

BUILDING PROSPERITY

Research is building a brighter future for Canadians

Pre-Budget submission to the House of Commons Standing Committee on Finance by the Canada Foundation for Innovation (CFI), Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council of Canada (SSHRC)

August 2011



Canadian Institutes of
Health Research

Instituts de recherche en
santé du Canada

Natural Sciences and Engineering
Research Council of Canada

Conseil de recherches en sciences
naturelles et en génie du Canada

Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

The Canada Foundation for Innovation (CFI), Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC) and Social Sciences and Humanities Research Council of Canada (SSHRC) are the federally funded agencies that are at the heart of Canada's vibrant research ecosystem. Together, our investments support Canada's top research talent and state-of-the art research infrastructure at post-secondary institutions across the country. The research we fund advances knowledge and understanding of the past and present. It enables training of the next generation, inspires innovative business processes, new products and services, high-paying jobs, better health outcomes, sound public policy, and a cleaner environment — all building blocks for a prosperous Canada.

“While other governments are cutting back on funding research and innovation in the face of economic uncertainty, our government has invested more. That is because our government understands that science and technology power Canada's economy.”

— *The Honourable Gary Goodyear, Minister of State for Science and Technology (June 1, 2011)*

INTRODUCTION

Canada's strong post-secondary research performance, in universities, colleges and teaching hospitals, is an important strategic asset that will give the country a leg up in emerging successfully from the global economic downturn. Research advances knowledge, feeds policy development, creates new commercial opportunities, builds competitiveness, stimulates job creation, improves health outcomes, mitigates environmental impacts and identifies innovative approaches for delivering services that improve the lives of Canadians.

To ensure continued economic and social progress over the medium term, the Government of Canada will need to maintain the winning conditions that foster sustainable growth: making steady progress in eliminating the fiscal deficit, tapping into new markets for Canadian business and investing in Canada's economic future. Continued government investment in research and development (R&D) is essential for creating these winning conditions.

Public investments in R&D provide significant economic returns, usually ranging between 20% and 45% per year, depending on the focus of the research.¹ This is significantly higher than the average economic rate of return across all spending by governments, households and firms, which for Canada is 7%.

The CIHR, NSERC, SSHRC and the CFI enable research partnerships and the flow of knowledge across universities, colleges and the marketplace to enrich a culture of business innovation. Through our programs, we support collaboration between those who advance knowledge and those best suited to turn knowledge into benefits for Canadians.

IMPACT: Working with industry

SSHRC-funded research on 3-D environments is revolutionizing e-commerce. Paul Messinger, a professor of marketing at the University of Alberta, is working alongside IBM to bring online shopping together with the virtual worlds used in web-based communities such as Second Life. His research includes developing new ways to market products in virtual environments and innovative approaches to conducting business online such as using 3-D avatars to try on clothes and test products before you buy. The Canadian online marketplace accounts for over \$60 billion in sales annually.

¹ *Medical Research: What's it worth? Estimating the economic benefits from medical research in the UK*, Wellcome Trust, 2008 / A.J. Salter and B.R. Martin in *Research Policy* 30 (2001) 509-532

We are committed to the important roles we play in helping Canada achieve a strong economy with productive industries, vibrant communities and healthy citizens. As we work together to develop innovative solutions for the challenges facing us today, we are helping define a successful future for Canada in the 21st century.

IMPACT: Working together to address key issues

CIHR and NSERC are funding researchers across Canada from the health sciences, physics, chemistry and engineering who are developing alternatives to Technetium-99m, the medical imaging isotope that has been in short supply since 2000. The research will translate advances in imaging into applications that will help health professionals in patient diagnosis and treatment, and that will ultimately benefit the Canadian economy through the life sciences industrial sector.

We are collaborating in attracting and retaining talent through funding for the Banting Postdoctoral Fellowships and the Vanier Canada Graduate Scholarships, along with the Canada Research Chairs and Canada Excellence Research Chairs, which are awarded to the “best of the best” researchers. Approximately 30% of Canada Research Chair holders have been attracted from abroad.

The College and Community Innovation (CCI) Program administered by NSERC, working with the CFI, CIHR and SSHRC, is also helping strengthen the role of colleges in the innovation system through partnerships between colleges and the private sector. This program increases economic development in communities and creates new high-quality jobs based on know-how and technological innovation, particularly for the benefit of small and medium-sized enterprises. Since 2008, the CCI Program has invested more than \$44 million in 154 projects, which have led to at least 198 new industrial partnerships and leveraged more than \$12.4 million in contributions from private-sector partners.

The ability of Canada’s research enterprise to strengthen partnerships, maintain a leadership position, and attract and retain top global talent is crucial to bolster the country’s competitive edge and chart a path to a prosperous future.

KEY DIRECTIONS FOR BUILDING PROSPERITY

Recommendation 1: Invest in strengthening partnerships to close the innovation gap

Effective partnerships leverage the knowledge, creativity, strengths and resources of different partners to achieve common goals. Partnerships between the academic and private sectors connect researchers with business leaders to foster new insights and inventions that will generate tangible benefits for society. Building a strong interface between post-secondary institutions and the private, public and non-profit sectors is essential to accelerate the pace of discovery and commercialization and turn Canadian research efforts into successes in the marketplace.

The CFI: Partnering for prosperity
Because CFI funding covers up to 40 percent of research infrastructure projects, universities and colleges must have a plan in place to raise the remaining 60 percent. Provinces often contribute a large proportion of that, but private-sector firms have also jumped on board. To date, the private sector has contributed \$1.2 billion to CFI-funded projects. Why? Because it makes good business sense. Such

IMPACT: Making business more competitive

Alberta’s oil sands represent the world’s second largest hydrocarbon basin. But once the tar-like bitumen is removed from the ground, it must be upgraded to heavy oil — a process that consumes large amounts of fresh water and energy. NSERC-funded researchers at the University of Calgary’s CFI-funded In Situ Energy Centre are reducing the cost and environmental impact of the process by testing innovative ways of converting the bitumen *before* it leaves the ground. Oil sands companies such as Shell Canada, Nexen Inc., Total E&P Canada and ConocoPhillips Canada have already expressed their interest in this research.

investments allow companies to field test new products, attract new customers and create trusted relationships with institutions and researchers who are on the cutting-edge in their fields. Over the past decade, the CFI has invested approximately \$2.1 billion in research infrastructure that supports the work of CIHR and NSERC-funded researchers who have working relationships with private-sector companies. This represents 48% of the CFI's total infrastructure investment.

CIHR: Strategy for Patient-Oriented Research

To help the provinces and territories deliver high-quality, cost-effective health care, CIHR and a coalition of national stakeholders has led the development of the Strategy for Patient-Oriented Research. The Strategy contributes to Canada's sustained economic recovery by improving health outcomes, determining more effective practices and interventions, and improving the cost-effectiveness of health service delivery. While these efficiencies and savings will have a dramatic impact on health care costs (which now exceeds \$190 billion annually), the increased capacity and decreased barriers to clinical research will mean more jobs.

NSERC: Strategy for Partnerships and Innovation

Building on its current annual investments of approximately \$330 million in partnered R&D, NSERC's Strategy for Partnerships and Innovation (SPI) helps Canadian companies prosper by connecting and collaborating with colleges and universities. These investments lever more than \$160 million annually from more than 1,900 Canadian companies. Of the close to 800 new collaborations that have occurred within the past 15 months, 442 involved companies that are new to NSERC's partnership programs and 88% have been with small or medium-sized enterprises.. The SPI features Engage Grants to foster new collaborations between companies and academics. Of the companies involved in Engage Grants, 94% have gained new knowledge or developed new technologies as a result of their partnership, and 90% use or plan to use the new knowledge acquired through the partnership.

SSHRC: New funding opportunities for partnerships

SSHRC has put in place flexible funding opportunities that enable post-secondary institutions and private sector, government, non-profit and community-based organizations to pursue new insights into pressing issues through collaborative research. This year, SSHRC is adding a new "Digital Economy" priority area to support research and knowledge exchange on the nature, impact and integration of digital technologies in all aspects of our economy, society and culture. Partners will explore how we individually and collectively enhance, adapt to, and take advantage of, widespread connectivity and digital media. The lines of enquiry include innovation across campuses and communities using digital technologies, building a world-class digital infrastructure, growing the ICT industry, creating Canada's digital content advantage, and building digital skills for tomorrow.

Government investment in post-secondary research stimulates increased R&D and fosters innovation in the private and non-profit sectors. This is important because one of the key weaknesses in Canada's innovation system identified by the Science, Technology and Innovation Council as well as the OECD, has been the relatively low level of business investment in R&D, and adoption of transformative new technologies in Canada.

Two key programs supported by CIHR, NSERC and SSHRC provide these benefits — the Business-led Networks of Centres of Excellence (BL-NCE) and the Centres of Excellence for

IMPACT: Focusing and accelerating innovation

Research funded through The Green Aviation Research and Development Network (GARDN), one of four inaugural Business-Led Networks of Centres of Excellence created in 2009, has contributed to the design of landing gear for the new Bombardier Global 7000 aircraft and the improvement of the equipment to select an aircraft flight path for better fuel efficiency. GARDN is also helping the Canadian aerospace industry meet its environmental responsibilities and ensure competitiveness in the global marketplace.

Commercialization and Research (CECR). BL-NCEs and CECRs help close Canada's innovation/productivity gap and increase the level of business investment in R&D.

Recommendation 2: Maintain Canada's international competitiveness in research

Canada ranks first in the G7 in terms of R&D performed by the higher education sector, as a percentage of GDP and leads the G8 in scientific output per capita.² The positive momentum in Canada's research, training and innovation capacity is enabling the attraction and retention of some of the world's top minds, providing Canada with a significant R&D and innovation advantage for the future. Continued investments in the foundation are needed to sustain a world-class research environment and provide opportunities for top researchers and students to work on stimulating and well supported projects. Canada's global reputation for cutting-edge research forms the foundation of the country's innovation system, and it is a resource that is highly valued by all, including the private sector. Fully exploiting this advantage through continued public R&D investments will drive economic and social outcomes that benefit Canadians.

In accordance with the Government of Canada's S&T Strategy, investments by CIHR, NSERC and SSHRC have supported top researchers and their ideas, while the CFI has funded the state-of-the-art tools those researchers need to compete with the best in the world. Canada's post-secondary institutions now have the capacity to attract top talent and make cutting-edge, world-changing discoveries. Supporting world-class research that has global impact is our common, underlying mission, for it is excellence that builds the country's reputation for effective training programs, strong partnerships and international networks that advance knowledge to solve global challenges.

Given the globalization of research, economic competition and business supply chains, to maintain Canada's solid foundation in R&D, it is also essential to partner with the best international researchers to maximize the returns from research and to open up — and seize — new research opportunities. In recent years, we have each developed innovative initiatives that focus on domestic and international strategic partnerships in an effort to increase the impact of research on communities and industries through collaboration.

Canada's leadership in international research is critical in shaping our future. "The North is intrinsic to who we are as a nation", as Professor Sherrill Grace³ has emphasized in her research on Canadian identity. The Government of Canada is taking action to implement the Northern Strategy for the benefit of all Canadians. World-leading Arctic research underpins this strategy and helps ensure sound decision-making.⁴ Direct investments in the research and infrastructure address

IMPACT: International collaborations

All four agencies are making significant investments in Northern research on topics such as Aboriginal People's health, food security in Northern communities and youth involvement issues. Over the next five years, a team of Canada's world-class northern researchers will collaborate with their international counterparts to study the impact of changing permafrost and snowfall on landscapes, wildlife, northern communities and northern industries. The \$4 million grant was issued in June 2011 under NSERC's Discovery Frontiers initiative to support the Arctic Development and Adaptation to Permafrost in Transition (ADAPT) project, led by Université Laval ecologist Warwick Vincent.

² <http://www.conferenceboard.ca/hcp/details/innovation/scientific-articles.aspx>

³ Department of English at the University of British Columbia

⁴ *Canada's Northern Strategy: Our North, Our Heritage, Our Future*. Department of Indian Affairs and Northern Development and Federal Interlocutor for Métis and Non-Status Indians. Ottawa, 2009

the challenges and seize the many opportunities that exist in the North today. We have built a capacity for northern research and we will continue to play a key role in supporting this robust research enterprise into the future.

Recommendation 3: Uphold Canada’s reputation as a top destination for global research talent

The global job market is increasingly being driven by talented, skilled, creative and highly mobile people who are commercializing innovative ideas and developing new business processes that drive economies and improve quality of life. The federal S&T Strategy recognizes that to create jobs for Canadians and attract world-class talent from around the globe, we must nurture tomorrow’s leaders by providing both scholarships to students and direct funding to the researchers who create a robust training environment. The Government of Canada has demonstrated its commitment to investing in talent, innovation and research, especially in times of economic restraint.

The CFI, CIHR, NSERC and SSHRC are committed to supporting programs such as the Canada Research Chairs, the Canada Excellence Research Chairs, the Vanier Scholarships and the Banting Fellowships — all key pieces of Canada’s vibrant research ecosystem. These programs boost Canada’s pool of research talent and help feed new and emerging areas of the labour market. To date, they have attracted almost 700 world-class researchers to Canada who, in turn, are attracting additional researchers and graduate students.

IMPACT: Investing in the next generation

Vanier Canada Graduate Scholar Channakeshava (Keshav) Sokke Umeshappa examines the interactions between various types of immune cells to better understand how they create an optimal immune response and defend the body against cancers and viral diseases. Originally from India, the University of Saskatchewan student says the Vanier Scholarship not only gave him the financial security to focus on his research, but it also put him in good stead to become a leader in his field.

Each year, thousands of students work with top researchers in world-class research facilities funded by the CFI where they acquire the skills they need to bring new ideas and innovative approaches to the workplace. Attracting and retaining the world’s most talented researchers in the early stages of their career also helps build our nation’s long-term capacity for innovation.

CONCLUSION

Sustaining investments for Canada’s prosperity

Our agencies and the CFI thank the government for its continued investments in world-class research, talent and infrastructure. Budgets are about tough choices for government. They are about setting national priorities and making sure that the impact of the investments being made will benefit all Canadians. Bringing people and sectors together to develop creative solutions is vital to enhance the country’s competitive advantage. In Budget 2012, the Government of Canada has an opportunity to send a clear signal that a sustained investment in research is crucial to ensure a brighter future for Canadians.

“Knowledge and Innovation are the drivers of success in the 21st century global economy. To be a world leader in knowledge and innovation, we must continue to attract and develop talented people, and increase our capacity for world-leading research and development. These have been the driving principles of the Government of Canada’s Science and Technology Strategy, and the basis for ongoing investments we have made to support research talent in our country.”

— *The Right Honourable Stephen Harper, Prime Minister of Canada (August 3, 2011)*