Mobilizing Science and Technology

to Canada's Advantage

Progress Report

2009

Canada

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Cat. No. Iu4-105/2009E-PDF
ISBN 978-1-100-12279-3
60580

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Message from the Prime Minister

Canadians have always been able to take pride in being international leaders in science and technology. From the discovery of insulin to the development of the Canadarm to the invention of the BlackBerry®, Canadian researchers have always been at the vanguard of scientific and technological achievement.

Canada's advantage, of course, is primarily due to the talents and efforts of Canadian scientists and researchers themselves. In addition, both the private and public sectors have done their part to ensure that Canadian talent has access to the support and facilities it needs to compete and succeed on the world stage.

Building on our science, technology and research advantage is more important than ever. Even after Canada and other countries emerge from the global recession, our economies will be fundamentally changed. We are already witnessing worldwide competition for the world's best and brightest researchers. Going forward, we can expect that the jobs of the future will be even more dependent on our science and technology sectors. Attracting and retaining these jobs requires us to make smart long-term decisions today.

It was with these objectives in mind that I took great pleasure in launching Canada's Science and Technology Strategy, *Mobilizing Science and Technology to Canada's Advantage*, in May 2007. Our vision is to make Canada an even more attractive international destination for research, investment and work in the fields of science and technology.

Mobilizing Science and Technology to Canada's Advantage: Progress Report 2009 will provide you with an update on how far we have come in delivering on this Strategy. Whether we are talking about health care, environmental, energy or information technologies, Canada has a lot to build on. We look forward to working with and supporting Canadian scientists and researchers as they take the next step.

The Right Honourable Stephen J. Harper,
Prime Minister of Canada

Message from the Minister of Industry

The Government of Canada's Science and Technology (S&T) Strategy, *Mobilizing Science and Technology to Canada's Advantage*, lays out a plan to develop three distinct Canadian advantages:

- an Entrepreneurial Advantage that encourages firms to be innovators;
- a Knowledge Advantage that puts Canadians at the international forefront of research and discovery; and
- a People Advantage that helps build the best educated, most skilled and most flexible workforce.

Today we are pleased to report on the significant progress that has been made in the past two years. To advance our S&T Strategy, we have introduced new federal programs and initiatives, including the Knowledge Infrastructure Program, Centres of Excellence for Commercialization and Research, and the Automotive Innovation Fund. And those are just a few examples of our most recent initiatives.

Our government believes that investments in science and technology are investments in Canada's future. Our ideas, innovation and inventiveness ensure our long-term economic competitiveness.

I know that this progress report demonstrates that belief and, as Minister of Industry, I will continue to follow our plan to improve our country through our S&T Strategy, and to promote entrepreneurial innovation and creativity in all fields.

The Honourable Tony Clement
Minister of Industry

Message from the Minister of Finance

Science and technology have been fundamental priorities of this government since we took office in 2006. We have long recognized that support for research, innovation and highly qualified people are key to our country's future economic prosperity and to improving the quality of life of Canadians.

Our long-term economic plan, *Advantage Canada*, has science and technology at its core. Ever since its 2006 release, *Advantage Canada* has driven our investments in creating the best-educated, most skilled and most flexible workforce in the world. Our successive investments in people, research, infrastructure and commercialization have also been guided by our 2007 Science and Technology (S&T) Strategy, *Mobilizing Science and Technology to Canada's Advantage*. It helps explain why Canada invests more in higher-education research and development, as a percentage of gross domestic product, than any other country in the G-7.

Each budget we have tabled since taking office has demonstrated our government's commitment to implementing our S&T strategy, and our ongoing determination to invest significant amounts in research and development while encouraging the partnerships with the private sector that can turn promising concepts into groundbreaking applications.

Canadians can rest assured that our significant investments in science, technology and basic discovery-oriented research will continue. Throughout our mandate, the government has strongly supported S&T, and we've backed that support with more than $7 billion in new funding. We will provide the investments necessary to ensure Canada's scientific community will contribute to greater prosperity for individuals and families across Canada.

In today's uncertain economic climate, our government considers innovation to be essential in helping our economy recover quickly from a global economic downturn and create jobs and prosperity for the future.

The Honourable James M. Flaherty
Minister of Finance

Message from the Minister of State (Science and Technology)

Two years ago, the Prime Minister set out the Government of Canada's vision for science and technology, and for innovation and research by launching the Science and Technology (S&T) Strategy, *Mobilizing Science and Technology to Canada's Advantage*. Since then, we have worked hard to bring that vision to reality.

Our comprehensive plan has guided us in making strategic investments and alliances to improve the quality of life of Canadians and strengthen our economy.

These measures have included increased funding to support Canada's scientists and researchers through the federal granting councils; providing better research equipment and facilities for colleges and universities; helping organizations and businesses take more of their innovations from the laboratory to the marketplace; and launching new initiatives to educate, attract and retain the world's best scientists.

As the progress report marks a milestone for the S&T Strategy, I would like to acknowledge our many partners, who have embraced the goal of creating a new climate of innovation and discovery throughout our nation. Key partners from business, academia and other governments have been inspired to join in investing in Canada's future through S&T.

Under the leadership of the Prime Minister, with significant new investments from our government, and by working together, we have witnessed the kind of remarkable results that can be achieved in creating value for Canadians. Moving forward, we will continue to implement this strategy to the economic and social benefit of all Canadians.

The Honourable Gary Goodyear
Minister of State (Science and Technology)

Mobilizing Science and Technology to Canada's Advantage

Executive Summary

The Government of Canada is building a strong future for Canadians through science and technology (S&T) and research. Scientific discoveries and new technologies are essential to building a dynamic economy. This is, perhaps, even more important in difficult economic times. By investing in S&T and research, the Government of Canada is creating a stronger economy, future opportunities for jobs, an improved quality of life and other benefits for Canadians. New knowledge and technologies will help us meet many of the challenges of the 21st century — from preserving the quality of the environment to enhancing our health, protecting our safety and security, and managing our energy and natural resources.

Mobilizing Science and Technology to Canada's Advantage

The federal S&T Strategy seeks to foster Canada's competitiveness through investments and activities in three key areas:

- Entrepreneurial Advantage
- Knowledge Advantage
- People Advantage

It is founded on four core principles:

- Promoting world-class excellence
- Focusing on priorities
- Fostering partnerships
- Enhancing accountability

It also identifies four priority areas for enhanced investment and activity:

- Environmental science and technologies
- Natural resources and energy
- Health and related life sciences and technologies
- Information and communications technologies

On May 17, 2007, the Prime Minister released a federal S&T Strategy, *Mobilizing Science and Technology to Canada's Advantage*. As a key part of the Government of Canada's long-range economic plan, *Advantage Canada*, the S&T Strategy lays out a comprehensive, multi-year plan to make Canada a leader in S&T and research and a source of entrepreneurial innovation and creativity.

Canada has tremendous strengths in our research base and in the resourcefulness of our people. We have a proud history of accomplishments in S&T and research — from the discovery of insulin to the creation of the BlackBerry®. But as a country, we must do even better in turning ideas into the innovations that will improve our economic competitiveness and standard of living.

That is exactly what the federal S&T Strategy aims to do.

Moving Quickly to Achieve Enduring Results

The Government of Canada is quickly translating the S&T Strategy's objectives into reality. The government's sustained commitment to S&T and research is reflected in a succession of recent federal budgets that have made major, ongoing investments to build a sustainable national competitive advantage.

Budget 2007 focused on fostering research partnerships involving businesses, academics and the public sector by renewing important existing programs and launching new ones to keep Canadian researchers at the forefront of their fields and to strengthen partnerships to ensure Canadians benefit from their discoveries. In addition, the government took steps to improve the business environment to support creativity and innovation.

Building on these advances, Budget 2008 put the emphasis on people — attracting the world's top researchers and students, and encouraging Canada's best researchers and students to collaborate here at home.

Budget 2009, known as Canada's Economic Action Plan, contains one of the single largest federal budget investments in S&T to date. The plan announced $5.1 billion in new spending in the areas of S&T infrastructure, research, people and commercialization. These investments will help jump-start the economy as early as this summer and will improve the working environment of researchers for decades to come.

Federal S&T spending has increased every year since 2006. In doing so, it surpassed an historic level of $10 billion in 2007–08. Canada ranks first in the G-7 and second among the 30 Organisation for Economic Co-operation and Development (OECD) countries for R&D performed in the higher-education sector as a percentage of gross domestic product.

Strong progress has been made in implementing the S&T Strategy. The federal government has strengthened existing initiatives and advanced the principles of the S&T Strategy through new world-class policies and programs that will expand private sector participation in S&T, build Canada's knowledge base and brand Canada as a destination of choice for talented, highly qualified S&T workers and students.

The vision of the S&T Strategy has taken hold. Key partners from business, academia and other governments have been inspired to join us by investing in Canada's future through S&T.

As Canada and other countries emerge from the global economic recession, successful economies will be those that create a knowledge advantage by supporting research. The jobs of the future will be increasingly dependent on science and technology, and attracting those jobs requires long-term vision and a favourable environment for investment in research and development.

Working together, we have witnessed the kind of remarkable results that can be achieved in creating value for Canadians. Moving forward, we will continue to lay the groundwork through the S&T Strategy to the economic and social benefit of all Canadians.

About This Report

Through this report, the Government of Canada is working to demonstrate more clearly the impact of federal S&T investments and to advise Canadians of the progress made in implementing the Strategy.

The examples that follow are not meant to be comprehensive; rather, they show the scope and depth of the Government of Canada's activities, its commitment to getting initiatives up and running and to advancing the principles of the S&T Strategy.

Entrepreneurial Advantage

Making Canada a World Leader in Innovation through Science and Technology

Canada's ability to gain a competitive advantage in the modern economy increasingly depends on our ability to translate knowledge and ideas into commercial products that will generate wealth and improve the lives of Canadians and others around the world.

The Science and Technology (S&T) Strategy recognizes that the private sector plays a central role in meeting this challenge by investing in leading-edge research and development (R&D) and bringing innovations to market. Over the last two years, the Government of Canada has made substantial efforts to build this Entrepreneurial Advantage by putting in place conditions that encourage private sector investment in S&T.

By encouraging entrepreneurs to innovate and market their products to the world, the government can maximize the benefits from its investment in skills and research. The following section will outline the steps taken in three areas: creating a competitive and dynamic business environment; strengthening public–private research and commercialization partnerships; and increasing the impact and efficiency of federal research and development assistance.

Creating a Competitive and Dynamic Business Environment

A business environment that encourages innovation starts with an economic framework that supports investment, rewards success and reduces unnecessary red tape that can frustrate business initiative.

Today's businesses are competing in an increasingly global marketplace. For Canada to prosper in this complex and highly interconnected age, the Government of Canada must ensure that Canada's competition and investment policies reflect global realities and our national interest.

Modernizing Canada's Competition and Investment Policies

In June 2008, the federally appointed Competition Policy Review Panel released its final report, *Compete to Win*, which issued specific recommendations on how to strengthen Canada's economy. Based on these recommendations, the government introduced detailed proposals to modernize Canada's competition and investment laws. On March 12, 2009, the *Budget Implementation Act*, 2009 (Bill C-10) received royal assent, including significant amendments to the *Investment Canada Act* and the *Competition Act*. The legislative changes will boost Canada's competitiveness, stimulate investment, protect consumers and safeguard Canada's national security.

Specifically, the amendments to the *Investment Canada Act* included establishing a national security review mechanism; eliminating lower investment review thresholds for transactions in specific sectors; increasing transparency and ministerial disclosure; changing the basis for calculating the monetary threshold above which investments are reviewed; and increasing the review threshold for investments involving nationals of WTO members. Amendments to modernize the *Competition Act* included measures to make it easier to prosecute hard-core cartels, such as price-fixing conspiracies; permit administrative monetary penalties for companies that abuse their dominant position; align Canada's merger review process with peer jurisdictions by introducing a two-stage review process for complex transactions; and significantly increase penalties for deceptive or misleading advertising. These reforms will improve the competitiveness of Canadian businesses; better protect consumers; and make Canada a more innovative, productive and prosperous country.

Giving Canada an Investment Edge

To help increase foreign direct investment in Canada, the Government of Canada has:

- Taken action to improve the competitiveness of Canada's business tax system, including significant reductions in the general corporate income tax rate, and has been encouraging provinces and territories to do the same
- Enhanced the Scientific Research and Experimental Development (SR&ED) tax incentive program
- Eliminated withholding tax on all interest paid to arm's-length non-residents
- Ratified an update to the Canada–U.S. Tax Treaty that phases out withholding tax on interest paid to non-arm's-length U.S. residents and extends treaty benefits to limited liability companies

To better understand private sector innovation, the Council of Canadian Academies has recently produced a report on private sector innovation in Canada, entitled *Innovation and Business Strategy: Why Canada Falls Short*. The report examines Canada's weakness in productivity growth and suggests that it is due to business strategy choices.

Improving the Competitiveness of Canada's Business Tax System

Since 2006, the Government of Canada has introduced significant tax relief to position Canadian businesses for success — in 2009–10 alone, total tax relief for Canadian businesses, including the measures proposed in Budget 2009, will total more than $7 billion. In 2008–09 and the following five fiscal years, business tax relief will total more than $60 billion. Key initiatives include:

- Substantial, broad-based tax reductions that are lowering the general federal corporate income tax rate from 22.12 percent (including the corporate surtax) in 2007 to 15 percent by 2012 to strengthen Canada's business tax advantage. These tax reductions include the elimination of the corporate surtax in 2008 for all corporations and a reduction in the general corporate income tax rate to 19 percent in 2009.

- Support to encourage the growth of small businesses through a reduction of the federal income tax rate applying to qualifying small business income to 11 percent in 2008, and increases in the amounts of small business income eligible for the reduced federal income tax rate to $500 000 in 2009.

- A temporary 50-percent straight-line accelerated capital cost allowance (CCA) rate for investment in manufacturing or processing machinery and equipment, which was extended in Budget 2009, to help position businesses in the manufacturing and processing sector for long-term success.
- A temporary two-year 100-percent CCA rate for computers that allows businesses in all sectors to fully expense their investment in computers in the year they are acquired to boost Canada's productivity through the faster adoption of newer technology.
- The elimination of the profit-insensitive federal capital tax in 2006 in order to improve the efficiency of the business tax system and help businesses to grow and prosper.

Provinces and territories have also taken action to enhance the competitiveness of Canadian businesses:

- Ontario recently announced its decision to join a modernized Harmonized Sales Tax Framework and to reduce its corporate income tax rate from 14 percent in 2009 to 10 percent by 2013.
- Other provinces, including British Columbia, New Brunswick and Manitoba, are also reducing their corporate income tax rates.
- All general provincial capital taxes will be eliminated by 2012.

The combination of federal, provincial and territorial actions will help Canada achieve the goal of having the lowest overall tax rate on new business investment (marginal effective tax rate) in the G-7 by 2010. In addition, as a result of corporate income tax reductions introduced by the government, Canada will have the lowest statutory corporate income tax rate in the G-7 by 2012.

Enhancing the Scientific Research and Experimental Development Tax Incentive Program

Canada's Scientific Research and Experimental Development (SR&ED) tax incentive program is one of the most advantageous tax systems in the industrialized world for supporting business investment in R&D. In 2008, it provided about $4 billion in tax assistance to Canadian businesses. On the basis of consultations with stakeholders, the Government of Canada introduced in 2008 several changes to enhance the availability and accessibility of the financial support for R&D for Canadian small and medium-sized companies. It also allocated additional funding to improve the administration of the SR&ED program. Together, these changes will encourage Canadian technology-based firms to innovate, prosper and grow.

Improving Access to Investment Capital

Access to investment capital is the lifeblood of private sector R&D. Canadian firms seeking capital and Canadian investors looking for investment opportunities must be able to count on the quality of Canada's securities regulation system.

To look at how best to create a Canadian advantage in global capital markets through improved securities regulation, in February 2008 the Government of Canada appointed an Expert Panel on Securities Regulation. The panel released its report in January 2009, recommending, among other things, a shift towards a more proportionate and principles-based approach to securities regulation and the creation of a single securities regulator and securities act.

Budget 2009 committed the Government of Canada to working with willing partners towards establishing a Canadian securities regulator that respects constitutional jurisdictions and is part of a streamlined securities regulatory system that reinforces financial stability, strengthens enforcement and is more accountable to investors and Canadians.

To support the Canadian venture capital industry and to promote and sustain the growth of Canada's most promising innovative young firms, the Government of Canada is providing the Business Development Bank of Canada (BDC) with $350 million to expand its venture capital activities, including additional direct investments of $260 million in Canadian firms and indirect investments of $90 million in Canadian venture capital funds. In addition, Budget 2008 earmarked $75 million for BDC to create a new, privately run venture capital fund aimed at later-stage Canadian technology firms. These actions will help spur investment in innovative growing companies.

As part of the government's Extraordinary Financial Framework announced in Budget 2009, the Business Credit Availability Program (BCAP) has been launched. BCAP is an evolving suite of programs designed to improve access to financing for Canadian businesses through enhanced cooperation among private sector financial institutions and the government's financial Crown corporations, Export Development Canada and the Business Development Bank of Canada. It will deliver at least $5 billion in incremental financing to businesses, largely SMEs.

The Government of Canada's Labour Sponsored Venture Capital program is made up of funds that provide venture capital to innovative small companies. Individuals who invest in the funds receive income tax credits which totalled an estimated $150 million in 2008. These funds backed about 200 companies in 2008 according to Thomson Reuters.

Balancing Risk and Regulation: The Case of Nanotechnology

At the request of the Government of Canada, the Council of Canadian Academies assembled an Expert Panel on Nanotechnology to assess the state of knowledge for existing nanomaterial properties and their health and environmental risks, which could underpin regulatory perspectives on needs for research, risk assessment and surveillance.

Released in July 2008, the panel's report, *Small is Different: A Science Perspective on the Regulatory Challenges of the Nanoscale*, noted the limited state of available knowledge and identified a need to give priority to the development of a strategic research agenda to improve understanding of risks associated with specific classes of nanomaterials. While the panel felt that a new regulatory mechanism is not required for nanomaterials, it identified areas in which the regulatory framework could be strengthened and called for increased coordination between levels of government and international regulatory agencies.

The Council of Canadian Academies provides independent, expert scientific assessments on matters of significant public interest with the goal of informing public debate and decision making.

Strengthening Public–Private Research and Commercialization Partnerships

Public–private partnerships can be highly effective in catalyzing competitive advantage as researchers and entrepreneurs combine access to world-class knowledge networks with proven business expertise with the know-how to successfully match innovation with real opportunities in the marketplace.

Under the S&T Strategy, the Government of Canada made a series of commitments to strengthen public–private research and commercialization partnerships, with a focus on the four priority S&T areas: environmental science and technologies, natural resources and energy, health and related life sciences and technologies, and information and communications technologies.

Creating Advantage with Canada's Networks of Centres of Excellence

Partnerships of researchers and entrepreneurs are important because they bring research strengths to bear on market-driven challenges and opportunities.

With Budget 2007, the Government of Canada made substantial new investments in Canada's world-renowned Networks of Centres of Excellence (NCE) program. The NCEs have an extraordinary track record of harnessing the research strengths of academia, industry and government to make a difference on issues of social and economic importance.

Their across-the-board success in knowledge generation, technology transfer and leveraging private sector investment has made them a model of innovative public–private partnerships and commercialization practices to the world. In 2006–07, the NCE program accessed $59 million in partnership cash and in-kind investments, including $22 million in private sector contributions.[1]

The core NCE program consists of 15 networks working in four areas of strategic importance: advanced technologies (including information and communications technologies), engineering and manufacturing, the environment and natural resources, and health and life sciences. In addition, three new-initiative NCEs are bringing a multi-sectoral perspective to social issues such as bullying, care for the elderly and obesity. A competition is under way that will add new networks in the priority and sub-priority areas of the S&T Strategy.

Networks of Centres of Excellence Take on New Challenges

Canada's Networks of Centres of Excellence (NCE) program is internationally renowned for its ability to create Entrepreneurial, Knowledge and People Advantages.

In 2006–07, the NCE:

- Partnered with close to 2000 companies, government departments and agencies, hospitals, universities, and other organizations in Canada and around the world
- Employed more than 6000 researchers and highly qualified personnel
- Supported its scientists in filing 110 patents and publishing 4309 papers in refereed journals
- Obtained or launched negotiations on 20 licences and generated four spinoff companies

The NCE program is an initiative of Industry Canada in partnership with the three federal granting agencies — the Canadian Institutes of Health Research, the Natural Sciences and Engineering Research Council of Canada, and the Social Sciences and Humanities Research Council of Canada.

1 Networks of Centres of Excellence, *The Winning Advantage: Annual Report 2006-2007*, p. 5.

New Business-Led Networks of Centres of Excellence

R&D creates jobs, improves the quality of life of all Canadians, and builds a more diverse and resilient economy over the long term.

In 2007–08, the Government of Canada moved to build on the NCE program's solid foundation by investing $46 million over four years in new Business-Led NCEs. These new large-scale collaborative networks will help increase private sector investments in research in Canada, support the training of skilled researchers and accelerate the timeline involved in transferring ideas from the laboratory to products in the marketplace.

Selected through a rigorous competitive process, the Business-Led NCEs will focus on innovative tools for drug discovery, nanotechnology-enhanced forestry products, next-generation aviation technologies and sustainability challenges relating to hydrocarbon production.

New Centres of Excellence for Commercialization and Research

To bring together partners from the academic, private and public sectors to advance research and facilitate commercialization of technologies, products and services, the Government of Canada has also invested $350 million over five years to create new Centres of Excellence for Commercialization and Research.

This new initiative will create world-class centres to advance research and facilitate the commercialization of technologies, products and services in the four priority areas identified in the federal S&T Strategy.

To date, 17 successful initiatives have been launched. They were chosen by international peer review and informed by advice from the private sector. Each centre will bring together people, services and infrastructure to maximize the benefits of the government's investment in skills and research. They will also encourage private sector investment.

Making Ideas Make a Difference

The Bioindustrial Innovation Centre (BIC) in Sarnia, Ontario, is one of Canada's first Centres of Excellence for Commercialization and Research.

BIC's vision is for Canada to become a global leader in taking sustainable feedstock — such as farm and forestry by-products and wastes — and turning it into commercially viable renewable resources and value-added chemicals. These new products will be available for use in many applications, from the construction industry to auto parts production.

The College and Community Innovation Program

The Government of Canada is committed to helping strengthen the links between the colleges and the private sector.

Conceived as a pilot program in 2004, the College and Community Innovation (CCI) program was made permanent and provided $48 million through Budget 2007. The objective of the program is to increase innovation by enabling Canadian colleges to increase their capacity to work with local companies, especially small and medium-sized enterprises (SMEs). CCI supports applied research and collaborations that facilitate commercialization and technology transfer. The applied research projects will bring together expertise from diverse fields to address business-driven problems. Three separate competitions were launched in 2008. The first is completed, with eight colleges awarded a combined $18 million over five years, while the other two competitions are in progress. Over the long term, the CCI program will increase the economic development of the community and create new quality jobs based on know-how and technological innovation.

Increasing the Impact and Efficiency of Federal Research and Development Assistance

The Government of Canada delivers a range of programs that help to increase private sector innovation. These take a variety of approaches, from the work of the BDC to stimulate the supply of venture capital available to emerging technology companies to the hands-on approach of the National Research Council Canada's Industrial Research Assistance Program (NRC-IRAP). NRC-IRAP works closely with Canadian SMEs to develop, exploit and apply technologies to create new products, services and industrial processes.

While many of these programs are highly successful, the S&T Strategy identified the need to achieve greater cooperation among federal R&D assistance programs and between federal and provincial programs that support technological innovation and commercialization in the private sector. The Government of Canada has launched major new initiatives in this area and taken significant steps to improve the impact and effectiveness of individual programs.

Innovation That Crawls Before It Flies!

What is the Regina Pipe Crawler? With investment from Western Economic Diversification Canada and SpringBoard West Innovations (a not-for-profit organization), two University of Regina researchers have developed a robot that can crawl inside water pipes to search for weak spots before they become costly to repair or cause damage. When market-ready, the technology is expected to generate cost savings for homeowners and municipalities alike.

Western Economic Diversification Canada invests in innovative commercialization projects like SpringBoard West ($2.2M) that support innovation in the S&T Strategy's four priority areas.

Facilitating Access to Federal Research and Development Assistance

To accelerate the commercialization of innovative products into the marketplace, the NRC, NSERC and BDC are working to better align their programs and activities.

The three federal agencies have launched several pilot programs in Montréal, Toronto, Winnipeg, Edmonton and Vancouver, and some of these pilots have been expanded to other geographic locations. Efforts to better serve clients include harmonizing due diligence processes and the co-location of both NRC-IRAP industrial technology advisors at five BDC regional offices and the co-location of NSERC staff at two NRC institutes. In April 2008, the NRC and NSERC successfully launched a joint call for technology-driven research proposals in nanotechnology (energy, environment, and information and communications technology). These projects are now under way.

Budget 2009 also provided NRC-IRAP with $200 million over two years to temporarily expand its initiatives for technology-based SMEs during the economic downturn. SMEs are important drivers of economic growth and job creation for Canadians.

Strategic Aerospace and Defence Initiative Invests in Canada's Future

In addition to improving alignment and partnerships in business R&D support, the Government of Canada is continuously improving the impact and effectiveness of individual programs, such as the new Strategic Aerospace and Defence Initiative (SADI), which replaced Technology Partnerships Canada in 2007–08.

SADI helps to drive private sector innovation in Canada by providing repayable investments for industrial research and pre-competitive development in Canada's aerospace, defence, security and space industries. Canada's aerospace and defence industries are recognized around the world for producing leading-edge products and services.

In addition to creating an Entrepreneurial Advantage, these investments will expand Canada's Knowledge and People Advantages. SADI-backed investments are expected to foster collaborative partnerships with universities, colleges and research institutions; promote the training of young workers and entrepreneurs; and generate high-quality jobs in communities in all regions of the country. SADI provides up to $225 million per year in support of aerospace R&D.

Canadian Firm Gets Ready to Build Components for Next-Generation Aircraft

Héroux Devtek Inc. — a Quebec-based firm — is using a $27-million repayable contribution from the Strategic Aerospace and Defence Initiative to position itself to supply components to global manufacturers of next-generation aircraft. The funds are enabling the company to move ahead with R&D on new materials and manufacturing processes that will enhance the performance and reduce the environmental footprint of selected aircraft landing gear.

Positioning Canada's Automotive Industry for the Future

The automotive sector is Canada's largest manufacturing industry. It employs some 150 000 Canadians directly and several hundreds of thousands more indirectly. To advance automotive research, the Government of Canada has launched major initiatives including Automotive Partnership Canada (APC), a five-year (2009–2014), $145-million initiative to support significant, collaborative, industry-driven R&D that benefits the Canadian automotive industry.

The government also created the $250-million Automotive Innovation Fund (AIF) in 2008–09. This initiative represents as another important step in the Government of Canada's efforts to increase the impact of its R&D assistance. Investments made through the AIF will lay the base for future competitiveness, opportunities and jobs in Canada's automotive sector.

Through the AIF, the Government of Canada will support large-scale R&D projects aimed at creating a more competitive Canadian automotive sector and helping Canada to achieve its environmental objectives. These projects will help Canadian automakers to upgrade their operations with state-of-the-art designs and production processes to build cars and trucks that are on the cutting edge of consumer demand.

An early investment under AIF is an $80-million repayable contribution that would support the Ford Motor Company of Canada's Renaissance Project, conditional upon successful completion of all federal requirements under the AIF's terms and conditions.

This venture features the establishment of a state-of-the-art, flexible engine assembly plant in Windsor, Ontario, and the creation of a new North American Centre for Diesel and Advanced Powertrain Research. The research centre will have the capabilities to perform advanced R&D on prototype powertrains, gasoline powertrain technologies, hybrid technologies and alternative fuel powertrains including diesel, biodiesel, ethanol blends and hydrogen. Total public–private investment in the Renaissance Project could reach $730 million by 2012.

Knowledge Advantage

Positioning Canada at the Leading Edge of Global Science and Technology

For Canada to be more productive and competitive, Canadian researchers must be at the forefront of important developments in science and technology (S&T) that will generate health, social, environmental and economic benefits for Canadians.

Over the past two years, the Government of Canada has laid important groundwork for Canada to gain a global Knowledge Advantage. The following sections will describe progress made in four areas: targeting world-class research excellence in areas of health, social, environmental and economic opportunity; maintaining Canada's G-7 leadership in public sector research and development (R&D); enhancing accountability and value for money from the granting councils; and exploring new approaches to federally performed S&T.

In addition to funding basic research, the government has made significant investments to seed the strategic research needed to meet Canada's economic and social needs. It has also increased its investments in research and facilities, and worked diligently with its partners in business, academia and government to increase the commercial impact of federal investments and activities across all of Canada's research strengths.

Targeting World-Class Research Excellence in Areas of Health, Social, Environmental and Economic Opportunity

New Funding for the Granting Councils for Targeted Research

In keeping with our goal of achieving global excellence, we have continued to direct substantial new funding towards both basic and strategic research at Canada's universities and colleges.

Budget 2007 provided $85 million per year in new annual resources for Canada's three granting councils — the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Social Sciences and Humanities Research Council of Canada (SSHRC) — to support exciting new research in the four priority areas identified in the S&T Strategy: environmental science and technologies, natural resources and energy, health and related life sciences and technologies, and information and communications technologies.

Budget 2008 expanded this support with an additional $80 million per year to foster research on important social and economic challenges, and to partner with public and private stakeholders to find practical solutions to many of these issues.

The results of these new investments are wide-ranging:

- CIHR has increased its grants to accelerate the translation of knowledge into more effective health products and services for Canadians.
- NSERC has funded three new strategic networks to focus on challenges in manufacturing, forestry and fisheries.
- NSERC has directed $6 million towards a new partnership with the National Research Council Canada's Industrial Research Assistance Program and the Business Development Bank of Canada to enable researchers in nanoscience and nanotechnology to collaborate on large research projects. NSERC also received $34 million per year for collaborative research on the knowledge and innovation needs of Canada's automotive, manufacturing, forestry and fishing industries. Working with an industry task force and other federal agencies (including the SSHRC, the NRC, the Canada Foundation for Innovation (CFI) and the Canada Excellence Research Chairs (CERC)), NSERC has set out an ambitious five-year agenda to further R&D benefits for the automotive industry, as part of the $145-million investment in Automotive Partnership Canada.
- The SSHRC and the International Development Research Centre have partnered to launch a $6.2-million initiative to link research teams in Canada and the developing world, to address S&T priority areas including environment and natural resource management and information and communications technologies for development.
- CIHR and NSERC have expanded their Collaborative Health Research Projects program from $6 million a year to a total of $13.8 million.

Straight to the Heart

New treatments for heart disease can improve lives and reduce costs to the health care system. The Canadian Institutes of Health Research and the Natural Sciences and Engineering Research Council of Canada have provided matching funds of $59 800 each to researchers at Université Laval to develop a new class of degradable coronary stents.

In March 2009, the Government of Canada announced that it will help create the Ivey Centre for Health Innovation and Leadership, through an investment of $5 million. The internationally recognized Richard Ivey School of Business at the University of Western Ontario will bring together expertise from the business, health sciences and medical sectors to develop specialized talent and commercialize health innovations that will benefit Canada's health care providers and patients.

Canada Is Becoming a World Leader in Neuroscience

The Institute of Neurosciences, Mental Health and Addiction (INMHA), one of the Canadian Institutes of Health Research's (CIHR's) 13 institutes, is dedicated to supporting research on the functioning and disorders of the brain, spinal cord, sensory and motor systems, and the mind. CIHR provides support to almost 12 000 health researchers and trainees across Canada and in 2007–08 provided $86.8 million for research related to Alzheimer disease, mental health and addictions.

Support for neuroscience research is also provided through the Networks of Centres of Excellence. PrioNet Canada at the University of British Columbia (UBC) and the Vancouver Coastal Health Research Institute are developing strategies to mitigate, and ultimately eradicate, prion diseases such as bovine spongiform encephalopathy (BSE) and its human variant, Creutzfeldt-Jakob Disease.

In addition, out of the seven Centres of Excellence for Commercialization and Research identified in Budget 2007, the Brain Research Centre (BRC) in Vancouver and the Montreal Neurological Institute are dedicated to neurological research. The BRC is a partnership between Vancouver Coastal Health and UBC's Faculty of Medicine. It draws on the skills of over 190 researchers, physicians and technicians to operate on a "bench to bedside" principle in order to bridge the gap between basic sciences and their clinical application as treatments for neurological diseases.

Boosting Research Funding for Sustainable Technologies

New technologies that can support the goal of sustainable development will be critical to Canada's future economic prosperity and ability to maintain a healthy environment. In Budget 2007, the Government of Canada made $500 million available to Sustainable Development Technology Canada (SDTC) to establish the new NextGen Biofuels Fund™ supporting production of next-generation renewable fuels. This new fund is complementary to the original SD Tech Fund™ aimed at developing and demonstrating innovative solutions to environmental challenges. Accordingly, SDTC currently operates two leading-edge funds:

- The $550-million SD Tech Fund™ supports projects that address issues relating to climate change, air quality, clean water and clean soil.
- The $500-million NextGen Biofuels Fund™ supports the establishment of first-of-kind large demonstration-scale facilities for production of next-generation renewable fuels.

New Carbon Reduction Technology Takes Aim at Climate Change

Atlantic Hydrogen Inc. — a corporate–university consortium based in Fredericton, New Brunswick — has used new Sustainable Development Technology Canada funds to develop the CarbonSaver™. This exciting new technology will remove carbon from natural gas fuels in solid form rather than returning it to the atmosphere. It will be used to feed hydrogen-rich natural gas as fuel to automotive engines or for applications in distributed power generation.

SDTC funds groundbreaking technologies and fast-tracks their progress to market by helping entrepreneurs connect with partners, formalize business plans and qualify for venture capital financing.

Moving Canada towards a Clean Energy Future

In keeping with the priorities of the S&T Strategy, the Government of Canada is supporting S&T activities that can reduce the impact of Canada's energy use on the environment. Budget 2009 announced the creation of a new Clean Energy Fund to support clean energy research, development and demonstration projects, including carbon capture and storage.

Placing Canada at the Forefront of Genomics Research

Genomics is an important, multidisciplinary science with the potential to improve the lives of Canadians and others around the world through better health and a cleaner environment. Budget 2007 provided $100 million, and Budget 2008 provided an additional $140 million, to Genome Canada — a not-for-profit corporation dedicated to establishing Canada as a research leader in genomics. This brings the total investment up to $840 million and will allow Genome Canada to operate through 2012–13. Using Budget 2007 and Budget 2008 funding, Genome Canada has invested in applied genomics research to strengthen Canada's agriculture, crop and bioproduct sectors. It has also partnered with California to advance important cancer stem cell research.

Maintaining Canada's G-7 Leadership in Public Sector Research and Development Performance

The Government of Canada is committed to maintaining Canada's international reputation for research excellence. Performing top-notch research and attracting and retaining outstanding researchers at our Canadian universities will help advance Canada's position in the global, knowledge-based economy and increase our access to the world's best ideas.

In keeping with our commitments under the S&T Strategy, the Government of Canada has taken decisive action to maintain Canada's post-secondary research system as one of the world's best. The federal investment in higher-education R&D helps Canada place the highest among G-7 countries and second in the OECD on higher-education R&D as a percentage of gross domestic product.

Altogether, Canadian governments and higher-education institutions performed some $12.6 billion in R&D in 2007–08. These investments have helped keep Canada in a leadership position among the G-7 countries.

Canada's World-Class Fuel Cell and Hydrogen Industry Gets Demonstration Centre

In 2008–09, the Government of Canada officially announced investments of $13.6 million over three years in the National Research Council's (NRC's) fuel cell and hydrogen technology cluster, an initiative that catalyzes broadly based community partnerships among industry, academia and the government to build Canada's competitive advantage through research, innovation and commercialization.

This is also the site of NRC's public–private Hydrogen and Fuel Cell Gateway in Vancouver — a technology demonstration and exhibit centre showcasing Canada's fuel cell and hydrogen industry. These investments support important work in an S&T Strategy sub-priority.

Capturing the Leading Edge of Quantum Computing

To position Canadian researchers at the forefront of quantum computing, Budget 2007 provided $50 million to the Perimeter Institute for Theoretical Physics. Quantum computing is a promising new combination of computing, engineering, and the mathematical and physical sciences. Budget 2009 builds on this advantage with a $50-million investment in the Institute for Quantum Computing at the University of Waterloo. This exciting new research centre has set its sights on creating a unique world-class environment for Canadian researchers working in quantum information and quantum computation. In November 2008, the Institute was pleased to announce the appointment of internationally renowned scientist Professor Stephen Hawking as a Distinguished Research Chair. Over the longer term, work at the Institute is expected to create significant economic benefits for Canadians through breakthroughs in knowledge and technology development.

Expanding the Boundaries of Science

In 2007–08, the Government of Canada announced it would provide the Canadian Institute for Advanced Research (CIFAR) with $25 million in funds over five years.

CIFAR is a not-for-profit organization that brings together leading researchers from across Canada and around the world to work collaboratively on complex advanced research. CIFAR's members include Nobel Laureates, Guggenheim Fellows, Royal Society of Canada members and many others working at the top of their fields. Together they expand the boundaries of knowledge and understanding in fields as diverse as nanoelectronics, experience-based brain and biological development, quantum information processing, and research into successful societies.

Improving Infrastructure at Universities and Colleges

The Government of Canada has made a major investment aimed at creating an economic stimulus while renewing the infrastructure that will support world-class research and training for decades to come. In Budget 2009, the Government of Canada committed up to $2 billion to accelerate repairs, maintenance and construction at Canada's colleges and universities. This funding will leverage up to an additional $2 billion in new investments to help ensure that post-secondary institutions continue to advance the frontiers of knowledge and contribute to Canada's economy through the research and advanced skills training they provide. Budget 2009's investments build on the $1-billion Post-Secondary Education Infrastructure Trust the government announced in Budget 2006.

Building Strength through the Canada Research Chairs Program

The Canada Research Chairs (CRC) program plays an important role in branding Canada's universities as hubs of world-class research and training grounds for the next generation of leading-edge scientists and highly qualified personnel. Research funded by the program also benefits Canada's public, private and not-for-profit sectors, helping them to respond to social, political and economic issues of concern to Canadians.

Canada Research Chair Attracts Global Attention with New Cancer Treatment

Dr. Sylvain Martel, Canada Research Chair in Micro/Nanosystem Development, Construction and Validation at the École Polytechnique de Montréal, made headlines around the world in 2007 with a breakthrough in medical robotics.

Using specialized software and prototypes developed with the support of CMC Microsystems, Dr. Martel and his team have created a system that could transport chemotherapy drugs through a blood vessel directly to a cancerous tumour, without damaging the healthy cells around it.

In 2007–08, the Government of Canada invested $258.6 million through the CRC program to fund 1902 CRC appointments across the country. Of these, 187 were new CRC appointments in 2007–08. The CFI made an additional investment of $22.4 million to fund research infrastructure essential to the work of 139 of these new chair holders.

Canada Foundation for Innovation Funds New Research Infrastructure

Canada is known for its state-of-the-art research equipment and facilities. As a country, we have invested heavily to ensure that Canadian and visiting researchers have access to the leading-edge tools and facilities they need to conduct world-class research and technology development that will generate benefits for Canadians.

Budget 2007 provided the CFI with $510 million to further strengthen the research capacity of Canada's universities, colleges, research hospitals and not-for-profit research institutions. The CFI put out its first call for proposals to use the new funds in February 2008. Budget 2009 increased this investment in Canada's Knowledge Advantage with another allocation to the CFI of $750 million for advanced research infrastructure, including $600 million in support of areas of priority identified by the Minister of Industry in consultation with the CFI, guided by the Foundation's strategic plan.

These new investments will have a significant impact on Canadian competitiveness and our reputation for research excellence. Since its inception, the CFI has allocated more than $4.5 billion to support 6000 projects at 128 research institutions in 64 communities across Canada.

The CFI's impact analysis for the last five years indicates that the availability of this new infrastructure has led to the following:

- Creation of more than 4000 public/private sector jobs
- Training of almost 11 000 technical personnel
- Generation of more than 9000 research collaborations
- Generation of more than 1500 international research collaborations
- Generation of 1750 intellectual property rights
- Development of 760 new or improved products, processes or services
- Development of 613 new or improved public policies or programs
- Creation of 198 spinoff companies

An important benefit has been the way these world-class facilities and equipment have helped attract new researchers to S&T projects in Canada. In 2006–07, some 2130 new researchers were recruited to CFI-sponsored projects. Of these, almost half (44 percent) came from outside Canada. That same year, CFI-funded projects also attracted more than 16 000 post-doctoral fellows and graduate students.[2]

2 Canada Foundation for Innovation, *2008 Report on Results: An Analysis of Investments in Research Infrastructure*, December 2008.

Linking the Ocean Floor and the World Above

CANARIE Inc. and the Canada Foundation for Innovation both contribute to NEPTUNE Canada — a $300-million leading-edge, Canada–U.S., public–private collaboration that will use a cabled observatory to expand scientific knowledge of the ocean and the ocean floor. Located on the seabed off the coast of British Columbia, Washington and Oregon, the observatory will be used by scientists to investigate a range of global challenges and opportunities. Projects will contribute to the international understanding of climate change, greenhouse gas cycling, earthquake and tsunami forecasting, pollution threats to human and animal health, and more. NEPTUNE Canada is managed by the University of Victoria and its partner, the University of Washington.

Preparing for Canada's Next-Generation Research Networks

Science is increasingly multidisciplinary, collaborative and network-based. In 2007–08, the Government of Canada allocated $120 million to CANARIE Inc. to continue its operation and development of the CANARIE Advanced Research Network. Canada has long been recognized for this sophisticated, broadband network that links Canadian universities, research hospitals, federal laboratories and other science facilities with each other and with the top science facilities around the world. By getting ready today for the cyber infrastructure of tomorrow, Canada will maintain its reputation for leading-edge technology development in the area of advanced communication networks, and the products, applications and services that run them.

Enhancing Accountability and Value for Money from the Granting Councils

Canada's three granting councils, CIHR, NSERC and the SSHRC, are important S&T funders in Canada. The S&T Strategy identified the need to improve coordination and enhance accountability across Canada's three granting councils.

Since that time, NSERC and the SSHRC have separated the roles of President and Chair of the granting councils, and increased membership in the councils from the research user community. The government is firmly committed to basic, discovery research. These moves will also increase the relevance of the research funded by the councils and encourage work on practical and commercial applications.

Other initiatives are under way to better coordinate programs, facilitate interdisciplinary and international collaborations, and improve client service. Efforts are also being made to collect and report standardized data on the results and impacts of investments made by the three granting councils and the CFI.

Exploring New Approaches to Federally Performed Science and Technology

The Government of Canada plays a major role in S&T in Canada. It invested $5.2 billion in 2007–08 in its own S&T initiatives. This included some $2.5 billion for government R&D and $2.7 billion for related scientific activities (data collection, testing and standards development, feasibility studies, and education support such as scholarships).

As promised in the S&T Strategy, the Government of Canada has worked to increase the impact of federal S&T investments. In some cases, we have made new investments in regulatory activities, scientific research or infrastructure that is in the public interest. In others, we have looked for innovative ways to effectively deliver results through strategic partnerships.

New Investments in Space — Reaching beyond Global Excellence

The Canadian Space Agency (CSA) is known the world over for its excellence in space technologies — from earth-observation and communications satellites to the Canadarm2 and Dextre (Special Purpose Dextrous Manipulator), which are essential tools for servicing the International Space Station. Many of these advanced technologies lead to commercial spinoff applications for use in industry and everyday life here on earth in areas such as manufacturing, underground mining and medicine.

Budget 2009 provided $110 million over three years to the CSA to develop terrestrial prototypes — such as a Mars Lander and a Lunar Rover — and to spur development of other technologies and space robotics.

Managing Our Ocean Resources for Sustainability

The livelihood of Canadians in many coastal communities depends on effective protection of the environment. Through Budget 2007, the Government of Canada provided $39 million over two years to science research programs at Fisheries and Oceans Canada. These additional resources will help stabilize ongoing collaborative fish stock assessment and research with the fishing industry.

Expert Panel on Federal Laboratories

In 2007–08, the Government of Canada appointed an independent panel of experts to consult with stakeholders and provide advice on transferring federal non-regulatory laboratories to Canadian universities or the private sector. Reporting back in June 2008, the panel identified five early candidates for alternative management arrangements. It also proposed a policy framework to guide similar decisions in the future.

Modernizing Federal Laboratories

The Government of Canada maintains a network of about 200 federal laboratories and scientific facilities across the country. Budget 2009 announced investments of $250 million over two years in an accelerated investment program to address maintenance that has been deferred at federal laboratories. Projects must be completed by the end of 2010–11 and will focus on laboratories that contribute to the government's main regulatory responsibilities such as health and food safety. Examples of early investments made under this fund include $10 million over two years in upgrades to the Canadian Food Inspection Agency's laboratories in Calgary, Lethbridge, Saskatoon and St-Hyacinthe to ensure the safeguarding of Canada's food, animal and plant systems. The government also announced $7.5 million to upgrade Natural Resources Canada's Northern Forestry Centre in Edmonton.

Natural Resources Canada's CANMET Materials Technology Laboratory will be relocated to new state-of-the-art facilities at the McMaster Innovation Park in Hamilton, Ontario. Minister of Natural Resources Lisa Raitt and McMaster University President Peter George unveiled the final building design and broke ground for the new facility on December 5, 2008, with completion expected in September 2010.

Strengthening Canada's Position as a World Leader in Arctic S&T

Canada is a significant player in Arctic science. Canadian Arctic scientists and managers lead in numerous international forums such as the Arctic Council, the Intergovernmental Panel on Climate Change and International Polar Year.

Under the Northern Strategy, Canada committed to building a new world-class hub for scientific activity in the Canadian Arctic. The new high Arctic research station will anchor the network of existing research facilities in the North and serve both Canadian and international researchers drawn by the science potential of Canada's vast and diverse Arctic. Under Canada's Economic Action Plan, $85 million was allocated to upgrade the existing network and $2 million to a feasibility study for the new research station. These investments lay the groundwork for strengthening Canada's position in Arctic S&T.

People Advantage

Growing Canada's Base of Knowledge Workers

Talented, skilled and creative people bring innovation to life. For Canada to thrive in the global economy, we must build the best-educated, best-trained and most flexible workforce in the world. Canada must be a magnet for highly skilled people if we are to maintain the quality of life and strengthen the social foundations that each of us cherish.

The Government of Canada has introduced a variety of progressive measures to help Canadians participate fully in a knowledge-based economy and to draw top science and technology (S&T) and managerial talent to Canada from around the world. From investments in flagship scholarships to new skills training initiatives, the federal government is partnering with business and other levels of government to augment the opportunities for Canada's best and brightest to study and apply their skills to Canadian priorities in health, energy and the environment, and to make our economy grow.

The following sections outline progress made in creating a competitive labour market environment; developing the next generation of S&T workers; attracting the best minds from around the globe; expanding opportunities for Canadians in a changing economy; and fostering a strong S&T culture.

Creating a Competitive Labour Market Environment

Achieving global excellence starts with a strong and attractive labour market in which the very best will want to work. Canadian businesses, universities and research organizations need to cultivate and have access to the world's most talented people and their ideas — whether they originate here in Canada or on the other side of the globe.

Getting the Fundamentals Right — Reducing Taxes for Individuals

In keeping with this goal, the Government of Canada has moved decisively to reduce taxes on individuals. Actions taken by the Government of Canada since 2006, including those announced in Budget 2009, will reduce taxes on individuals by an estimated $160 billion over 2008–09 and the following five fiscal years. As a result of Budget 2009, Canadians can now earn more before paying personal income tax, and earn more at higher levels before facing higher personal income tax rates. Budget 2009 also affirmed that a key future priority is to make Canada's personal income tax system more competitive for highly skilled workers to better enable Canadian businesses to compete in a globalized marketplace.

Creating a More Competitive Immigration System

Talented, skilled, creative people are the most crucial element of a successful national economy.

The Government of Canada has taken steps to make Canada's immigration system more competitive and able to respond to the economy's dynamic and changing labour market needs. Many Canadian industries are facing skilled labour shortages, even in these tough economic times. Companies of all kinds are scouting the globe for expertise that can meet their needs.

To address this situation, the federal government has introduced new flexibility into Canada's immigration system to help foreign-trained workers stay in our country and succeed. These include:

- Streamlining the Temporary Foreign Worker program to reduce costly wait times and delays for companies bringing in foreign workers.
- Developing the new Canadian Experience Class to make it easier for skilled temporary foreign workers and students with Canadian credentials and work experience to stay in Canada as permanent residents. Workers and students who meet certain conditions can apply for permanent resident status from within Canada.
- Creating the Foreign Credentials Referral Office (FCRO) to provide internationally trained individuals with foreign credentials recognition and labour market information they need, both overseas and in Canada, to help them better use their skills in the Canadian labour market. The FCRO also works with provinces, territories and stakeholders to strengthen foreign credential processes across Canada.
- Providing $50 million to support work with the provinces and territories to develop a common approach to foreign credential assessment and ensure better integration of immigrants into the Canadian labour force.

Developing the Next Generation of Science and Technology Workers

Canada has one of the most respected post-secondary education systems in the world. All Canadians enjoy the benefits of this strong foundation. As a country, we must build on this strength to create a strong People Advantage — ensuring that the next generation of Canadians has advanced skills in S&T and business to spark innovation and sustainable growth to the benefit of all Canadians.

Investments in Universities and Colleges

Post-secondary institutes are critical in providing Canadians with the knowledge and skills they need to succeed in the labour market.

In 2008–09, the Government of Canada provided $9.7 billion in support for post-secondary education. This includes an $800-million increase to the Canada Social Transfer (CST), bringing the total CST funding to provinces and territories for post-secondary education up to $3.2 billion. These new funds give provinces and territories the increased resources they require to maintain and strengthen Canada's universities and colleges. This funding helps ensure that Canada's post-secondary system can meet the needs of Canadians and contribute to Canada's economic and social success. Federal investments through the CST will continue to grow in the future, with planned increases of 3 percent each year.

Improving Accessibility — Grants and Loans

Financing the costs of education is an important consideration for today's families and students. The Government of Canada has been hard at work with its colleagues in the provinces and territories to modernize the financial support system for Canadians who choose to pursue a college or university education.

A new, consolidated Canada Student Grant Program will channel increasing financial support to Canadian students. Starting in the fall of 2009, some 245 000 college and undergraduate students will start to benefit from grants under the program. Currently valued at $350 million, this initiative will receive additional funding to reach $430 million by 2012–13.

The Government of Canada has also supported new improvements to the Canada Student Loans Program. With $123 million in new funding for four years starting in 2009–10, the Government of Canada and participating provinces and territories plan to modernize and simplify the program's loans process. Changes to the program will make it easier for students to access financial assistance and to manage their loans.[3]

3 Student financial assistance in Canada is delivered through partnerships between the Government of Canada and participating provinces and territories. Quebec, Northwest Territories and Nunavut operate independent financial assistance programs and receive payments in lieu of direct participation.

Celebrating Global Excellence in Medical Research through the 2008 Canada Gairdner International Awards

Dr. Nahum Sonenberg, of McGill University, was honoured for his numerous contributions to the control of protein synthesis. His scientific discoveries have led to world-class breakthroughs in cancer research and advances in scientific understanding of learning and memory.

Dr. Samuel Weiss, of the University of Calgary, was recognized both for his identification of the metabotropic glutamate receptor, now a major target for pharmaceutical research and neurological disease therapies, and for his discovery of neural stem cells in the brains of adult mammals. This second achievement has led to new approaches in brain cell replacement and repair.

The Government of Canada celebrated the 50th anniversary of the Gairdner International Awards in 2008 with a $20-million endowment. The new funds will allow the Gairdner Foundation to expand its awards and outreach activities. The awards will help to brand Canada internationally as a global leader in health research.

Attracting the Best Minds from around the Globe

All countries compete to attract and keep the top students in the world. And, in the new global economy, that race is intensifying. In the past two years, the Government of Canada has taken unprecedented steps to make Canada one of the most attractive places for the world's best students to study. These initiatives will help foster global excellence in research and strengthen Canada's ties to the global supply of talent and ideas.

Generating Excellence — The World's Best Scholarships and Research Chairs

The first of these prestigious programs — the new Vanier Canada Graduate Scholarships program — will support 500 Canadian and international doctoral students each year with three-year scholarships valued at up to $50 000 per year. Launched in September 2008, these awards are expected to attract and support world-class doctoral students who demonstrate a high standard of scholarly achievement in graduate studies and strong leadership skills.

A second headliner — the Canada Excellence Research Chairs (CERC) program — is another major investment in branding Canada's Knowledge and People Advantages. Under the program, universities will receive up to $10 million over seven years to support each of the 20 CERC holders and their research teams in establishing ambitious research programs at Canadian universities. In April 2009, the Minister of Industry announced the final selection of 40 proposals to move forward to the next phase of the competition.

This exciting new program has already won global attention and promises to attract leading academic powerhouses and graduate students from around the world, and to retain Canada's best who might otherwise have been lured away. Once the CERCs are in place, these researchers will bring the influence of their scientific insights, teaching abilities and world-class research networks to Canada's campuses — seeding excellence among countless students and the businesses that work alongside them.

Expanding the Canada Graduate Scholarships

The Government of Canada's investment in Canada's post-secondary education goes further. It has also boosted funding for the Canada Graduate Scholarships (CGS) program — a key source of support for Canada's most promising graduate students in all disciplines.

The CGS program was expanded through Budget 2007, which provided funding to support an additional 1000 new scholarships each year. By 2009, the total number of scholarships awarded under the program should reach 5000. In addition, 250 new CGS–Michael Smith Foreign Study Supplements per year will be available to Canadian CGS recipients to pursue one semester of foreign studies and be exposed to the latest ideas and innovations the world has to offer in their field of study.

Budget 2009 added $87.5 million over three years to temporarily expand the CGS program. This increased funding will help students deepen their skills through further graduate study at a time when they face a weakening labour market. Starting in 2009, these funds will provide for an additional 500 doctoral scholarships, valued at $35 000 each per year, and for a further 2000 master's scholarships, valued at $17 500 per year.

Bell, Banting and Best, and Bombardier — Canada Renames Scholarships

The Canada Graduate Scholarships have been renamed after some of Canada's best-known pioneers of technology, medicine and entrepreneurship:

- Alexander Graham Bell
- Sir Frederick Banting and Dr. Charles Best
- J. Armand Bombardier

Our next generation of innovators will now tap into the support of the Bell, Banting and Best, and Bombardier scholarships as they push the frontiers of science, innovation and industry — following in the proud tradition of Canada's titans of S&T.

Expanding Opportunities for Canadians in a Changing Economy

Being competitive in the modern economy means having a labour force with the skills and training to adapt to a changing global market. Connecting talented, creative and skilled people with outstanding training opportunities for knowledge-based employment is critical for our economy to prosper and Canadian workers to find the jobs they want.

New Skills Training Opportunities for Canadians

Following through on its *Advantage Canada* commitments, the Government of Canada is investing $500 million annually over the next six years, beginning in 2008–09, in a series of new Labour Market Agreements (LMAs) with the provinces and territories. These agreements will help Canadians to reach their full skills and employment potential, and will raise the productivity of Canadian business.

Resources are allocated to the provinces and territories on a per capita basis and will give each province or territory the flexibility to focus on job training programs and employment supports that will meet the local and regional needs of employers and workers alike. These supports will be targeted to persons not eligible for assistance under Employment Insurance (EI) Part II, including immigrants and other new labour market entrants. A robust accountability framework accompanies each LMA to ensure effective planning, delivery and review of results.

In addition, through Budget 2009, the Government of Canada committed $250 million annually over two years for the Strategic Training and Transition Fund. The fund will be administered through LMAs with provinces and territories and will provide access to training and other assistance to individuals, whether or not they qualify for EI.

Industrial Research and Development Internships

Hands-on training and business experience is also vital for today's university and college graduates. Budgets 2007 and 2009 invested over $25.5 million in the new Industrial Research and Development Internships (IRDI) program to give graduates just this kind of opportunity. Launched in 2008–09, the IRDI creates internships with participating businesses for graduate students and post-doctoral fellows. With the support of their sponsors, interns will be able to take the expertise and knowledge they acquired at university and apply it to a business environment to address a business research need.

In addition, the National Research Council Canada's Industrial Research Assistance Program (NRC-IRAP) provides companies with support to hire recent graduates from colleges and universities for up to one year to work on innovative business strategies and technology-related projects. Budget 2009 provided $200 million over two years, starting in 2009–10, to NRC-IRAP to temporarily expand its initiatives, including $30 million to help companies hire over 1000 new post-secondary graduates.

Fostering a Strong Science and Technology Culture

The S&T Strategy identified the need for Canadians and businesses to better understand the way S&T and innovation increasingly help drive our economy and improve our quality of life. A strong S&T culture will encourage the next generation of Canadians to pursue knowledge-based careers and business opportunities.

Innovative Science Outreach

More and more Government of Canada departments and agencies are coming up with innovative ideas to generate public excitement in S&T. National Science and Technology Week — usually held each year in October and spearheaded by Natural Resources Canada — is a truly national celebration that brings together partners from across government, industry and academia to offer a variety of exciting events to raise awareness among young people about careers in S&T. From Iqaluit to Québec, from Vancouver to the East Coast, students and teachers join in hands-on science challenges and fun-filled tours, seminars and competitions.

This spirit of federal S&T collaboration is exemplified by science.gc.ca, the Government of Canada's official website for S&T information. The site focuses on creating interest and excitement in Canadian S&T through outreach initiatives such as the Great Canadian Science Race, which reached over 325 000 children and 14 000 teachers across the country. The website science.gc.ca continues to grow in popularity, seeing a 32-percent rise in unique visitors in 2008.

Another exciting initiative is the Canadian Institutes of Health Research's (CIHR's) new Synapse Youth Connection. Some 4000 CIHR-funded researchers, graduate students and post-doctoral fellows are voluntarily mentoring youth to expose them to their passion about careers in health. In its first year alone, the program reached more than 20 000 students directly and more than 26 000 indirectly.

A Modern Approach

to Science and Technology Management

A modern approach to science and technology (S&T) management is vital to supporting Canada's goal to be a world leader in S&T and innovation.

The Government of Canada has taken significant steps to realize gains in this area — moving forward with activities aimed at strengthening Canada's domestic and international S&T partnerships and seeking a fresh approach to accessing external S&T advice.

The following will look at how the government is taking action to make Canada a world leader through stronger domestic and international partnerships; revitalizing our external S&T advisory bodies; and improving S&T impact measurement and reporting.

Making Canada a World Leader through Stronger Domestic and International Partnerships

Today's innovation leaders search out and tap into sources of knowledge discovery and business opportunity all over the world — from China to Brazil, from Halifax to Victoria. For Canada to prosper in the global knowledge economy, we must excel at connecting to the global supply of ideas, talent and technology.

Strengthening Our Domestic Science and Technology Partnerships

Canada's provincial and territorial governments make significant contributions to Canada's economic prosperity and quality of life through a range of S&T activities.

In keeping with its commitment to the principle of partnerships, the Government of Canada continues to strengthen its collaborative relationships with Canada's provincial and territorial governments, by actively engaging in the work of the Federal/Provincial/Territorial Working Group on Innovation.

The $2-billion investment in repairs, maintenance and construction at Canada's colleges and universities, announced in Budget 2009, also involves close collaboration with provinces and territories.

Connecting to the Global Supply of Ideas, Talent and Technology

Enhancing Canada's links with global S&T and innovation networks is a key priority if Canadian researchers and entrepreneurs are going to achieve world-class results in today's highly competitive, global scientific and business environments.

S&T agreements are an important part of Canada's Global Commerce Strategy (GCS), which has a $50-million annual budget to develop Canada's trade and investment interests at home and abroad. As part of the GCS, the Government of Canada has strengthened its network of trade commissioners around the world to meet the needs of globally engaged Canadian companies seeking new sources of innovation or taking their products to market.

The Government of Canada has also completed its assessment of Canada's S&T presence on the international scene and is continuing to explore options to further contribute to and benefit from international S&T developments. While Canadian scientists and technology-oriented entrepreneurs are already enjoying the benefits of Canada's S&T partnerships and agreements with the United States (e.g., the Canada–California Strategic Innovation Partnership), India, China and Israel, they will soon be able to take advantage of recently signed agreements with Brazil and Chile. Going forward, the government will continue to pursue new S&T partnerships with a range of countries with which Canada can shape mutually beneficial S&T relationships.

Revitalizing Our External Science and Technology Advisory Bodies

The S&T Strategy highlighted the need to bring the Government of Canada's sources of external advice into line with the realities of today's complex and increasingly integrated S&T environment.

To achieve this goal, the Government of Canada appointed the Chair of the new Science, Technology and Innovation Council (STIC) in June 2007 and the members of the Council in October 2007. The STIC meets regularly to develop advice on S&T and innovation issues of national importance, as requested by the Minister of Industry or other ministers via the Minister of Industry.

Its impact is already visible. In 2008, the Minister of Industry accepted the Council's recommendations on sub-priorities for S&T investment from the four priority research areas identified in the S&T Strategy. The Council also played a role in shaping the design of the highly acclaimed Canada Excellence Research Chairs and Vanier Canada Graduate Scholarships.

Minister of Industry Accepts Science, Technology and Innovation Council's Advice on Science and Technology Strategy's Sub-Priorities

In 2008, the Science, Technology and Innovation Council recommended a set of S&T Strategy sub-priorities for the design of Canada's research support programs.

Environmental Science and Technologies

- Water (health, energy and security)
- Cleaner production and use of hydrocarbon fuels

Natural Resources and Energy

- Oil sands energy production
- Arctic (resource production, climate change adaptation and monitoring)
- Biofuels, fuel cells and nuclear energy

Health and Related Life Sciences and Technologies

- Regenerative medicine
- Neuroscience
- Health in an aging population
- Biomedical engineering and medical technologies

Information and Communications Technologies

- New media
- Animation and games
- Wireless networks and services
- Broadband networks
- Telecom equipment

The priorities and sub-priorities identified by the STIC are being used by the three granting councils to guide their investments.

Improving Science and Technology Impact Measurement and Reporting

Recognizing the need to provide greater accountability to Canadians, the Government of Canada is engaged in efforts to increase its ability to measure and report on the impact of its S&T investments.

The Policy Research Initiative is leading a group of federal science-based departments and agencies to find ways to better identify, describe, measure and report on the impacts of federally performed S&T. A working paper was published and an event was held in 2008. Additional working papers and a final report will be released in 2009.

Also, in May 2009, the STIC released its inaugural report *State of the Nation 2008 – Canada's Science, Technology and Innovation System*. It is a benchmarking report, to compare Canada's performance with that of other countries.[4] Along with this report, these documents will help to better inform Canadians about S&T.

4 http://www.stic-csti.ca/eic/site/stic-csti.nsf/eng/h_00011.html

Conclusion

Working Together to Create a Better Life for Canadians

In May 2007, the S&T Strategy, *Mobilizing Science and Technology to Canada's Advantage*, was released. It is a multi-year plan developed in consultation with Canadians and has been well received by the research community. As part of the government's long-term plan to build a globally competitive economy, the S&T Strategy aims to help increase the prosperity of Canadians and improve their quality of life. More specifically, the Strategy provides a vision to create highly skilled job opportunities, a cleaner environment and healthier communities.

In every year since the Strategy's launch, the Government of Canada has been systematically implementing policies and programs to advance the S&T agenda. In fact, the government has committed billions of dollars in a succession of federal budgets to transform the S&T Strategy's vision into reality.

The Strategy itself — together with the scope and imagination of the government's flagship activities — has also drawn the interest of the world's scientific and business communities. From everyone working together, remarkable results have been achieved in creating value for Canadians.

While Canada is already seeing the early outcomes of a shared, forward-looking approach, we must continue to use the potential of S&T to make a lasting difference in the lives of Canadians.

In the year ahead, the Government of Canada will continue to be guided by the S&T Strategy and bring forward new investments to make Canada a world leader in science and technology.