Submission to the Expert Review Panel on Research and Development

Feb. 2011

The Institute for Competitiveness & Prosperity is pleased to submit our responses to several of the questions in the Expert Panel Consultation paper.

We think the panel is on the right track. The consultation paper recognizes that innovation is critical to our standard of living and that it is much broader than scientific R&D. It also concludes that innovation is affected by a system of factors influencing our companies' choices to adopt innovation as a competitive strategy – a choice that compels them to draw on a variety of inputs, not just R&D, in support of innovative activity. We have argued that innovation is different than R&D and invention. As we conclude in our attached paper, on the difference between innovation and invention, "What is Innovation – Really?" public policy is excessively focused on invention and not innovation. A broader focus on innovation would highlight the challenge we face in Canada with under developed management capabilities to drive the process. We have attached a summary of our recent research on this issue, "Canada's Systematic Under Investment in the Education of Managers, A Review of the Research." Our responses to specific questions follow.

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

We have concluded that Canada will not progress on innovation until our policies focus broadly on innovation rather than narrowly on invention. If we want more innovation, public policy can help in four ways:

- Designing innovative educational programs connecting inventors who care about innovation with business people wanting to transform inventions into consumer-relevant innovations. These programs would also involve innovation financiers; public funding could even be available for winning innovations.
- Ensuring that public funding of innovation aims at developing both the hard science skills and "softer" skills of communication, consumer understanding, and team building.
- Recognizing that necessity is the mother of both invention *and* innovation—and ensuring that our markets are intensely competitive to pressure our firms to add consumer value to their products and processes.
- Broadening our financing of innovation. For instance, we should loosen the definition of 'fundable R&D', which is currently far too tight. None of the success stories described in our attached discussion paper, "What is Innovation - Really?" would qualify for funding of the innovations that made them world leaders. Such R&D could include consumer research, test marketing and pilots, and other product development activities carried out by non-scientists.

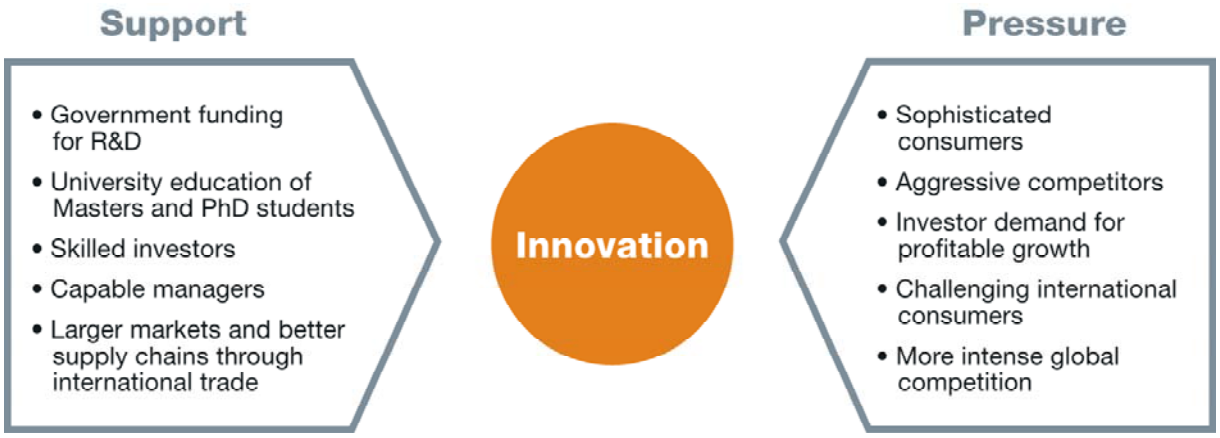
2. Does Figure 2, the model of business innovation presented above, capture the key structural factors and inputs to innovation? If not, what is missing?

The model captures the key structural factors and inputs to innovation. We are encouraged that the supporting text to "Talented, educated, entrepreneurial people" states that "a strong foundation of entrepreneurial and commercial skills is another vital aspect of business innovation." The Consultation Paper notes that Canada produces fewer graduates in management

disciplines than the US and that managers in Canada generally have lower educational attainment than their US counterparts.

The Institute for Competitiveness & Prosperity has developed a framework that shows how specialized **support** and competitive **pressure** are drivers of productivity, innovation, and prosperity. *(*Exhibit 1*)*

Exhibit 1 Support and Pressure drive Innovation



Source: Institute for Competitiveness & Prosperity

- **Support** refers to the conditions that provide a foundation of assistance to all firms and individuals as they compete and develop.
- **Pressure** comes from aggressive and capable competitors who threaten complacency and from sophisticated customers who demand innovative goods and services at low prices.

What is critical in a framework for business innovation is the recognition that it is an interactive system. It is not a linear process in which scientific inventions are passed on to business people to be "commercialized."

Support and pressure need to work in balance. All support and no pressure creates a cushy and lazy environment inimical to productivity and innovation. All pressure and no support creates a harsh and barren environment, equally inimical to productivity and innovation.

Policies in Canada have been oriented towards the support of the hard sciences for invention. As we have seen in our past research, this does not adequately recognize the importance of business and management processes for innovation. Our competitiveness and prosperity are built on a solid base of excellence in the sciences. And leading high technology firms are founded by science and engineering graduates. But successful innovation requires a balance of science and other skills. These other skills are important to achieve a successful transition from start up to thriving business.

3. Regarding capital, is there an adequate supply of risk capital for Canadian firms at each stage of their growth? If not, why not? Where returns on investments are low, what are the reasons and potential solutions?

The Institute has found that Canada's venture capital industry invests far fewer dollars per company than their peers in the United States.[1] As lamented by many in the venture capital industry, the amount of available funds has shrunk considerably in the past few years. But this is not unique to Canada. Available venture capital funds are now also at a much lower level in the United States – declining by more than a third from 2008 to 2009.

One public policy solution to this apparent problem has been special tax credits to motivate individuals to invest in venture capital – most notably Labour Sponsored Investment Funds (LSIFs). These funds with their focus on small investors are poorly matched with the requirements for sophisticated financiers of high risk startups. Here in Ontario, the special tax treatment is scheduled to expire in 2012 and we do not recommend it be resuscitated. We urge the federal and other provincial governments to assess critically the real costs and benefits of LSIFs to innovation in Canada.

There may be an opportunity to turn our sub-scale investments to an advantage. Observers of the venture capital industry have noted that venture capital has become too capital intensive and in some sense has lost its traditional position as a "no-frills" funder of startups. In a time when venture capital returns are low in both Canada and the US and available venture capital is much less plentiful, traditional approaches that are aimed at creating large pools of funds with significant investments per company may not be appropriate.

Entrepreneur and consultant to the venture capital industry Eric Ries coined the phrase "lean startup" and, along with Stanford professor Steve Blank, developed a new approach to venture capital. Based on ideas of design thinking – iteration, fact-based decision making, and experimentation – lean start up organizations are temporary in nature, designed to discover and implement a profitable business model that can start small and be scaled up quickly for commercial success.[2] At its core, the lean startup minimizes the amount of cash required in the early stages of a company. Its managers are challenged to earn revenue from day one and make investments only as revenue is generated. This requires real customers from the outset, as well as continuous interaction with them to guide iterative product development. According to Blank and Ries, the lean startup has a low burn rate of its cash by design, not by crisis.

Lean startups place a premium on management agility to test hypotheses and answer the unknowns. As Ries observes, "The agile practices have to be adapted, shifting the focus somewhat from generating stuff to learning about what customers will want. Most technology startups fail not because the technology doesn't work, but because they are making something that there is not a real market for."[3] Product development is carried out in a continuous cycle measured in hours, not years, and is necessarily coupled with customer contact. Costs are minimized through the relentless search for supporting open-source programming tools and easily distributed web-based software. Examples of successful lean startups cited by its proponents include Dropbox, a file sharing and synchronization service, IMVU, an online chatting service, Foursquare Labs, a mobile

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[1] Institute for Competitiveness & Prosperity, Report on Canada, Beyond the recovery, June 2010, p.48

[2] Steve Blank and Eric Ries, "The Lean Startup – Low Burn by Design not Crisis," available online: http//www.slideshare.net/venturehacks/the-lean-startup

[3] Steve Lohr, "The Rise of the Fleet-Footed Startup," The New York Times, April 24, 2010, available online: http://www.nytimes.com/2010/04/25/business/25unboxed.html

phone location application, Grockit, an online educational network, and KISSmetrics, a provider of analytical tools for marketers.

Traditional venture funds aim for larger investments and do not focus on bootstrap operations. In the current market of financial stress, these traditional approaches are problematic. Lean startups are a promising antidote to the current ills of Canadian and US venture capital business models. Given the challenges of achieving large investments in startup companies, it would be wise for us to understand this concept more deeply. Canada's business schools and organizations like MaRS in Ontario may be able to establish formal courses in lean startup ventures, similar to the popular "Evaluating Entrepreneurial Opportunities," a practical course offered at Stanford's Graduate School of Business. Opportunities may exist for small investments by government to help the lean startup approach gain traction here in Canada.

6. Regarding the creation of demand for business innovation, what role, if any, do you believe that government should play in being a "first customer" for R&D investments in Canada?

We think that governments in Canada can play a useful role as customers in enhancing support and pressure by being a "first customer" for R&D investments.

On the support side, government procurement can help new Canadian innovators by being a reference customer, which can be very useful in international markets. On the pressure side, governments need to be sophisticated customers creating demand conditions that anticipate the nature of demand in the world. Michael Porter has identified the importance of both customer attributes - demanding and sophisticated. Customers who are not easily satisfied relentlessly pressure their suppliers to improve their product and service offerings.[4] But demanding customers are not enough. Customers need to be sophisticated in their understanding of nuances of product and service improvements. If they are simply aggressively demanding, focused on driving down price without regard to quality or innovation, they do not contribute to the development of competitive industries and firms. Examples of sophisticated customers are the Japanese in consumer electronics, the French in wine, and Americans in movies. In these examples, local customers set world standards and suppliers in these home markets find it relatively easy to serve foreign markets.

In our previous research on Toronto's bio-pharmaceutical cluster, we have found that the region suffers from demanding, but unsophisticated customer conditions. Sophisticated demand drives healthy competition which in turn leads to innovation in products and processes while driving down costs – what analysts call a "positive sum game." However, public procurement of innovative medicines and devices in Canada is a zero-sum game where the participants divide value instead of creating it because competition is focused primarily on containing costs.

One approach to increasing public buyer sophistication within pharmaceuticals and devices is for our governments to embrace disease management in a small number of disease states. By focusing on the full cost and treatment outcomes in specific disease states, governments could stimulate competition by providers at all stages and approve new treatments based on fully assessed costs and success.

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[4] Institute for Competitiveness & Prosperity, Working Paper 5, *Strengthening structures: Upgrading specialized support and competitive pressure, July 2004,* see pp. 17-19 for more detail on the research on the factors of support and pressure.

The key lesson is that for public procurement to be an effective driver of innovation it needs to provide both demanding and sophisticated pressure.

7. 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?

At the federal level, we see an orientation toward the hard sciences in the granting councils related to innovation. Research grants for business school academics represent an insignificant portion of funding overall and within the Social Sciences and Humanities Research Council (SSHRC). Scholarships bypass students in graduate business education programs almost entirely because the professions are not included within the mandate of the granting councils.

In the 2010 federal budget, Ottawa highlighted its innovation initiatives, but it continued its misdirected focus on invention through the hard sciences. As one example, the budget increased funding for the research granting councils by $32 million. Of this increase, $29 million was directed to the Natural Science and Engineering Research Council (NSERC) and the Canadian Institutes of Health Research (CIHR). Only $3 million was directed to social sciences and humanities through SSHRC.

Until our federal and provincial governments recognize the difference between invention and innovation and the need for a balance between hard sciences and the social sciences and humanities and between science and engineering and management skills, their efforts will lead to more inventions, but inadequate innovations in the market by Canadian businesses. Strong management is a critical element in the innovativeness of our economy, and hence its productivity and prosperity.

We have a significant gap versus our US counterparts in business degree holders—and this gap is the result of fewer spaces in our schools, not the lack of demand by students. More alarming is the lower educational attainment of those in management occupations, irrespective of field of study. Just over a third of our managers have a university degree, compared to half in the United States. If we believe that education is important to the development of human capital and prosperity, this situation seems competitively dangerous.

15. 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?

As we discuss in our attached paper, there is a profound difference between R&D and innovation. R&D is typically scientist driven and has its goal the discovery of new-to the-world materials or products. Innovation is typically driven by business people to enhance customer value or out perform competitors. Many inventions do not provide a consumer benefit; nor are all innovations the direct results of an invention. Government needs to provide a solid foundation of support for basic and applied R&D since market forces typically result in an under investment by the private sector. Through their spending on post secondary education, governments also need to ensure that we are producing the right mix of capabilities for innovation. In our view, public policy's focus has been out of balance – emphasizing invention and R&D to a much greater degree than innovation. The major challenge is to get the conceptual balance right – from which programs and funding will be better balanced. We are not arguing that public investment needs a radical shift from invention to innovation. But some rebalancing is required.