Putting the Pieces Together

A Response to the Review of Federal Support to Research and Development

Engineers Canada*
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**Engineers Canada is the business name of the Canadian Council of Professional Engineers*

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EXECUTIVE SUMMARY

Engineers Canada is the national organization of the 12 provincial and territorial associations that regulate the profession of engineering in Canada and license the country's more than 234,000 members of the engineering profession.

Engineers Canada makes the following recommendations regarding federal support for research and development:

- direct programs to specific research and development areas;
- streamline the delivery of existing programs;
- remove barriers to commercialization and technology transfer within program requirements;
- continue to advance foreign qualifications recognition; and
- put in place measures to maximize talent and knowledge inputs.

The engineering professions believes that the federal government, in cooperation with businesses, academia, professionals and other stakeholders is a valuable and necessary contributor to research and development and innovation in Canada.

Introduction

Engineers Canada is the national organization of the 12 provincial and territorial associations that regulate the profession of engineering in Canada and license the country's more than 234,000 members of the engineering profession.

Professional engineers are committed to being active participants in the development of public policy in the interest of helping to protect the health, safety and quality of life of Canadians. We promote and facilitate high academic, professional and ethical standards across the country. As professionals, engineers are obligated to work in the public interest, in an accountable and transparent manner.

Today, we are offering long-term solutions to government on issues where the engineering profession can lend its expertise, education and experience to help create a safer, more sustainable, and prosperous future for Canada within a global community.

Why does Engineers Canada care about the government's role in research and development funding?

Engineers Canada is supportive of government investment in research and development and innovation in Canada, and strongly supports cooperation between the engineering profession and the federal government in research and development.

Investment in research and development and innovation allows businesses and universities to develop new designs and products that improve efficiency, promote environmental stewardship and enhance economic diversity. Federal government support for research and development and innovation helps to ensure adequate funds are available to support the procurement and retention of talent and to reinforce the position of Canada as a good place to invest, as well as to develop our domestic intellectual property.

The profession is supportive of the principle of federal government investment in research and development and innovation in Canada. The profession further believes that collaboration between the engineering profession and the federal government is integral to innovation in Canada. Finally, Engineers Canada is committed to working to assist the government in making key investment decisions for research and development and innovation in Canada, both given the expertise of our professionals, and the need to ensure that new and emerging technologies and processes that emerge from research and development are undertaken with the public interest and safety of Canadians in mind.

What role does engineering play in research and development?

Engineering is involved in research, design and development at all stages. The practice of engineering is at the nexus between the natural environment and the human environment. It is the practical application of science and other basic research into tangible products and processes that improve the quality of life of Canadians and

protect public safety.

Typically, engineering research happens in early stages and involves creating new knowledge, and publishing results. At this early stage, the commercial application of the work is still vague. Engineering design work occurs in mid-stage engineering and creates new products processes or procedures that are of direct value to the end user. Engineering development work occurs in the later stages, and frequently results in commercially viable intellectual property that is incorporated into products of significant value in their markets.[1]

Given the role of engineering at all stages of research and development, the engineering profession has several recommendations to the *Expert Review Panel on Research and Development Funding.*

Recommendations

1. Direct programs to specific research and development areas

A consistent and strategic approach to government investment in research and development in Canada is needed. A clear plan is required if the intent is to support rolling investments and partnerships with universities, not-for-profits, and the private sector in supporting research and development and fostering innovation.

A recent article in *The Economist* suggests that by focusing efforts on areas where a country enjoys a comparative advantage, follows market trends, and has a natural interest and competence; governments can help guide investments successfully. Emerging global trends suggest that there is a role for governments to play in guiding investment toward key sectors. [2]

If a key role of government in fostering research and development is "providing appropriate support for business and commercially oriented R&D", it follows that government also has a role to play—with the private sector and academia—in identifying and directing funding to potentially high value activities in areas of known strengths. However, any strategic plan would have to ensure that the delivery of financial support continue to be an open and transparent process.[3]

2. Streamline the delivery of existing programs

Within the consultation document, there are 44 programs listed that fall within the scope of the Expert Review Panel's work. There are no fewer than sixteen federal departments or agencies listed as managing a program. Academics, small-to-medium businesses, not-for-profits, and engineers are all expected to navigate complex application processes that can take

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[1] Briefing Note: Intellectual Property Issues for Faculty Members at Dalhousie University, Dr. Peter H. Gregson, Ph.D., P.Eng, March 10, 2010.

[2] The global revival of industrial policy: picking winners, saving losers. The Economist, Aug 5, 2010 print edition

[3] Review of Federal Support to Research and Development, Expert Panel Consultation Paper, October, 2010, p. 14

considerable resources. Anecdotal information from professional engineers would suggest that companies interested in doing research and development work are by necessity keeping the scope of their projects smaller in order to avoid directing too many resources to the funding and incentive process. Additionally, applications can take as long as eighteen months to yield a result, making it difficult to maintain project momentum.

By streamlining program delivery, the Government of Canada can stimulate investment in research and development. While single-window service may not be appropriate for all programs, there may be opportunities for government to group activities together more effectively, either thematically or by function.

For example, the Canada Business portal does provide an overview of available programs but is limited in its capacity to assist businesses, academia, or other stakeholders in navigating the complexity of the programs. While specific programs, such as the *Industrial Research Assistance Program*, do offer access to information officers to help you work through the application process, overall there needs to be better communication between businesses, academia and the government on how to efficiently navigate the granting and incentives processes.[4]

3. *Remove barriers to commercialization and technology transfer within program requirements*

As the Expert Review Panel continues its assessment of federal support for research and development, Engineers Canada recommends that the Panel examine the elements of the most popular granting programs, such as the *Scientific Research and Experimental Development Tax Incentive Program*, the *Industrial Research Assistance Program*, and various Natural Sciences and Engineering Research Council programs, to ensure that the requirements to qualify for grants and incentives do not include elements that may be stifling commercialization.

For example, the Council of the Canadian Academies notes in its April 2009 report, “Innovation and Business Strategy: Why Canada Falls Short”, that technology transfer between university researchers and businesses is an area in need of significant improvement in Canada.[5]

The difficulties faced in securing intellectual property ownership of engineering-related research, design and development can limit the commercialization of joint academic and business research and development. Allowing intellectual property costs to be covered by funding programs, and ensuring that the other requirements do not put proprietary information in the public domain before intellectual property issues are resolved could facilitate the commercialization of much research and development work.

Currently some federal research and development funding programs, as well as most academic institutions, either require or strongly encourage the rapid publication of research findings. Unfortunately, there is frequently inadequate funding available to support the costs of

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[4] http://www.canadabusiness.ca/eng/

[5] Innovation and Business Strategy: Why Canada Falls Short, Council of the Canadian Academies, April 2009, pg.16.

intellectual property protection prior to the publication of results. The additional capital required to make the jump to commercialization is difficult to acquire without intellectual property protection, because a return on investment is not guaranteed.[6]

Clearly, companies benefit from owning the intellectual property that emerges from their investments in research and development as it increases their valuation, appears as an asset on a balance sheet, is expected by their investors and purchasers, and it imposes a barrier to entry for competition.

4. Foreign Qualifications Recognition

Engineers Canada recommends that the federal government continue to work with the engineering profession and other professions to continue to modernize foreign qualifications recognition in Canada in order to help attract and retain the talent needed to boost the success of research and development and innovation in Canada. The Science and Technology and Innovation Council notes:

"Canada's capacity to innovate also depends on our ability to attract talented researchers and scientists. In the face of global competition, Canada must remain diligent in working to recognize foreign credentials so that skilled newcomers can contribute to Canadian society."[7]

The engineering profession has worked successfully with the Government of Canada to make it easier for employers to obtain the engineering talent they need to remain competitive through improvements to foreign qualifications recognition. These improvements will help to ensure that international engineering graduates can be a part of a strong research and development sector in Canada.

In particular, we have been working to ensure that federal government requirements do not duplicate credentialing and licensing processes currently performed under the legislative authority of the provincial and territorial engineering regulatory bodies. Engineers Canada provides a valuable link to provincial and territorial regulators and can help coordinate input from them on implementation of national policy initiatives.

A recent labour market study conducted by Engineers Canada suggests that both foreign qualified graduates and domestic graduates will be required to meet the engineering needs of a competitive economy over the next decade. While attracting talent from outside Canada is invaluable, governments, businesses, professional associations, and academia have a responsibility to encourage young Canadians to pursue fields of study – including engineering – that are integral to a strong and productive research and development sector in Canada. The federal government must work with its provincial and territorial counterparts to ensure that young Canadians are receiving a strong educational foundation in science, technology,

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[6] Dr. Peter H. Gregson, Ph.D., P.Eng, "Briefing Note: Intellectual Property Issues for Faculty Members at Dalhousie University", March 10, 2010.

[7] Science, Technology and Innovation Council: State of the Nation 2008: Canada's Science, Technology and Innovation System, 2009

engineering and mathematics to help lead them to the fields that contribute meaningfully to research and development and innovation in Canada.[8]

5. Maximizing talent and knowledge

Overall, Canada, and the engineering profession more specifically is finding it difficult to attract and retain highly qualified professionals. There are some indications of a dwindling talent in the areas of computer and information sciences, applied mathematics and computer software engineering. In engineering, mechanical, electrical, and civil engineering remain the programs with the largest undergraduate enrolment, in that order. Enrolment in computer engineering continued to drop, declining by 11.1 percent relative to 2007 figures.[9]

Furthermore, there is an inherent disconnect between the academic research cycle and the entrepreneurs cycle. Acquiring the right talent can be difficult for businesses engaging in research and development, unless they conduct the work in-house, as a design engineer at a university for example will find it difficult or un-enticing to leave the academic cycle to undertake short-term industrial projects that may or may not be publishable and may not be patentable for them.[10]

Conclusion

The engineering profession supports and agrees with federal government investment in research and development and innovation in Canada. By developing a strategic approach to investment, streamlining program delivery helping to create the conditions to attract talent and knowledge both here and from abroad, and by drawing on linkages between businesses, academia, professionals, and the government, and relying on the expertise of professionals like engineers, the federal government can help foster increased research and development investments in Canada.

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[8] Engineering Labour Market Conditions 2009-2018, Engineers Canada, 2010 (soon to be released – www.engineerscanada.ca)

[9] Canadian Engineers for Tomorrow: Trends in Engineering Enrolment and Degrees Awarded 2005-2009, Engineers Canada, September 2010

[10] Dr. Peter H. Gregson, Ph.D., P.Eng, "Briefing Note: Intellectual Property Issues for Faculty Members at Dalhousie University", March 10, 2010