

The Best and the Brightest

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Canada has some of the best and the brightest scientists in the world. Take for instance Gilles Brassard in quantum cryptography, Paul Corkum in attosecond physics, and Barbara Sherwood-Lawlor in earth sciences who are international leaders in their fields. There is little doubt that Canadians are performing well given our modest resources. The question is: are we supporting our top talent effectively to allow them to collaborate with top researchers around the world, and to allow our companies to realize value from our research investment?

Canada produces 4.1% of all research papers, and performs only 2.1% (at \$24.3B) of the research and development undertaken in the world. That's double what it was in the 1980s and 90s, but is still far behind countries like the US (\$405B), China (\$296B), Japan (\$160B), Germany (\$69B), South Korea (\$56B) and even behind France (\$42B), the UK (\$38B) and India (\$36B).

And science and technology are, by their very nature, international. Discoveries in chemistry and innovations in engineering can take place anywhere in the world. And the most cutting edge innovation happens when the best people in a discipline are able to work together in teams to take advantage of the brilliance of each member. What we call Big Science in fields such as physics and astronomy has been characterized for many decades by international collaboration, since each project was usually too expensive and complex for a single country to undertake it alone. And climate change science has necessarily been the subject of joint projects at an international level.

But in other disciplines, how good is Canada at facilitating the mobility of our scientists and engineers so that they can participate in this joint research for the benefit of Canada? Most Canadian researchers link effectively with their colleagues south of the border; geographical and cultural proximity are huge advantages for Canadian scientists wanting to participate in the \$405B of annual research and development undertaken by American scientists.

But what of the rest of the world? For decades Canada had Memoranda of Understanding (MOUs) in science and technology with other countries, but they had fostered virtually no collaboration. More recently, a key vehicle has been S&T Agreements with key target countries including China, Brazil, Israel, and India coupled with a Joint Committee of the two countries to identify the research priorities for jointly funded projects. International S&T Partnerships Canada (ISTP) managed the peer review in Canada and organized joint workshops of researchers. (I served on the Canada/China Joint Committee on S&T for seven years until my retirement a year ago.)

These S&T Agreements are still fairly new, but we can already start to assess how they are working. In the first five years with China, \$20M from Canada flowed to 17 projects

across five disciplines, all with companies involved and benefiting; China provided matching funding for their researchers and companies. Then with a refocusing designed to generate more impact, resources were identified for bigger projects in just two disciplines – clean automotive transportation and human vaccines. With the announcement soon of selected projects and companies, the government can take a step back and the model can be assessed along with other models to determine how Canada should be partnering with China and other countries down the road.

A second model is the Canada-India Research Centre of Excellence announced in Budget 2011 as part of Canada's India Engagement Strategy. This Centre was chosen through competitive process managed by the Network of Centres of Excellence program. It is led by three Canadian universities and will be conducting \$13.8M in research over the years 2012-2017 through 9 joint projects with 158 researchers and 61 partners, including the private sector, in both countries.

Yet another model implements international R&D through earmarked funding in the programs of the granting councils. Their peer review processes are well established and second to none internationally. Initiatives such as the Human Frontier Science Program and the G8 Research Councils Initiative set joint priorities across a number of countries and fund the top research teams. The Government could consider ensuring an international collaboration dimension to the new Canada First Research Excellence Fund which was announced in Budget 2014 at \$1.5B over 10 years.

The one common element of the initiatives used to date is the low level of funding assigned to them. Former Minister of Finance Jim Flaherty has spoken of university research as an investment rather than a Budget expenditure, but he was constrained by a deficit. A few million dollars per year is not sufficient to constitute a serious basis on which to partner with countries like China and India. They are producing some of the top scientists and engineers in the world, and their researchers can partner with anyone they wish. We would like them to choose Canadians, not just so that we can reap the benefit of discoveries and insights in specific projects, but to open up a new partnership with the countries which are going to be leading the way in science and engineering in the future. If we are not partnering with them in the short term, we'll be left standing on the sidelines of international research in the long term.

So where might the Government of Canada focus in the future in facilitating our own best and brightest researchers to partner with leading researchers in other countries? As many readers will know, the Government of Canada is currently reviewing its Science and Technology Strategy first launched in 2007. Its national consultation has been completed, and there is no evidence that it has conducted a targeted international consultation on Canada's Strategy, as China has done with its unique 7th year review of its 2006-2020 National Medium and Long Term Program for S&T Development which sets out the strategy for building China into an innovative country by 2020.

The review of our Strategy is a tremendous opportunity for the Honourable Ed Holder, Canada's new Minister of State (Science and Technology) and the Honourable Ed Fast Minister of International Trade to put their personal imprint on Canada's S&T direction. One of their top priorities should be to ensure that Canada's ability to partner in

international research is one of the key elements of the updated S&T Strategy, with strong delivery agents and a peer review selection mechanism. But equally important as Canada emerges from deficit, Ministers Holder and Fast should work closely with the Honourable Joe Oliver, the new Minister of Finance, to ensure that these programs are provided with sufficient funding so that Canadian researchers can partner with the best and the brightest --- wherever they are in the world.

About the Author

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