

**ADVANCING CANADA'S GLOBAL COMPETITIVENESS IN
RESEARCH & DEVELOPMENT**
A SUBMISSION TO THE HOUSE OF COMMONS STANDING
COMMITTEE ON FINANCE

2005 PRE-BUDGET CONSULTATION

Presented by the Partnership Group for Science and Engineering

283 Sparks Street, Ottawa ON K1R 7X9

613-991-6369

6 September 2005

Introduction

The Partnership Group for Science and Engineering (PAGSE) is a cooperative association of more than 20 national organisations in science and engineering, representing some 50,000 individuals from industry, academia and government sectors. It was formed in June 1995 at the invitation of the Academy of Science of the Royal Society of Canada. On behalf of its members, PAGSE addresses issues concerning the nature, importance and benefits of science and engineering to Canadians and promotes greater understanding by decision-makers of the role of Science and Technology (S&T) in Canada's prosperity. One of its best-known activities is the "Bacon and Eggheads" program held monthly in the West Block of Parliament when the latter is in session.

General Comments

The quality of life of Canadians is tied to the nation's ability to compete in a global economy. Maintenance and further enhancement of our capacity for innovation in S&T is essential for this competitiveness. Canada has made great strides in recent years in building support for university research, the engine of our national innovation system. The Canada Foundation for Innovation, Genome Canada, the Canadian Foundation for Climate and Atmospheric Sciences, the Sustainable Development Technology Fund, the Canada Research Chairs, Canada Graduate Scholarships and federal contributions to Indirect Costs of Research have all significantly furthered our ability to attract top researchers. However, there are gaps in these programs and there is evidence that the recent gains are not sustainable unless we make new investments to enhance our competitiveness.

Canada's capacity for innovation in S&T, already strong in the university sector, must be further strengthened in other sectors, especially industry. Investments must also be made in a more strategic manner. Other countries, in both Europe and Asia, are substantially increasing their investments in national S&T capacity, while the United States, concerned about its declining share of patents, sees increasing international competition as a threat

to its lead in innovation and to its market share and will surely act too. All countries are working to attract highly qualified personnel from abroad and to retain their own skilled nationals. Canada must do better or risk falling behind, first in R&D output and later, but inevitably, in productivity and international economic competitiveness.

Enhancing Canada's Research Effort

PAGSE considers the following to be important issues related to sustaining and building S&T capacity that merit consideration by the Government of Canada

1. Support for Government-wide Perspectives on Canada's S&T Effort

The recently created Office of the National Science Advisor (NSA) to the Prime Minister as well as the Canadian Academies of Science have significant potential to assist the government to ensure sustainability of our R&D capacity in areas critical to our economy. The National Science Advisor can carry out assessments of the value of federal investments in S&T and the Academies can evaluate Canada's science performance and other issues of importance to Canadians such as the contribution of science and technology to national policy issues.

The mandate of the National Science Advisor (NSA) is daunting and expectations for this Office are high, within both government and S&T circles. However, the Office of the National Science Advisor requires stable (permanent) support staff to deliver on its responsibility to provide quality advice to the highest levels of federal decision makers and the Office must have direct access to those levels.

Recommendation:

- *That the Government provide stable support to the NSA's Office and facilitate its access to the highest level of decision makers.*

2. Balancing Research Capacity in Academia, Government and Industry

Support for University Research

PAGSE congratulates the Government of Canada on the establishment of multi-year funding for the granting councils. However, this development needs to be better communicated to the scientific community who do not seem to be fully aware of it. As a result of the pressure for funding from holders of the Canada Research Chairs and the recent large increase in the number of new researchers at universities, success rates for grant applications are diminishing in many disciplines, including for new recruits.

In addition, balancing Canada's research capacity requires commensurate funding for operations and maintenance to support the numerous projects made possible by the

quality infrastructure leveraged by the Canada Foundation for Innovation (CFI). It may be tempting to think that as the CFI funding runs down that the system will rebalance itself. However, failure to renew the rapidly depleting CFI funds will break the virtuous circle of investment in research infrastructure, the training of skilled graduates, and the development and commercialisation of innovation by industry.

Recommendations:

- ***That the Government affirm its commitment to sustainability of the university-based innovation system and strengthen the capacity of the granting agencies to maintain a long-term perspective by enhancing the rate of increase of their funding allocations, beginning with an increase of 6-9% for 2006-2007 plus a corresponding increase in funds for the indirect cost of research. Such increases and those already recently made need to be better communicated in order to encourage academic staff and students to stay in Canada.***
- ***That the Government invest additional funds in the Canada Foundation for Innovation and make improved provision for associated operating costs of infrastructure funded through the program.***

Government science capacity

The National Science Advisor has been charged with identifying better ways to coordinate and integrate Canada's scientific assets across the innovation system and thereby enhance their productivity. Science-based Departments and Agencies (SBDAs) and Research Support Agencies (RSAs) are vital components of the nation's capacity for innovation. In addition to monitoring and regulatory work, they conduct in-house process-oriented, thematic research to meet departmental mandates and government priorities. Moreover, they do so with a breadth of focus and a long-term perspective that is not common in other research sectors. Such a perspective is especially critical with respect to research in key resource and environmental areas. The effectiveness of SBDAs and RSAs, however, has been diminished in recent years by the erosion of their A-base funding. The federal partners in collaborative research programs that involve both government and academic researchers need increased funding: to permit them to carry out those roles that must be performed by government; to provide strategic leadership; to allow them to participate as full research partners with their Canadian and international academic colleagues and; to enable them to reap the benefits of knowledge transfer for application to policy.

In previous submissions to this committee, PAGSE has strongly recommended that the Government of Canada should evaluate its recent investments and prioritise its future funding of government science. PAGSE commends those SBDAs that have adopted the guidelines formulated by the Council of Scientific and Technological Advisors (CSTA) with respect to the need for alignment of federal S&T with government issues and priorities (e.g. BEST and STEPS reports). Now it is time to apply these guidelines across all federal SBDAs. Furthermore, a horizontal approach to federal S&T should integrate

aspects of complementary university- and industry-based research with government S&T programs in innovative and productive partnerships¹

Canada's vast landmass, inland and territorial waters, across its provinces and territories, present daunting logistical and financial challenges for scientific research that are unique in the developed world. PAGSE commends the Government for its renewed investment in the Polar Continental Shelf Project (PCSP), its new commitment to the International Polar Year in 2007-2008 and to the ArcticNet consortium. However, the costs of access and daily maintenance, shipboard operations and long-term field observatories are beyond the capabilities of these organizations. The logistical support for Canadian researchers operating in the remote parts of Canada needs to be better coordinated and broadened. A long-term, strategic vision is now needed, including local capacity building, to ensure that Canada's research and policy needs are met in remote areas across the country and that Canada is able to take its rightful place in relevant international activities.

Recommendations:

- ***That the Government of Canada reinforce the mandate and the means of the National Science Advisor to review, rationalise and focus research in government laboratories on the regulatory and service requirements of programs of national strategic importance that the federal government is best positioned to undertake.***
- ***That the Government re-affirm its commitment to ongoing long-term monitoring of variables essential to understanding Canada's natural environment and resources and for related ongoing longer-term research by the provision of adequate A-base budgets to the relevant governmental departments.***
- ***That the Government of Canada specifically mandate and fund operational support for scientific programs in remote areas and create an inter-agency body to provide coordinated logistical support to the full spectrum of scientific research conducted in Canada's vast remote lands and oceans. The National Science Advisor should be tasked with determining how to structure and implement such a body.***

Support for Research in Industry

The Government has set an ambitious goal for dramatically increasing the proportion of research and development carried out by industry, an area in which Canada lags in comparison to its competitors. This can be achieved through tax and other incentives for R&D and by measures to improve the climate for industry partnerships with government and university labs and to encourage technology transfer. Government can assist smaller companies in their bid to commercialize products by becoming a first adopter of new products and services. It can invest in proof of principle and demonstration projects and it can reward productive companies that increase their level of in-house R&D by according them favourable treatment when procuring products and services. In addition, the Government can provide seed money at critical stages in the innovation cycle when

¹ e.g. Industry Canada, 2002. *Achieving Excellence - Investing in People, Knowledge and Opportunity*

commercial venture capital may not be readily available, although this needs to be done strategically. A Small Business Innovation Research Fund for early stage R&D projects at small technology companies would better enable Canadian companies to compete with companies in the USA who already enjoy access to such a fund.

Recommendations:

- ***That the government strengthen existing programs such as Technology Partnerships Canada, Technology Early Action Measures and the Industrial Research Assistance Program and establish a Small Business Innovation Research Fund to support research and innovation by Canadian small businesses.***
- ***That the government review the highly successful Scientific Research and Experimental Development tax credit program with the view to expanding its reach further downstream towards the marketplace.***
- ***That the Government of Canada monitor seed funding programs to ensure that they are market driven and led by the private sector. The Business Development Bank of Canada could administer such programs.***

3. Improving Capacity to Participate in International Research Programs

Inadequate funding often hampers Canadian participation in international initiatives that are carried out on Canadian territory or in territorial waters. Funding needs to be available promptly in order to be effective, it needs to be sufficient to facilitate participation in joint research with international partners and its duration must match that of international programs.

The European Union (EU) has a series of research funding envelopes (Euro 37 billion) known as the Framework Programmes for Research and Technology Development that have been very successful in fostering collaborative research between universities, government and industry. These Programmes are accessible to researchers outside the EU, provided that they bring with them some funding from their own national sources. Many countries outside the EU have arranged to access these benefits by setting up a special fund so that their nationals can qualify for the EU Framework Programmes. Canada, unlike countries as diverse as Norway and China, has not done so and hence Canadian researchers, especially those in industry, cannot easily access the EU funds. The productivity payoff from access to the leading-edge research resulting from programs much larger than those that Canada could afford without international participation could be enormous.

Recommendations:

- ***That the Government establish a mechanism for ensuring the timeliness and adequacy of funding directed to supporting Canadian participation in international research programs, especially those on Canadian territory. Such a mechanism should be open to all researchers from academia, government, or industry.***

- ***That Canada should create an EU Opportunities Fund of at least \$25M/yr that Canadian researchers could access on a competitive basis to become eligible for even more significant support from the EU Framework Programme for Research and Technology Development. In this manner Canadians would be empowered to partner on EU Framework initiatives, with genuine benefits accruing therefrom.***

4. Future Capacity in S&T

Young Scientists and Engineers

Given the increasing international competition for attracting and retaining highly qualified personnel, it is imperative that the Government of Canada continue to strongly encourage the post-graduate training of young Canadian scientists and engineers as part of its strategy to ensure the nation's S&T capacity in the immediate future. PAGSE congratulates the Government on the excellent Canadian Graduate School Program, including measures for forgiveness of at least part of the significant debt load of many new graduates that may otherwise discourage them from pursuing further training. Small and medium enterprises (SMEs) need highly qualified personnel in order to build their capacity for innovation and improve their productivity. Better mechanisms are needed to facilitate the participation of graduate students and postdoctoral fellows in SMEs.

Recommendation:

- ***That the Government of Canada create, through the granting agencies, Canadian Postdoctoral Fellowships at a level of \$55,000 to \$60,000 per year. It is recommended that the program support 600 postdoctoral fellows and that the fellowships could be held in universities or in industry, especially SMEs.***

Collaboration Strategies and Mechanisms

The rapid pace of the global competition in innovation requires that Canada develop more efficient ways to transform research results into new products and technologies. Systematic approaches to removing barriers and bottlenecks to collaboration must be found as innovation depends on the continuum from basic research to product development. There is little advantage in casting government, academia and industry as separate cultures. Nonetheless their specificity must be recognized, as each requires a somewhat different environment for optimal performance. Given these considerations, effective approaches to stimulate collaboration should include public-private partnerships and research/industry clusters.

Public-private partnerships to support pre-competitive work based on scientific excellence is an effective approach to exploring the potential application of basic research results. Private sector financial contributions, consolidated in a consortium fund, can accelerate the process of innovation by stimulating research with broad technological potential in universities and research institutions. Moreover, private sector participants

constitute a group of receptors that can use the results of this work to augment or diversify their internal development projects.

Countries that have been successful in building and maintaining their productivity and international competitiveness based on the rapid transfer of research results into commercialisable developments have benefited from the building of industry/research clusters. These are geographical concentrations of linked industries and other entities important to competitive success. The latter include government agencies and others such as universities, standards-setting agencies, think-tanks, vocational training providers and trade associations that provide education, information, research, specialised training and technical support. Clusters go beyond the notion of Centres of Excellence or Networks of Centres of Excellence. They are the key to maintaining the “virtuous circle” of research catalysing innovation and application that leads to re-investment in S&T by the private sector. The value of cluster development needs to be more explicitly recognised by the various federal players and their actions need to be supported in order to enhance the conditions conducive to cluster development wherever appropriate local industries are willing to take the lead.

Recommendations:

- ***That Government optimize existing tax measures intended to encourage the formation of public-private research consortia and private sector contributions to related consolidated funds to support university research with technological potential.***
- ***That Government create a new Tri-Council Cluster Development Program, led by industry with participation by the NSERC, CIHR, SSHRC and the National Research Council (NRC).***

Summary of PAGSE 2005 Recommendations to the House of Commons Standing Committee on Finance

A-New Opportunities for Canada

- Create an EU Opportunities Fund of at least \$25M/yr that Canadian researchers could access on a competitive basis to become eligible for even more significant support from the EU Framework Programme for Research and Technology Development.
- Create a new Tri-Council Industry /Research Cluster Development Program, led by industry with participation by the NSERC, CIHR, SSHRC and the NRC
- Establish a Small Business Innovation Research Fund.
- Reinforce the mandate and the means of the National Science Advisor to review, rationalise and focus research in government laboratories on the regulatory and service requirements of programs of national strategic importance.
- Specifically mandate and fund operational support for scientific programs in remote areas throughout Canada by creating an inter-agency body to provide coordinated logistical support to the full spectrum of scientific research conducted in Canada's vast remote lands and oceans. Task the National Science Advisor with determining how to structure and implement such a body.

B-Building on Recent Investments

- Enhance the rate of increase of the tri-Council funding allocations beginning with 6-9% for 2006-2007 plus a corresponding increase in funds for the indirect cost of research. Such increases and those already recently made need to be better communicated in order to encourage academic staff and students to stay in Canada.
- Invest additional funds in the Canada Foundation for Innovation and make improved provision for associated operating costs of infrastructure funded through the program.
- Create, through the granting agencies, Canadian Postdoctoral Fellowships at a level of \$55,000 to \$60,000 per year. The program should support 600 postdoctoral fellows to be held in universities or in industry, especially SMEs.
- Re-affirm commitment to ongoing long-term monitoring of variables essential to understanding Canada's natural environment and resources and for related ongoing longer-term research by the provision of adequate A-base budgets to the relevant governmental departments.

C-Policy Creation and Implementation

- Provide stable support to the Office of the National Science and facilitate its access to the highest level of decision makers.
- Establish a mechanism, open to all researchers from academia, government, or industry, for ensuring the timeliness and adequacy of funding directed to supporting Canadian participation in international research programs, especially those on Canadian territory.
- Optimize existing tax measures intended to encourage the formation of public-private research consortia and private sector contributions to related consolidated funds to support university research with technological potential.
- Review the highly successful Scientific Research and Experimental Development tax credit program with the view to expanding its reach further downstream towards the marketplace.
- Monitor seed funding programs to ensure that they are market driven and led by the private sector. The Business Development Bank of Canada could administer such programs.