

## George Brown College: Submission to Expert Panel on Federal Support for R&D

**George Brown College** is a key part of the economic, cultural and social fabric of Toronto. George Brown College is one of Canada's largest, most diversified and highly respected colleges, serving a broad and vibrant student body with an incredibly rich program mix of apprenticeship training, certificates, diplomas and degrees. We recognize the importance of applied research and teaching our students innovation literacy, acquired by our students through work on applied research. Innovation literacy includes research, development, problem solving, adaptability, leadership and entrepreneurial skills, and the ability to recognize innovation in work contexts. Applied research enables us to integrate industry-responsive innovation and research as a cornerstone of offering our students the applied learning required for today's—and tomorrow's—economy. Our industry partners benefit significantly from this focus. Our students graduate with expertise in their areas of choice, ready to work as full participants in the Canadian economy. These students will also be future innovators, experienced in solving practical problems using innovative thinking in their industries.

Over the past four years GBC has developed our applied research capability; we are a leader in the college system for building research capacity, attracting funding from government programs, and engaging with partners on issues of importance to our community. Since the formal inception of our research office three years ago, we have served the innovation needs of 77 partners, mobilising 694 students in support of industry innovation, and raised over \$1.2M in matching funding from our industry partners for applied research project work.

*Q1. In addition to the R&D activity defined by the OECD, should government be funding other business activities related to the commercialization of R&D? If so, what and why?*

**Recommendation:** The government should support the full range of R&D and innovation activities as defined by the OECD Frascati Manual, particularly the development activities required by firms seeking to innovate.

Capturing the broader concept of innovation as legitimate and fundable R&D activities will better enable firms to access supports from post-secondary institutions (PSIs) as required. The distinction between R&D activities and innovation activities is dependent on context. There are significant activities that fall outside of these definitions or are not collected in national statistics that are essential to firm innovation activities and economic performance.<sup>1</sup> These activities include market development, prototype and concept testing, and business planning activities. While essential to innovation, these activities are not always fundable through funding agencies. Business planning and market research are important components of the commercialization process that are necessary preliminary steps for product design, prototyping and testing context. For example, we have worked with a SME, *Mill Pond Cannery and Preserves*, to conduct market research on Ontario organic ingredients for making new food products. Within the span of one year, we have successfully aided this SME to create four products and launch them on the market. They are now being sold in over a dozen stores, and new products are in development. In addition to the business and market research, we conducted recipe formulation and nutrition research, and provided graphic designs for the labels. Additionally it would be useful for the government to provide a program to subsidize the cost of patent application filing and prosecution by PSIs and their SME collaborators. This would facilitate the creation of sustainable competitive advantage around innovative technologies collaboratively developed through PSI/SME applied research.

*Q2 Does Figure 2, the model of business innovation presented above, capture the key structural factors and inputs to innovation? If not, what is missing?*

**Recommendation:** A Canadian innovation strategy is needed to support business innovation. This strategy should include leveraging PSIs for innovation support and access to R&D equipment.

Canada needs an innovation strategy<sup>2</sup> that supports business innovation and encourages firms to invest with PSIs in participatory, open innovation.<sup>3</sup> *Inputs to business innovation* should also include structural supports offered by Canadian PSIs. The Finnish Innovation System offers a useful model with the many structural supports underlying business innovation.<sup>4</sup> Acknowledging the PSI enablers will let firms acquire as-needed business planning and marketing support, and access to R&D equipment. Colleges are close to industry and offer good opportunities for supporting business innovation activities commensurate with providing job-ready graduates.

*Q5. Regarding networks, collaborations and linkages, what are the main impediments to successful business-university or business-college partnerships? Does the postsecondary education system have the right capacity, approaches, and policies for effective partnerships with business?*

**Recommendation:** Government should support clusters, both linked geographically and virtually, to support firms where and when as needed. Marketing, outreach and funding programs must be oriented to the needs of industry and foster greater complementary linkages among all PSIs who support business innovation.

Clusters will enable knowledge transfer and commercialization of basic research from university laboratories, and firm-level innovation activities that can draw on PSI applied research and experimental development expertise and facilities. Effective policy is required that will create clusters and “regions of knowledge” that can enable the commercialization of basic research and the application of ideas and innovation by firms.<sup>5</sup> Virtual clusters such as the UK’s National Endowment for Science, Technology and the Arts<sup>6</sup> use social networks to facilitate collaborative innovation where partners can be regional as well as international. The college applied research system is well positioned to play a lead role in strengthening national and regional capacity to innovate, working with research centres and industry partners to enhance competitiveness.<sup>7</sup> Businesses are often unaware that PSIs offer applied research services. A recent survey by NSERC shows that only about 7% of firms that do R&D use NSERC programs. Only about 2% of small R&D performers use NSERC; 70% of firms were not aware of NSERC or the programs available to them. In comparison, about 90% use SR&ED and 17% use IRAP.<sup>8</sup>

Industry access to the human resources in the colleges is currently limited by system constraints. College faculty are hired to teach, so freeing up faculty from teaching duties to work on industry applied research is a challenge. Restructuring and funding is required to orient college faculty time to applied research. This funding should not be focused on one professor, but rather be targeted at providing system-level support to engage multiple faculty members in applied innovation activities. The strength of college applied research is that we address industry innovation challenges with a multidisciplinary approach. Leveraging the industry connections of a block of faculty will enable colleges to address business innovation challenges with multidisciplinary solutions. This will also reinforce applied research as part of the teaching and learning experience, which provides all students with innovation training commensurate with aiding business innovation.

*Q7 Regarding talent, is Canada\* producing sufficient numbers of graduates with the right skills to drive business innovation and productivity growth? If not, what changes are needed? Where demand for advanced skills is low, what are the reasons and what changes, if any, are needed?*

**Recommendation:** Expand the definition of highly qualified personnel and implement Conference Board of Canada recommendations on developing national innovation education requirements and linkages.

Accessing students can also be a challenge as undergraduate students are often not eligible for funding under federal granting programs. The focus should be on graduating innovation literate, creative and entrepreneurial

individuals at all levels.<sup>9</sup> Of particular importance to all PSIs is how well we prepare the next generation of talent for entrepreneurial and innovation activities. Expanding the definition of Highly Qualified Personnel (HQP) to include undergraduate college students (Highly Qualified and Skilled Personnel-HQSP) captures the larger potential of engaging our entire work force in innovation capacity development. Those with graduate degrees represent less than 5% of our population.<sup>10</sup> HQSP acknowledges the role of advanced skills and education and the multiplier effect of a wider population equipped with innovation literacy, which is needed at all levels of the work force. Those with graduate degrees can be better enabled at innovation when working with a more innovation ready work force in general. Indeed, OECD data show that it is those with intermediate skills that are more responsible for innovation at the firm level, greater productivity comes from firms that conduct incremental innovation, and the skills required for this innovation are not science and engineering alone, but rather are the skills we understand as innovation literacy, many of which are rooted in the social sciences.<sup>11</sup>

Colleges and polytechnics support business innovation and economic growth through education in a wide range of disciplines, including but not limited to science, technology, engineering, math, commerce, management, the social sciences, humanities, and the arts. Many of these skills are being sought out by employers, who recognize the importance of hiring employees with skill-sets and knowledge beyond those that are job-specific. Our graduates are content experts in their fields, but also expert learners, able to adapt to our changing world. “Empowering people to innovate” is a key OECD policy principle.<sup>12</sup> Innovation can be supported where education at all levels has a focus on innovation and productivity enhancement, which can lead to the mobility of skilled personnel and open innovation among firms and countries.<sup>13</sup>

The Conference Board of Canada has called for innovation education in four pillars: 1. Develop a pan-Canadian framework for promoting innovation skills; 2. Recognize and credential innovation skills; 3. Strengthen links among education, business and communities; and, 4. Increase innovation training in pre-service and in-service programs for educators.<sup>14</sup> Linking the education of innovation nationally will enhance our ability to facilitate business innovation across the country and across educational jurisdictions.<sup>15</sup>

Ontario government mandated Key Performance Indicators (KPIs) rate employer satisfaction based on the skills they perceive their employees (college graduates) possess. One question on the Employer KPI survey asks: “When [Graduate’s name] first started working with you after his/her graduation, how satisfied were you with his/her educational preparation for the following skills and abilities?” Data extracted from GBC’s 2009-2010 Graduate and Employer KPIs demonstrate that employers are 93% satisfied with GBC graduate’s abilities to be adaptable, 89% satisfied with their critical thinking skills, 89% satisfied with their abilities in problem solving, and 78% satisfied with their creativity and innovation skills. Employer satisfaction ratings for the above skills confirm the college’s aptitude in fostering innovation literacy in its graduates.

*Q9. With which federal programs supporting business or commercially oriented R&D in Canada do you have direct experience and knowledge? In your view: Which of these programs are working, and why? Which programs are not working, and why not ?*

**Recommendation:** Continue and expand the suite of programs under the College and Community Innovation Program umbrella, which is working effectively to enable firms to collaborate with colleges.

Programs that are explicitly designed to facilitate business innovation are working to encourage firms to invest in applied research and experimental development with Canadian colleges and polytechnics. The College and Community Innovation Program (CCIP) administered by NSERC on behalf of the Tri-Council is a very effective instrument for engaging firms in business innovation. CCI funding has enabled our collaborations with many

small companies in product development, product testing and commercialization. Funding requirements with cash and in-kind structure give flexibility and encouragement to SMEs to prove their innovative concepts in partnership with PSIs. While this is a federal funding program, it complements nicely the use of regional and provincial networks resulting in deep penetration in provinces. The CCIP suite of programs fosters collaboration, moves much quicker than traditional Granting Council competitions, and is an excellent vehicle for developing the applied research and experimental development layer of the Canadian innovation system. This in turn enhances the overall PSI capacity to aid in bringing disruptive innovations to market from university labs, and incremental innovations to the market within firms. The CCIP includes a very accommodating and flexible suite of sub-programs. However, some expenses that are eligible under SR&ED are not eligible as in-kind contributions from industry partners. This reflects a lack of coordination between these two funding programs, and illustrates how different activities are funded and/or counted in different ways by different government agencies.

In other government programs there is a lack of standard review criteria across all funding programs, and not all programs offer transparent criteria for their assessment.<sup>16</sup> This is an impediment to effective industry engagement with funding programs as it leads to cynicism in firms about how decisions are made.

*Q11 How could the Government of Canada lighten the administration requirements of its programs on recipients and improve outreach to business?*

**Recommendation:** Streamline application processes and forms, and conduct marketing for firms to increase awareness of PSI receptivity and innovation supports. Create a true innovation system by coordinating business development among federal and provincial agencies to reduce overlap and increase cooperation.

Industry innovation supports must move at the speed of business. Networks with multiple entry points (colleges, universities, funding agencies) mean firms can access all the resources at their disposal despite not initially knowing what they all are. A single steward to guide and mentor the business would also be valuable. Research program administration requirements vary widely across different agencies and programs. Status reports might be required monthly, annually, every 18 months or other. Standardization of forms and documentation (applications, financial and status reports) would mean less time spent on administrative aspects. It would also make applying and reporting to various agencies easier.

*Q12 How could the Government of Canada be more innovative and responsive to meet new needs or opportunities and try alternative service delivery approaches in its programs?*

**Recommendation:** Provide an “any point of entry” contact point for all involved in supporting business innovation. Marketing and outreach to industry should encourage PSI responsiveness; all PSIs should be linked through existing research offices to provide project triage and hand off support as needed by industry clients.

*Q14. What lessons and best practices can be taken from provincial business and commercially oriented R&D programs, and how should the two orders of government align their programming?*

**Recommendation:** Federal and provincial funding bodies should align and streamline program, application and reporting requirements, market PSIs as available assets to assist with business innovation needs, and coordinate decision-making criteria to account for a variety of investment types and levels.

The Ontario Centres of Excellence (the primary vehicle for industry-academic partnerships in the Ontario Network of Excellence) is good example of how funding organizations can work together. Their business developers are connected to all PSIs and are part of a network of different agencies and institutions that can

offer support to businesses. The business developers also work with applicants to improve their R&D plans thus helping ensure a good idea is acted upon even if the applicant is inexperienced in the world of funded R&D. Common project development tools greatly aid in finding the right match with a PSI, as well as helping to socialise the industry partners to how projects are triaged and how to work with PSIs.

*Q15. Is there a difference between R&D and innovation? If yes, how are they different? Should government focus on R&D or Innovation? What should the balance be?*

**Recommendation:** Expanding the scope of R&D to include those innovation supports acknowledged as necessary by the OECD will encourage more firm-level business innovation.

The government should increase business innovation commensurate with the establishment of industry-facing applied research services accessed through any PSI in the system.

There is a difference between R&D and innovation. Not all firms who innovate conduct R&D.<sup>17</sup> Innovation and R&D definitions need to be harmonized, coordinated within a national innovation strategy, and supported through industry facing business innovation services accessible from all PSIs working together in a complementary fashion. Canada needs an open innovation system that articulates industry needs to public R&D facilities that offers industry a single point of contact on innovation system support services. We also need common indicators across the innovation system. Reorienting and modernizing the Canadian post-secondary education system to function as an industry-facing innovation system will encourage firms to make more and better use of the capacity that exists with postsecondary R&D. Linking R&D and business innovation to training all levels of the workforce, particularly at the intermediate level and in a variety of disciplines, will lead to increased innovation capacity and improved productivity.<sup>18</sup>

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<sup>1</sup> Schramm, A. Toward an Entrepreneurial Society: Why Measurement Matters. Innovations. MIT Press. Winter 2008, Vol. 3, No. 1, P 3-10.

<sup>2</sup> Gault, F. Innovation Strategies For A Global Economy: Development, Implementation, Measurement and Management. International Development Research Centre/Edward Elgar Publishing, Inc. 2010.

<sup>3</sup> Buur, J., & Matthews, B. Participatory innovation. International Journal of Innovation Management, 12(3), 255-273. 2008. Chesbrough, H. Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business School Press. 2003.

<sup>4</sup> See <http://www.research.fi/en/innovationsystem>.

<sup>5</sup> OECD. Innovative Clusters: Drivers of National Innovation Systems. OECD Publishing. 2001. OECD. Dynamising National Innovation Systems. OECD Publishing. 2002.

<sup>6</sup> See <http://www.nesta.org.uk>.

<sup>7</sup> Conference Board of Canada. "Innovation Catalysts and Accelerators: The Impact of Ontario Colleges' Applied Research." 2010

<sup>8</sup> Statistics Canada 2010.

<sup>9</sup> OECD. Innovation in the Knowledge Economy. Implications for Education and Learning. OECD Publishing. 2004. OECD. The OECD Innovation Strategy: Getting a Head Start on Tomorrow. OECD Publishing. 2010.

<sup>10</sup> OECD. Education at a Glance 2010: OECD Indicators. OECD Publishing. 2010. Statistics Canada - 2006 Census. Catalogue Number 97-559-XCB2006028.

<sup>11</sup> Toner, P. Workforce Skills and Innovation: Major Themes from the Literature. OECD. Paris. 2011.

<sup>12</sup> OECD. The OECD Innovation Strategy: Getting a Head Start on Tomorrow. OECD Publishing. 2010.

<sup>13</sup> Gault, F. Innovation Strategies For A Global Economy: Development, Implementation, Measurement and Management. International Development Research Centre/Edward Elgar Publishing, Inc. 2010. OECD. Innovative People: Mobility of Skilled Personnel in National Innovation Systems. OECD Publishing. 2001. OECD. Innovation in the Knowledge Economy. Implications for Education and Learning. OECD Publishing. 2004.

<sup>14</sup> Solving Canada's Innovation Conundrum: How Public Education Can Help, July 2003, The Conference Board of Canada.

<sup>15</sup> George Brown College is currently leading a study with 14 academic partners, the ACCC, the Conference Board, and Polytechnics Canada to address these four needs directly through a rigorous longitudinal study of student engagement in business innovation.

<sup>16</sup> Macaulay, J., Ledwell, P. Innovation Nation: Building a culture and practice of innovation in Canada. Public Policy Forum 2009.

<sup>17</sup> OECD. Measuring Innovation: A New Perspective. OECD Publishing. 2010.

<sup>18</sup> Toner, P. Workforce Skills and Innovation: Major Themes from the Literature. OECD. Paris. 2011.