, *Technology Transfer Issue Paper*, <http://www.cipp.mcgill.ca/data/publications/00000005.pdf>.

<sup>2</sup> Gu & Whewell, *University Research and the Commercialization of Intellectual Property in Canada*, [http://acst-ccst.gc.ca/comm/rpaper/home\\_e.html](http://acst-ccst.gc.ca/comm/rpaper/home_e.html).

<sup>3</sup> Industry Canada, *Report of the Expert Panel on Commercialization*, [http://strategis.ic.gc.ca/epic/site/epc-gdc.nsf/en/h\\_tq00013e.html](http://strategis.ic.gc.ca/epic/site/epc-gdc.nsf/en/h_tq00013e.html).

<sup>4</sup> World Economic Forum, as cited in the *Report of the Expert Panel on Commercialization*.

Prime Minister's Advisory Council on Science and Technology, and the 2007 Science and Technology Policy make it clear that the commercialization of publicly-funded research is a key part of the Canadian strategy to support commercialization of new knowledge in Canada.

The commercialization of research conducted within PROs requires that emerging technologies cross the 'invention-innovation gap,' which is the gap between the products of applied research performed within scientific laboratories and the more refined technology required by firms. Most technologies developed within scientific laboratories are 'inventions,' that is, technologies at a very early stage from an industrial perspective. For example, when university inventors identify technologies that may be of commercial interest, they have normally not yet developed them to the point where they have produced a working prototype. As a result, many technologies need to be further developed outside the PRO before they can be considered 'innovations,' that is, market-ready products and services. This development gap is particularly difficult to address because these technologies need to cross organizational boundaries from public-research organizations into receptor firms. Crossing this boundary costs money both to bring the technology to a stage where the receptor firm is willing to adopt it, and to train individuals to be able to manage this activity. In 2004, a previous IPMG workshop identified an inadequate supply of this 'invention-innovation' funding as constituting an important obstacle to the commercialization of publicly-funded research in Canada and recommended that a further workshop be held on the topic of this funding gap. The workshop described in this report was developed in response to that recommendation.

## ***2.2. Programs in Support of Commercialization***

This section briefly describes the programs in support of commercialization active in Canada as of September 2007. It is organized into three subsections. The first two subsections describe programs that directly bridge the invention-innovation gap by means of: 1) the provision of commercialization funding; and, 2) capacity building through development of human capital. The third subsection addresses the broad range of programs that provide resources for commercialization in a less direct manner.

### **2.2.1. Provision of Commercialization Project Funding**

The lack of commercialization project funding is often discussed as a barrier to bridging the invention-innovation gap in Canada. In the past, academic research funding has only addressed work until the publication stage of research, which is often very early in the development cycle. Specialized funding for further development of potentially-commercializable inventions (e.g. prototype development) increases the probability that a promising technology will be transformed into products and services. Furthermore, commercialization often requires complementary business activities such as the acquisition of intellectual property protection or the development of market studies to be used in identifying and attracting potential licensees.

Funding available to universities and research hospitals is better documented than that provided to other organizations. In 2004, these organizations had \$36.9M in the following commercialization-related expenditures: salaries of technology transfer office staff (54%), patenting and regular legal expenditures (29%), litigation (1%), and other operational expenditures (16%).<sup>5</sup> The majority of this funding is from internal sources: 41% from institutional funds; 34% from revenues from past commercialization agreements; and, 25% from external sources.<sup>6</sup> Two federal programs dominate in providing external funding to universities. NSERC's Idea to Innovation (I2I) program has supported 237 projects with approximately \$30M in commercialization funding between December 2003 and December 2007 and has budgeted another \$7.5M for 2008. CIHR's Proof of Principle (POP) program granted \$15.4M to 183 projects between 2001 and January 2007.

There are other commercialization funding programs beyond those at the federal level. They tend to focus on particular regions and specific industry sectors within Canada and vary in size and scope. For example, Valorisation Recherche Québec was allocated \$120M over six years (2000-2006) in order to establish four technology transfer firms in the province of Quebec to fund projects. The Ontario Genomics

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<sup>5</sup> Statistics Canada (2006). Survey of Intellectual Property Commercialization in the Higher Education Sector, 2004. Catalogue No. 88F0006XIE - No. 011

<sup>6</sup> Ibid

Institute's Pre-commercialization Business Development Fund provides another example, confined to Ontario and to the genomics sector.

One noteworthy finding from a recent review of funding programs was their lack of stability. Among the programs listed as current resources on government websites and technology transfer organizations' websites, one quarter of the programs appear to have become inactive recently. This implies a relatively high rate of change, which may make it difficult for potential beneficiaries to identify appropriate programs and apply to them.

### ***2.2.2. Capacity Building through Training and Networking***

The increasing focus on the commercialization of publicly-funded research in Canada has resulted in the rapid expansion of business development and industry liaison offices in Canada. Technology transfer professionals within these offices are well-positioned to address the invention-innovation gap by linking promising inventions with both internal and external resources for development. The increased emphasis on these offices and professionals is best documented among universities and research hospitals. Between 1998 and 2004, the number of universities which describe themselves as 'actively managing IP' increased from 50 to 70. Over the same period, the total number of full-time employees in commercialization functions at Canadian universities and hospitals rose from 186 to 280. In light of this trend, programs have been developed to support recruitment and training of entrants to this relatively new profession.

The largest program supporting the development of technology transfer professionals is the Tri-Council's Intellectual Property Mobilization program. It provides funding for internship training programs, and supports the development of consortia or networks of industry liaison offices. As of the beginning of 2008, the IPM program had disbursed \$16.4M to more than 26 networks, and another \$2.9M directly in support of 6 internship training programs.

As with the funding for commercialization expenses, professional development funding changes from year to year. This funding supports a large variety of strategies that are intended to build commercialization-relevant expertise in Canada. Two

examples of these programs are the CIHR's Commercialization Management Grant and the Science to Business (S2B) program. The CIHR's Commercialization Management Grant is an example of a limited term program. In 2005, 13 technology transfer offices at universities and research hospitals were awarded \$0.68M. This supported the recruitment of at least 13 recent MBA graduates to work in those TTOs as Fellows in Commercialization Management for one year. The Science to Business (S2B) program uses another approach to address the same need. It provides grants to help business schools recruit Ph.D. graduates with training in health research into health-oriented Masters of Business Administration (MBA) programs. The objective is to develop "a cadre of scientifically knowledgeable entrepreneurs and venture capitalists by fostering an entrepreneurial culture within the research community".<sup>7</sup> Between 2005 and 2007, eleven Science to Business applications were awarded \$1.4M in funding, which supported 28 MBA scholarships. Together these programs build commercialization-relevant expertise in Canada.

### **2.2.3. Other Support Programs**

The programs described in the previous two subsections provide support for human and financial capital to address the invention-innovation gap. These programs are often the focus of discussions on the commercialization of publicly-funded research because of their direct connection to the development process. However, a diverse range of programs provides important, although less direct, support for commercialization. The following table reviews some of the many types of programs.

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<sup>7</sup> Canadian Institutes for Health Research, Science to Business (S2B) Program (Archived), <http://www.cihr-irsc.gc.ca/e/28324.html>.

**Table 1. Examples of Other Types of Support Programs**

<b>Program Type</b>	<b>Description</b>	<b>Example</b>
Research Park & Business Incubators	Proximity between firms and PRO facilitates technology transfer Incubators support spin-off firm creation	Simon Fraser University's Discovery Park
Mentorship Programs	Mentors lend their assistance to help the spin-off company grow from early stage into maturity	Technology Entrepreneur Company (TEC) Edmonton through its VenturePrize program
Cluster Support Programs	Spatial concentrations of firms in the same sector (e.g. biotechnology) can heighten advantages to investments in R&D and thus increase the probability of firms' commercializing PRO discoveries	NRC's support of clusters spans across the country from Vancouver's Fuel Cell and Hydrogen Technologies to Halifax's work in Life Sciences

### **2.3. Summary**

As the commercialization of publicly-funded research has become a higher priority, a dynamically-evolving set of programs has been created to support commercialization in Canada. In the workshop, participants were invited to reflect on and discuss these programs in the context of both the changing public research context and the changing Canadian business context.

### 3. Workshop Discussions

Following some preliminary remarks to welcome participants, to establish the context, and to set the day's agenda, participants engaged in discussions in breakout groups of 3-6 people in both the morning and afternoon. After each discussion session, participants met in plenary to debrief each other on the various small group findings. Each small discussion group was assigned individuals representing a diverse set of perspectives and experience so as to maximize exchange. The morning and afternoon sessions had distinct themes; discussion prompts for these sessions are provided in Appendices B and C.

During the morning's discussions, participants were asked to identify gaps in current funding arrangements. In the plenary debriefing of these discussions, the workshop participants challenged the central question of the workshop.

There was no consensus that there is presently a lack of gap funding in Canada. Some participants maintained that the lack of invention-innovation funds still represented an obstacle. Others disagreed, with one participant noting, "If the commercialization project is good enough, you'll be able to find the money." This represents a major change from the earlier workshop in 2004 at which a different group of participants identified a lack of gap funding as a significant obstacle. This difference in perspective raises the question of whether the increased commercialization funding available since 2004 has reduced the extent to which gap funding is an obstacle.

Several participants also noted that the 'gap' model of innovation is problematic as it encourages a 'technology push' model of science and commercialization.<sup>8</sup> In this linear model of innovation, inventions arise from basic science, which is performed with no consideration of end-use, and transformed into commercial products and processes through applied research and development. A number of participants criticized this model for providing an overly simplistic conception of innovation. First, it tends to focus attention on patenting, licensing, and spin-off creation to the exclusion of other valuable forms of transfer, like contract research and faculty consultancy. Second, it fails to take

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<sup>8</sup> This model is often contrasted with a 'market pull' model, which conceives of commercialization as a process in which firms identify market needs and seek and adopt technologies that allow them to address these needs.

into account interactions between actors in the innovation system and thus supports an emphasis on top-down analysis and program development. A more sophisticated model would promote the appropriate use of both top-down approaches (e.g. identifying sectors of strategic importance to the nation) and bottom-up approaches (e.g. supporting the diversity of organizations that increase coordination and networking in regional technology clusters). Finally, the participants were concerned that discussions of funding gaps encourages policy-makers to restrict commercialization support to direct 'invention-innovation' funding, "solving problems by shoving money at them," rather than developing more sophisticated programming in support of commercialization.

In summary, participants considered that gap financing was not appropriate for further discussion for two reasons:

- 1) 'Gap funding' is no longer a significant obstacle for most organizations.
- 2) The 'gap' model of commercialization, which frames the process in terms of resource requirements, is inadequate and thus should not shape policy.

Once gap funding was deemed an inappropriate topic, the participants developed the following set of four alternative objectives that they saw as having more potential impact on Canadian technology transfer:

- 1) Identify and communicate clear and appropriate goals for the commercialization of publicly funded-research in order to align the activities of the many stakeholders in the innovation system.
- 2) Create a Canadian focus on international competitiveness, such that technologies and firms are positioned as world leaders not Canadian leaders.
- 3) Develop commercialization champions in science, business, and finance, because lack of human capital is a barrier to commercialization.
- 4) Foster business demand for innovation by:
  - a. Improving access to risk capital in Canada, such that new firms can be launched, and small firms have the possibility to grow into large firms while remaining Canadian.
  - b. Catalyzing and growing clusters that will 'pull' technologies into the market.

The afternoon small-group session was dedicated to a discussion of strategies for developing and implementing these four objectives. The recommendations arising in

from these small group discussions were the focus of the afternoon plenary session. A wide variety of strategies were presented and discussed. These recommendations are summarized in the following section.

## 4. Recommendations

The workshop participants provided a diverse set of recommendations for ways to support the commercialization of publicly-funded research in Canada. This section presents these recommendations; each subsection addresses one of the four participant-identified objectives.

### 4.1. Clarify Goals for Commercialization

The workshop participants reiterated a recommendation of a 2004 workshop on technology transfer: there need to be clearer national priorities for commercialization in Canada.<sup>9</sup> Clearly-stated goals are important tools in aligning actors within the innovation system. In the absence of clear goals, stakeholders develop different understandings of the system and misalignment can hinder both communication and deal flow. Clear priorities also allow for the alignment of governmental activities. Canada's Science and Technology Strategy should be one pillar of a national economic plan for Canada's global position in the future; the plan should also inform trade and foreign affairs. There was consensus that the 2007 Science and Technology Strategy, "Mobilizing Science and Technology to Canada's Advantage" did not adequately identify and prioritize objectives for commercialization, despite broadly advocating for a climate of commercialization of research. Canada would benefit from a goal-setting process that would define national goals more specifically than in existing strategy documents.

A process of establishing national priorities for commercialization and dissemination of PRO research requires an organization to take the lead in providing the resources required to manage it. The Science, Technology and Innovation Council (STIC)<sup>10</sup> was mentioned as an organization well-placed to lead this process, possibly in collaboration with divisions of Industry Canada and the Department of Foreign Affairs and International Trade. Commercialization occurs through the interactions of academic, governmental, and industry organizations, and requires many different types of expertise. To identify realistic goals, the process must involve broad consultations with a wide variety of commercialization stakeholders, including researchers, technology

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<sup>9</sup> <http://www.cipp.mcgill.ca/data/publications/00000005.pdf>

<sup>10</sup> <http://www.stic-csti.ca/epic/site/stic-csti.nsf/en/Home>

transfer officers, industry representatives, university administrators, venture angels and venture capitalists, entrepreneurs, and program managers for commercialization-focused granting programs. Outcomes from this process should be:

- A clearly defined set of goals at a national level
- Definitions of key terms
- Measures to evaluate attainment of goals

#### ***4.2. Focus on International Competitiveness***

Commercialization priorities and programs should be established with the overarching objective of enhancing Canada's international competitiveness. The country's domestic market is very small relative to that of its trading partners, especially that of the United States. In recognition of this, it is important that Canadian firms position themselves as global leaders, as opposed to being only Canadian leaders, by developing products and services aimed at global markets from the start. This overarching objective could serve as a motivator for the goal-setting process described in the previous section. For example, a goal consistent with a focus on international competitiveness would be to seek to increase the number of firms that are 'born global', or to increase the number of firms that capitalize on those niches in which Canada has a competitive advantage.

#### ***4.3. Increase the Number of Innovation Champions in Business***

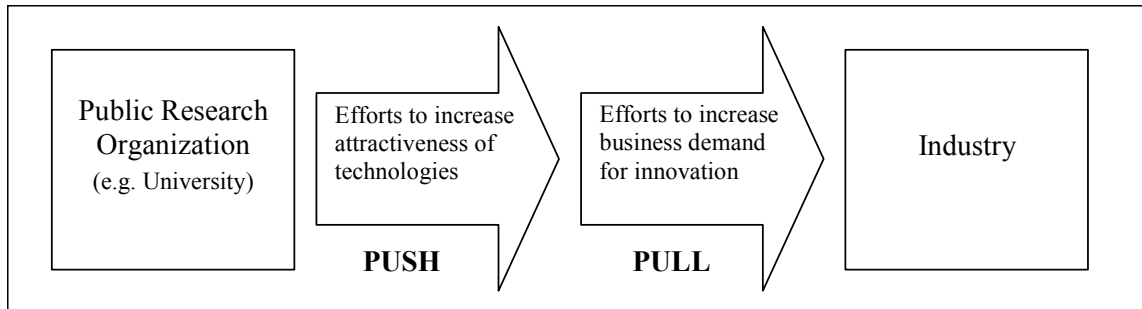
The participants felt that commercialization in Canada was hindered by a lack of human capital; Canada would benefit from a greater number of people able to champion innovation and commercialization in both established firms and through entrepreneurship. In keeping with the previous recommendation, much of this discussion also aimed at finding ways to increase the pool of Canadians with the capability to create, grow and support internationally-competitive businesses. A number of different approaches for different actors were suggested to achieve these goals. These are summarized in the following table.

**Table 2. Encouraging Champions of Innovation**

<b>Actor</b>	<b>Suggestions for Initiatives</b>
Universities, Colleges, and Research Hospitals	<ul style="list-style-type: none"> <li>• Offer scholarships that encourage students to seek out scientific and business training of strategic importance (i.e. human health bioscience, technology management, international business)</li> <li>• Expand programs that encourage Canadians to work and study in foreign markets where expertise can be gained to foster global integration</li> <li>• Offer business and entrepreneurship training to science graduate students and post-doctoral fellows</li> </ul>
Economic Development Organizations & Technology Transfer Offices	<ul style="list-style-type: none"> <li>• Provide mentoring opportunities to nurture entrepreneurs</li> <li>• Host events that encourage local networking, especially events that encourage the development of a community of practice for innovation with participants from across areas of expertise (e.g. venture angels, entrepreneurs, marketers, finance experts, and individuals with international business development skills)</li> </ul>
Government	<ul style="list-style-type: none"> <li>• Encourage foreign talent to immigrate to Canada by:               <ul style="list-style-type: none"> <li>▪ Reducing immigration barriers for students and professionals and their families</li> <li>▪ Reducing barriers to the recognition of foreign accreditation</li> <li>▪ Offering tax incentives to encourage the immigration of senior management in those industries in which Canada has the capacity to be a world leader</li> </ul> </li> </ul>

#### **4.4. Encourage Business Demand for Innovation**

The participants emphasized the importance of increasing the demand for innovation by Canadian industry. This strategy was described as ‘pull’ approach to commercialization to complement those programs that seek to ‘push’ technologies out of the universities, research hospitals and government science laboratories by making them more attractive commercialization prospects. Overall, participants felt that government programs relied too heavily on a push approach to commercialization.



**Figure 1. Push and Pull Models of Commercialization**

As a group, the participants made suggestions for a variety of mechanisms by which business demand for innovation could be strengthened. Two of these strategies targeted small- and medium-sized enterprises (SMEs):

### **1) Expand IRAP**

Through a network of more than 250 officers in 90 communities, the National Research Council's Industrial Research Assistance Program (IRAP) provides Canadian SMEs with technical and business advice and financial support for research activities.<sup>11</sup> The IRAP network was described as a valuable and underutilized resource. One way to increase the impact of the IRAP network would be by increasing the funding disbursed by IRAP; current funding caps were described as too low. Another approach would be to investigate ways to extend the IRAP mandate. The liaison program created by Dalhousie University and IRAP may provide a model worth emulating in partnership with other universities, colleges and research hospitals. This program facilitates research collaborations between the university and local small- and medium-sized enterprises (SMEs) and is credited with stimulating 50 SME-university research collaborations over four years.<sup>12</sup>

### **2) Create a Canadian version of the SBIR program**

The Small Business Innovation Research (SBIR) program is a key U.S. policy that encourages small businesses to conduct research and development. Small, domestic enterprises are able to compete for funding by proposing projects

<sup>11</sup> [http://irap-pari.nrc-cnrc.gc.ca/aboutirap\\_e.html](http://irap-pari.nrc-cnrc.gc.ca/aboutirap_e.html)

<sup>12</sup> <http://innovation.dal.ca/researchers/ConnectingtoIndustry.html>

consistent with the R&D needs of the federal government. The program has a substantial budget because eleven federal departments<sup>13</sup> are required to dedicate a portion of their R&D budgets for the program.<sup>14</sup> The Department of Defense alone expects to provide US\$1.14 billion in funding in 2008.<sup>15</sup> This program was proposed as a way to increase the R&D capacity of Canadian firms with the understanding that the program would have to be adapted to the Canadian environment.

Two of the strategies for increasing business demand for innovation centered on increasing access to risk capital in Canada:

**1) Support the development of venture angel groups.**

Groups of angel investors are expected to be able to match the size of early stage venture capital investments and thus address the scarcity of early stage venture capital. Networking among venture angels was also seen as a positive outcome from this investment model because of the importance for new firms to have access to individuals with a range of expertise.

**2) Offer tax credits for angel investment.**

Another strategy for addressing the need for early stage investment is to offer tax incentives to attract more investors to the angel investment community. The National Angel Organization has proposed that Canadian federal and provincial governments offer angel investors a combined tax credit of 30% in respect of their investments directly into eligible businesses, up to an annual maximum tax credit of \$250,000. Participants also observed that this strategy was endorsed by the Leader's Roundtable of the Conference Board of Canada in the report 'Six Quick Hits for Canadian Commercialization,' in 2005.

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<sup>13</sup> Department of Agriculture, Department of Commerce, Department of Defense, Department of Education, Department of Energy, Department of Health and Human Services, Department of Transportation, Environmental Protection Agency, National Aeronautics and Space, Administration National Science Foundation and Department of Homeland Security

<sup>14</sup> [http://www.sba.gov/aboutsba/sbaprograms/sbir/faq/sbir\\_sbir\\_faq.html](http://www.sba.gov/aboutsba/sbaprograms/sbir/faq/sbir_sbir_faq.html)

<sup>15</sup> <http://www.acq.osd.mil/osbp/sbir/overview/index.htm>

The final suggestion for increasing business demand for innovation was to expand support for the formation and growth of clusters. The participants proposed that the that regional and provincial governments were in the best position to identify and respond to the needs of clusters, but that these governments should work together with the federal government in identifying clusters of strategic importance.

## 5. Summary

This workshop demonstrated three important changes in thinking with respect to technology transfer in Canada:

- 1) The emphasis on addressing gap funding is much reduced. In 2004, a previous technology transfer workshop with different participants identified the lack of commercialization funding as a major obstacle to technology transfer in Canada. There was no such consensus among the participants in the recent workshop. It is possible that the increases in availability of commercialization project funding since 2004 has addressed this concern for some technology transfer organizations. Other participants still saw a lack of funding as a barrier to commercialisation, which implies that not all technology transfer organizations are equally able to access existing funding. As a group, the participants were more concerned with increasing the number of commercialization champions in the Canadian innovation system, and with ensuring that promising ventures were able to access the risk capital required to grow.
- 2) 'Gap' analogies for technology transfer were described as misleading and unsophisticated, especially when the focus is entirely on 'pushing' technologies out of research institutions. Participants suggested that commercialization be considered in terms of both 'push' and 'pull' forces, and as an activity that requires the coordinated efforts of many individuals and organizations. This change in focus can be expected to lead to an increase in emphasis on networking and the business side of commercialization.
- 3) A strong focus on the business or demand side of commercialization was evident throughout the workshop. This interest in business activity extends far beyond immediate commercialization concerns. For example, enhancing the existing IRAP program could be expected to improve commercialization in Canada but this effect would likely be small relative to the SME community beyond those affiliated with public research institutions.

The participants suggested that those seeking to improve the innovation system should strive to clarify goals for commercialization, and consider: 1) expanding IRAP; 2) creating a Canadian version of the SBIR program; 3) supporting the development of

venture angel groups; and, 4) offering tax credits for venture angel investments. Overall, the emphasis in the workshop was very clearly on the creation of an environment in which industrial innovation is encouraged and supported, but which leaves the onus for commercialization upon private enterprise.

## Appendix A. List of Participants<sup>16</sup>

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<sup>16</sup> This document lists the participants' titles and affiliations at the time of their participation in the workshop.

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## **Appendix B. Morning Discussion Questions**

The proposed objective of the morning session was the identification of gaps in the set of programs addressing the invention-innovation gap in Canada. Participants were invited to use the following questions to spark discussions in their groups.

- To what extent does Canada suffer from an invention-innovation gap in the commercialization of publicly-funded research relative to other countries. What level or type of funding are other countries using to address this challenge successfully?
- What has your past experience with commercialization taught you are the most important resources for bridging the invention-innovation gap? Is that knowledge reflected in the programs that you have encountered?
- What stage of the invention-innovation development process is supported least? What would be required to better support that aspect of the process and what benefits would this support yield?
- Is there a stage of the invention-innovation process that would not benefit from further investments? If yes, where could those resources be better employed?
- How does the nature and size of the invention-innovation gap vary across regions, technologies, and organizations? Is the diversity in needs reflected in the design of support programs?

## **Appendix C. Afternoon Discussion Prompts**

The objective of the afternoon session was to develop at least three recommendations to strengthen Canada's capacity to commercialize publicly-funded research by addressing at least one of the issues identified in the morning session:

1. The need for clear and appropriate goals for the commercialization of publicly funded-research and to address the misalignment of expectations among commercialization stake-holders
2. The need to create an international focus and capabilities, such that technologies and firms are positioned as world leaders not Canadian leaders
3. The need to increase the availability of individuals qualified to champion commercialization as technology managers, entrepreneurs, and financiers
4. The need to improve access to risk capital to increase the number of firms that can 'pull' technologies into the market; risk capital needs to support both new firm creation and the growth of small firms into large Canadian firms
5. The need to catalyze and grow clusters that will 'pull' technologies into the market