



Genome Canada submission to the House of Commons Standing Committee on Finance

Genome Canada would like to thank the House of Commons Standing Committee on Finance for this opportunity to provide input into the reflections of the Committee with specific reference to the third theme mentioned in the consultation document i.e.:

Increasing the competitiveness of Canadian businesses through research, development, innovation and commercialization.

Executive Summary

Canada lags behind the rest of the world in converting new knowledge generated in its Universities into use to the benefit of Canadians. This is reflected in the very low business expenditure in R&D figures that are often cited as being at the root of the issue. New technologies like genomics that have been developed through strategic investments made in academia are now maturing and giving rise to a unique opportunity in Canada to engineer a marriage between cutting edge innovation and our vast and diverse industry landscape. The end result will be measured by increased productivity and competitiveness in traditional areas of our economy. In order to achieve this goal, partnerships between academia and industry must become more dynamic than they are today and encourage innovation in the design and implementation of new programs that encourage industry to “pull” new knowledge from the creators to the users.

Genome Canada is at the centre of this ecosystem when it comes to applications across the key Canadian sectors of life sciences: energy and mining, agri-food, fisheries and aquaculture and forestry sectors, which are the drivers of the future bio-economy, an area where Canada should excel.

Submission

Genome Canada is a not-for-profit corporation, funded by the Government of Canada, dedicated to developing and applying genomics science and technologies to create economic wealth and social benefit for Canadians. In partnership with Canada's six regional Genome Centres, various levels of governments, academia and industry, Genome Canada invests in large-scale science and technology to fuel innovation.

Large-scale genomics research is being integrated into receptor industries and other users in important sectors of the Canadian economy. The forestry industry is embracing genomics in tree breeding programs, to increase yields and wood quality and select the right trees to plant in the face of climate change. Knowledge from the bovine genome project is being aggressively integrated into dairy cow breeding programs for competitive advantage purposes. Personalized health genomics programs are delivering value to patients and health care systems by driving more evidence-based approaches to health. New models of public-private, open innovation partnerships have been built in both the health and energy sectors (see below for more details).

We have a strong track record of leveraging federal funds through co-funding of genomics research projects with the private sector, among others. In partnership with the six regional Genome Centres, we have secured more than \$1.2 billion in co-funding since 2000. This co-funding has come from provincial governments, international partnerships and the private sector.

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We have also gained some perspective on the research needs of business for innovation through our recent interactions—in the form of workshops—with representatives from a variety of industry sectors (e.g., agri-food, fisheries, forestry, energy and mining) seeking to enhance partnerships with the genomics research community to commercialize genomics technologies and applications. This work has resulted in sector specific roadmaps defining how genomics can advance each sector.

Canadian business continues to lag in its commitments to R&D as compared to other countries. As the Conference Board of Canada recently reported, “despite a decade or so of innovation agendas and prosperity reports, Canada remains near the bottom of its peer group on innovation, ranking 13th among the 16 peer countries.” And the federal government noted in its progress report on the S&T Strategy in 2009, “as a country, we must do even better in turning ideas into the innovations that will improve our economic competitiveness and standards of living.”

The reasons for these disappointing results are of course complex, and no single element can explain the consistently poor Canadian scorecard as it relates to innovation and commercialization, but there are steps that can be taken to reverse this trend.

Genome Canada’s work in a number of areas has clearly demonstrated gaps in understanding and communication between the academic community and users and receptors in both the public and private sectors in terms of the productivity gains that could be made by integrating innovations into existing industries. This is highlighted by those natural resource-based industries that could benefit immensely from using new technologies, but where the industry-academic interface has not been productive.

In genomics, we have worked to bridge these divides by bringing together—in workshop style settings—users and researchers in order to learn from each other what is available and what is needed. Incentives must be provided to bring these groups together, and programs that reduce risk for industry need to be designed. As stated in last year’s Speech from the Throne “Our government will continue to protect and promote Canada’s traditional industries” and at Genome Canada, we believe that this will be possible if we successfully integrate new technologies into these key sectors of the economy – increasing productivity and competitiveness.

Genome Canada’s new Genomic Applications Partnership Program (GAPP) is an example of an initiative that is providing such incentives and reducing risk for industry and other users. This user-driven program has the goal of progressing technologies from academia into the realm of “real-world” applications based on challenges articulated by industry or the public sector. It will fund later stage R&D projects in academia, mature enough to envisage short-term application and commercial or other development. Each project receives a third of its funding from Genome Canada, a third from the “user” partner, with the remaining third from other co-funders including the province in which the project takes place. This program is playing a key role in addressing the initial gap in the funding pipeline getting projects mature enough for more significant investments from industry and other users. Examples of successes include a Quebec based cheese producer that is integrating genomics into its manufacturing process to ensure batch to batch consistency of their product, a young Ontario based biotech start up developing a new diagnostic for infectious disease and members of the aquaculture industry integrating genomics into their brood stock programs to improve farmed salmon stocks.

The next logical step would be to develop a funding program where public funds could flow to industry, especially early stage companies, to directly support projects within these SMEs that may not be ready for series A investments. This would help create new companies in a more robust and sustainable environment and help Canada become globally competitive. In the case of genomics applications, Genome Canada would be a perfect vehicle through which to run such a program due to the specialized knowledge and proprietary insights that we have honed over the years.

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Experimenting with Public-Private Partnerships of Open Innovation

Canada needs to take more risks in experimenting with different models of interaction across the public-private divide and encourage long term sustainable partnerships of mutual benefit. We have found that even established industries (energy, mining, pharmaceuticals, and agriculture) are now hungry to share information at earlier stages of the R&D process because individual companies within these industries see a mutual benefit in doing so in terms of advancing particular areas of knowledge that can be capitalized on. Several so-called "pre-competitive" consortia are developing in different fields. For example:

- The Structural Genomics Consortium (SGC) determines the three-dimensional structure of medically-relevant proteins and places them in the public domain without restrictions on their use. The objective is to highlight potential targets for drug research and to significantly accelerate the drug development process. SGC involves nine pharmaceutical companies who have agreed to fund Phase III of this initiative, which has been ongoing since 2004 and catalyzed by funding from the federal government through Genome Canada, CIHR, CFI, as well as the province of Ontario and the Wellcome Trust. The companies have collectively put \$42 million on the table for Phase III of the SGC which is due to end in June of 2015. Results produced from the consortium are placed directly into the public domain but IP can be derived by the companies on post-SGC work. Three spinoffs companies have already resulted from initiative. This is a new model of "inward investment" into Canada – not through bricks and mortar but through investments into Canada's brain power. The private sector is prepared to continue what they see as a highly productive model of open innovation as long as the public sector remains at the table.
- Six of the large companies in the energy sector have come together and co-funded a Genome Canada project on bioremediation of tailings ponds in the oil sands of Alberta. This is a topic that is of great importance economically, but for which it is clear that no one company would have the resources to tackle on their own. This type of public-private partnership is a win-win situation for both academic partners and industry, as well as the Canadian public.

These are exemplary and highly promising models of experimental approaches to public-private partnerships, but ones that are challenged by a lack of long-term sustainable funding. Government policies and funding programs should facilitate such novel and essential interactions and encourage their longer-term sustainability when they have demonstrated success as measured by research outputs, value to industry partners and socio-economic benefit for Canada.

Risk capital

Finally, there continues to be gaps on the venture capital side, with risk averseness and a low level of specialization in Canadian venture capital funds not permitting a level playing field with investors south of the border. In our experience both risk averseness and lack of specialization are related conditions that can be overcome by more specific expertise being integrated into the VC's allowing the necessary proprietary insights that allow high quality early investments choices to be made. The government should consider mandating government backed venture capital funds to participate in much earlier stage investment than is currently the case. We believe that this would allow more Canadian based spin outs to remain Canadian for a longer time thus creating high value offerings to the market.

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In summary, Genome Canada's recommendations include the following:

- Develop a comprehensive policy for R&D that flows from discovery to early stage commercialization
- Build productive bridges between the public and private sectors by providing incentives that bring these groups together, as well as design programs that reduce risk for industry;
- Experiment with alternative R&D funding models, including direct project specific funding to the private sector, where appropriate, while maintaining a balance of funding across the entire spectrum of research, from discovery to translation and application;
- Encourage long-term sustainability of unique and essential public-private partnership models of open innovation that show promising interaction across the public-private divide when they have demonstrated success as measured by research outputs, value to industry partners and socio-economic benefit for Canada; and,
- Consider encouraging government backed VC funds to participate in early stage investment in Canadian innovation.

Canada has an unprecedented opportunity to play a world leadership role in the development of the new bio-economy. Given the excellence of the knowledge base in the life science sectors and our nation's footprint in natural resources, agriculture and other bio-based resources, Canada should be reaping the rewards and claiming a disproportionately larger piece of the bio-economy pie, which is expected to reach between 4 to 9 per cent of OECD countries' GDP by 2030 (representing several trillion dollars). We hope that these recommendations can contribute to meeting this goal.

This fall Genome Canada will be making a request for funding of a 5-year plan that encompasses many of these ideas, with cross sector translation of new knowledge into use at its core.

We would be honoured to have the opportunity to address the Committee at the appropriate time during your pre-budget reflections.

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