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NRC · CNRC

Report on Plans and Priorities

National Research Council Canada

2006-2007
Estimates

_____

Maxime Bernier
Minister of Industry

TABLE OF CONTENTS

Acronyms and Abbreviations

ACURA	Association of Canadian Universities for Research in Astronomy
AIP	Atlantic Investment Partnership
ALMA	Atacama Large Millimeter Array
CBRN	Chemical, Biological, Radiation and Nuclear
cGMP	Current Good Manufacturing Practices
CFHT	Canada-France-Hawaii Telescope
CRTI	CBRN Research and Technology Initiative
CTI	Competitive Technology Intelligence
DRDC	Defence Research and Development Canada
FCHP	Fuel Cell and Hydrogen Program
FTE	Full-Time Equivalent
GHI	Genomics and Health Initiative
HRM	Human Resources Management
IP	Intellectual Property
IPF	Industry Partnership Facility
JCMT	James Clerk Maxwell Telescope
LRP	Long Range Plan for Astronomy and Astrophysics
LTRC	Language Technologies Research Center
MSE	Medium-Sized Enterprise
NIC	NRC Information Centre (NRC-CISTI)
NINT	National Institute for Nanotechnology
NMI	National Metrology Institute
NRC	National Research Council Canada
NRC-AMTC	Aerospace Manufacturing Technology Centre
NRC-ATC	Aluminium Technology Centre
NRC-BRI	Biotechnology Research Institute
NRC-CB	Commercialization Branch
NRC-CHC	Canadian Hydraulics Centre
NRC-CISTI	Canada Institute for Scientific and Technical Information
NRC-CPFC	Canadian Photonics Fabrication Centre
NRC-CSIR	Centre for Sustainable Infrastructure Research
NRC-CSTT	Centre for Surface Transportation Technology
NRC-GTL	Gas Turbine Laboratory
NRC-HIA	Herzberg Institute of Astrophysics
NRC-IAR	Institute for Aerospace Research
NRC-IBD	Institute for Biodiagnostics
NRC-IBS	Institute for Biological Sciences
NRC-ICPET	Institute for Chemical Process and Environmental Technology
NRC-IFCI	Institute for Fuel Cell Innovation
NRC-IIT	Institute for Information Technology
NRC-IMB	Institute for Marine Biosciences
NRC-IMI	Industrial Materials Institute
NRC-IMS	Institute for Microstructural Sciences

NRC-IMTI	Integrated Manufacturing Technologies Institute
NRC-INMS	Institute for National Measurement Standards
NRC-INH	Institute for Nutrisciences and Health
NRC-IOT	Institute for Ocean Technology
NRC-IRAP	Industrial Research Assistance Program
NRC-IRC	Institute for Research in Construction
NRC-PBI	Plant Biotechnology Institute
NRC-SIMS	Steacie Institute for Molecular Sciences
NSERC	Natural Sciences and Engineering Research Council of Canada
OAG	Office of the Auditor General of Canada
OECD	Organisation for Economic Co-operation and Development
OTEC	Ocean Technology Enterprise Centre
R&D	Research and Development
S&T	Science and Technology
SMEs	Small and Medium-sized Enterprises
SOFC	Solid Oxide Fuel Cells
STM	Scientific, Technical and Medical
TBS	Treasury Board of Canada Secretariat
TIS	Technology and Industry Support
TRIUMF	Tri-University Meson Facility

Section I – Agency Overview

Minister's Message

As Minister of Industry, I am proud to present this report on the National Research Council Canada's anticipated achievements and results over the next three years. Through the efforts of the National Research Council Canada (NRC) and its Portfolio partners, we are working to ensure that Canada has the necessary business and innovation environment to foster a culture of discovery and creativity to fuel economic success and support our enviable quality of life.

Today, we operate in a globalized economy where electronic commerce drives complex and interconnected supply chains from around the world and anyone can be our competitor. To thrive, we need a dynamic and adaptable economy — one with a highly trained work force and nimble businesses striving for competitive growth and development.

Looking ahead, we see the need to enhance Canada's business environment, including improving the critical ground rules that ensure stability, equitable conduct and competition for consumers, investors and businesses. Used strategically, these efforts can encourage investment in innovation, afford easier access to capital, support risk-taking and entrepreneurship, and ensure the efficient and productive allocation of resources.

We are working to reduce barriers to and within our markets and to encourage more domestic and foreign investment. We are supporting and defending our industries. We are working to improve business and consumer confidence. And we are supporting science, technology, research and development to encourage our industries, our businesses and our workforce to keep pace with technological change and drive innovation throughout our economy. And the demand for innovation across the Canadian economy — including in the areas of health care, climate change, productivity and the competitiveness of Canadian firms — continues to rise.

As presented in this report, NRC initiatives will help make Canada a better place to innovate and do business.

The Industry Portfolio consists of:
- Business Development Bank of Canada [1]
- Canadian Space Agency
- Canadian Tourism Commission [1]
- Competition Tribunal
- Copyright Board Canada
- Industry Canada
- National Research Council Canada
- Natural Sciences and Engineering Research Council of Canada
- Social Sciences and Humanities Research Council of Canada
- Standards Council of Canada [1]
- Statistics Canada

[1] Federal Crown corporations do not prepare Reports on Plans and Priorities.

It is my pleasure to present the *Report on Plans and Priorities* for the National Research Council Canada (NRC).

Maxime Bernier
Minister of Industry

Management Representation Statement

I submit, for tabling in Parliament, the 2006-2007 Report on Plans and Priorities (RPP) for the National Research Council Canada.

This document has been prepared based on the reporting principles and disclosure requirements contained in the *Guide to the preparation of Part III of the 2006-07 Estimates: Reports on Plans and Priorities and Departmental Performance Reports:*

- It adheres to the specific reporting requirements outlined in the Treasury Board Secretariat guidance;
- It is based on the department's approved Program Activity Architecture structure as reflected in its MRRS;
- It provides consistent, comprehensive, balanced and accurate information;
- It provides a basis of accountability for the results achieved with the resources and authorities entrusted to it; and
- It reports finances based on approved planned spending numbers from the Treasury Board Secretariat in the RPP.

Name: _____

Title: _____

NRC's Business (Summary Information)

Raison d'être

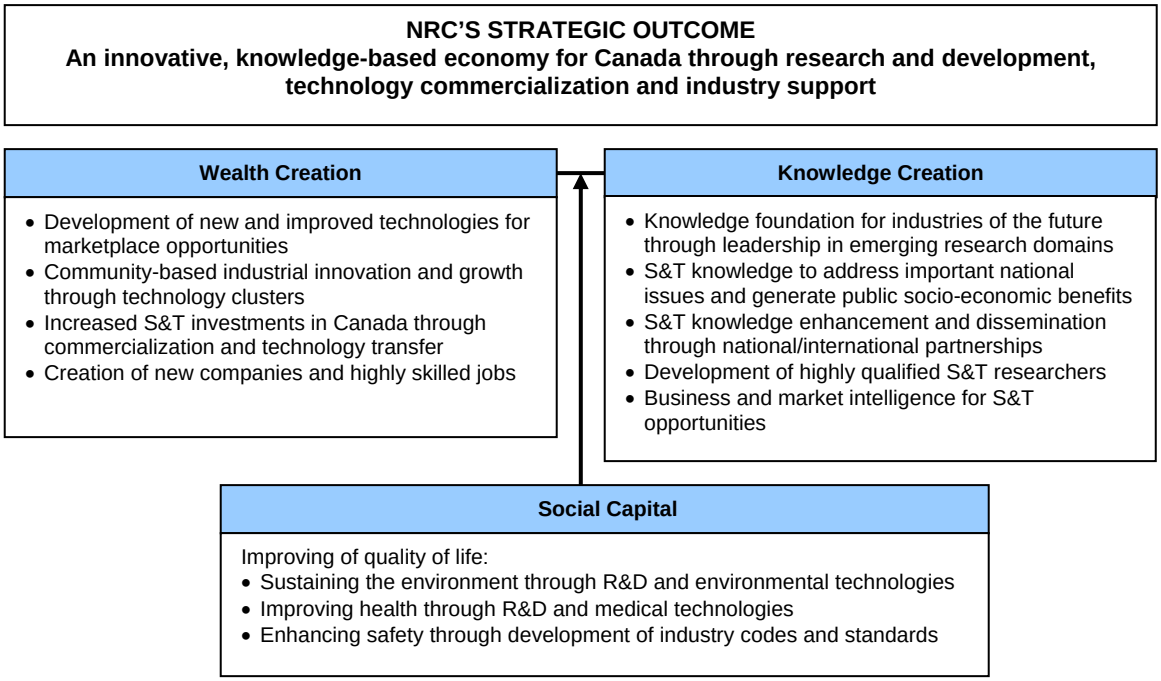
NRC is the Government of Canada's leading resource for Science and Technology (S&T) development. NRC's primary business is:

- Improving the social and economic well-being of Canadians.
- Providing technology and industry support for industrial innovation and growth.
- Supplying excellence and leadership in research and development (R&D).

NRC Benefits to Canadians

NRC delivers on its strategic outcome by creating wealth, knowledge and social capital for Canadians.

Figure 1-1: NRC Benefits to Canadians



NRC Alignment with Canada's Performance

NRC has a long history of making valuable scientific discoveries that strengthen Canadian industry and contribute to the well-being of Canadians and others worldwide. NRC's Vision 2006 supports two main Government of Canada priorities as outlined below.

A Sustainable Economy

"A better life for all Canadians is the highest priority for the government. To ensure our long-term prosperity, we need to increase our productivity."[1] . Global leadership in science and technology, education and commercialization are the cornerstones to achieving this objective. Through its dedication to excellence in research and development and its focus on technology cluster growth, knowledge transfer and the development of outstanding people through education and training, NRC is a key contributor to a sustainable, innovative and prosperous economy.

Canada's Place in the World

Canada seeks to play a major role in meeting the economic, health, environmental and security challenges facing the world. NRC supports all of these goals –combining leading-edge research in key areas such as genomics, health, sustainable technologies and the environment with a strong focus on global reach and international research collaborations to develop the scientific and technological advances needed to enhance the quality of life of Canadians and others around the globe.

NRC Plans and Priorities

Putting Plans and Priorities into Context - NRC's Operating Environment

NRC Unique Attributes

NRC has:

- A national S&T infrastructure positioned to: improve Canada's innovation capacity in existing and emerging fields of research; build networks for researchers and businesses; train highly qualified personnel; create new technology-based companies and jobs; and transfer knowledge and technology to Canadian companies.
- A core strength of over 4,000 talented and dedicated people, 19 research institutes, 15 industrial partnership facilities, the Industrial Research Assistance Program (NRC-IRAP), the Canada Institute for Scientific and Technical Information (NRC-CISTI) and two technology centres.
- The ability to help companies move from discoveries in the laboratory to the development, prototyping and commercialization of these ideas and technologies for the global marketplace.
- The skills to manage research towards short and long-term specific goals.
- The capability to bring together multi-disciplinary research teams to tackle issues of national importance.
- The ability to put together national programs for delivery in regions across the country.

National S&T Infrastructure

NRC delivers a national S&T program with laboratories, centres and facilities in communities across Canada (http://www.nrc-cnrc.gc.ca/contactIBP_e.html).

Ownership, Management and Maintenance of Capital Assets

Responsible for its own highly technical and complex operations, NRC manages 175 buildings totalling approximately 517,406 square metres of space.

[1] http://www.fin.gc.ca/budget06/speech/speeche.htm, The Budget Speech (May 2006), The Honourable James M. Flaherty, Minister of Finance.

Funding

NRC is funded through government appropriations. In the course of providing technical services to companies and other organizations, it recovers its costs for the purpose of reinvesting in the operation and maintenance of equipment and facilities.

Table 1-1: NRC Resources for the Planning Period

NRC Resources	2006-2007	2007-2008	2008-2009
Financial Resources ($ millions)	714.1	659.7	651.4
Human Resources (Full-Time Equivalents – FTEs)	4,033	4,090	4,141

NRC New Strategic Direction: Building a Roadmap for Future Sustainability

NRC launched a new Vision and strategic plan in 2006-07, "Science At Work for Canada: A Strategy for the National Research Council 2006-2011", that will guide the organization successfully over the next five to ten years. The new strategic plan builds on insights gained through the NRC Renewal Initiative, which included a foresight exercise and extensive internal and external consultations to define the organization's future opportunities and new directions.

Under the plan, NRC will anticipate and respond to important national priorities such as sustainable energy, healthy Canadians, safe and connected communities, protecting and managing our natural resources, and strong, productive and competitive industrial sectors by engaging innovation system participants in multi-stakeholder collaborations and developing key competencies that will position NRC for the future. Recognizing that multi-stakeholder partnerships and horizontal initiatives are increasingly necessary to marshal effective responses to government priorities, NRC will continue to work closely with other science-based departments and agencies on cross-cutting issues such as climate change, oceans management, genomics and public security.

From an operational perspective, NRC will continue to explore ways to sustain its asset base in the face of annual inflationary pressures, aging buildings and equipment and a static core budget. The organization will also focus on strengthening its management systems and financial base for future sustainability. This will include continuing to address recommendations made by the Office of the Auditor General of Canada (OAG) in its March 2004 Report and by the Government Expenditure Review. NRC prides itself on being an adaptable, flexible organization. These attributes will be particularly important in the years ahead as NRC strives to deliver the best results possible for Canadians. Figure 1-2, Strategic Framework for NRC Plans and Priorities, highlights NRC's plans and priorities for the next three fiscal years and Table 1-2 provides information on planned strategies.

Figure 1-2: Strategic Framework for NRC Plans and Priorities

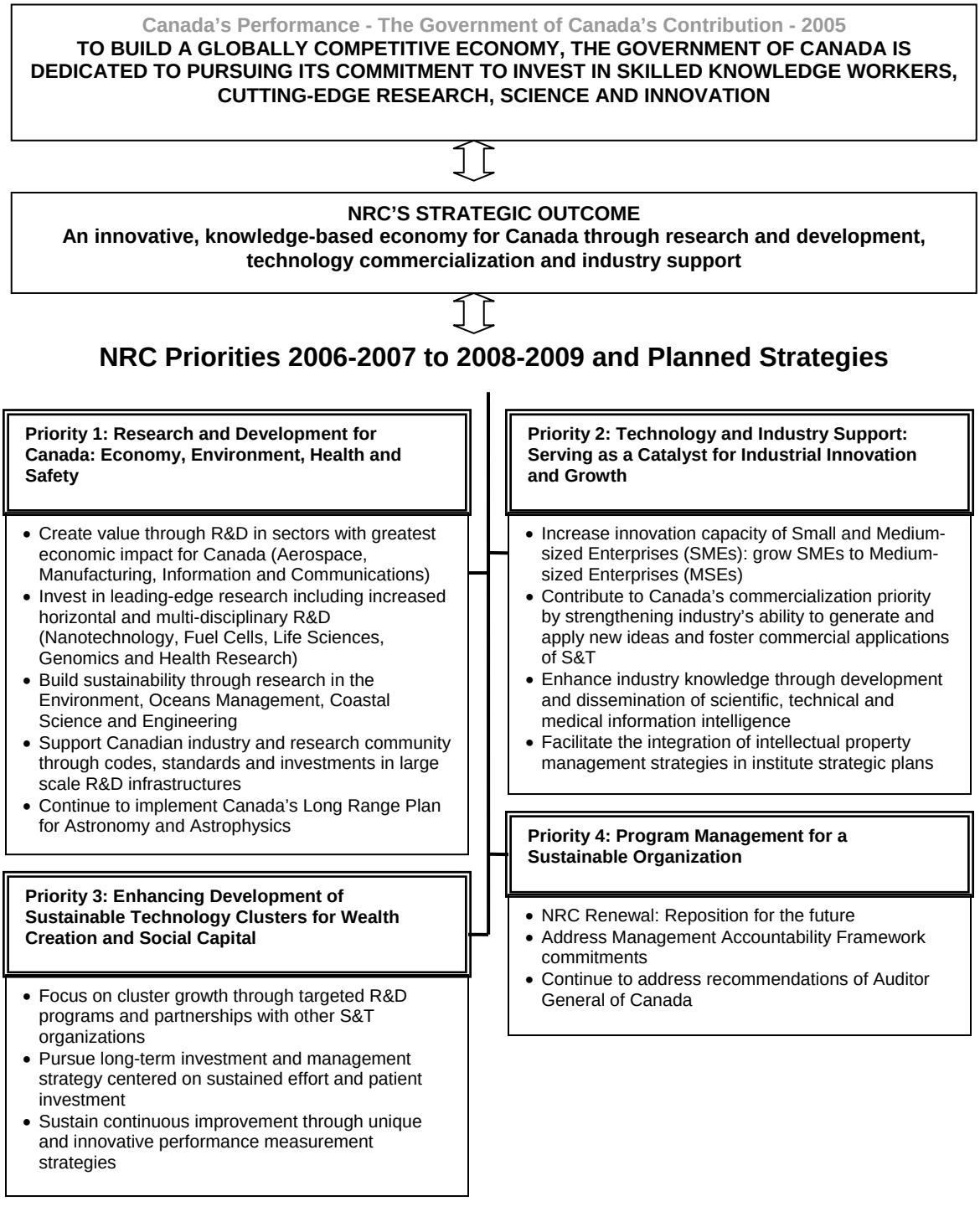


Table 1-2: NRC Business and Management Priorities for the Planning Period

NRC's Strategic Outcome: An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support		Planned spending ($ millions)		
Priorities and Type	Program Activity/ Expected results	2006-2007	2007-2008	2008-2009
Priority no. 1 Research and Development for Canada: Economy, Environment, Health & Safety Type: ongoing	Program Activity: Research and Development Expected results: • Leadership in new and emerging research domains • Excellence in R&D and innovation • Stewardship of large-scale S&T infrastructure • Contribution to federal strategies and initiatives • Research that benefits Canadians • Harmonization of international standards • New international S&T alliances	390.66	369.08	369.31
Priority no. 2 Technology and Industry Support: Serving as a Catalyst for Industrial Innovation and Growth Type: ongoing	Program Activity: Technology and Industry Support Expected Results: • Creation of new technology-based companies • Access to new technologies for Canadian firms through patents and licensing • Enhanced innovation capacity of firms • Improved dissemination of knowledge • Supporting the Canadian Industry	179.22	191.04	190.82
Priority no. 3 Enhancing Development of Sustainable Technology Clusters for Wealth Creation and Social Capital Type: previously committed	Program Activity: Research and Development and Technology and Industry Support Expected Results: • Competitive research and development base for cluster development • Innovative firms and deep talent pools in regions across Canada • Community ownership of cluster initiatives – local leadership and strategies • Improved quality of life through increased productivity and new technology-based solutions in health, for industry, the environment, etc.	75.89	29.54	22.00

NRC's Strategic Outcome: An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support		Planned spending ($ millions)		
Priorities and Type	Program Activity/ Expected results	2006-2007	2007-2008	2008-2009
Priority no. 4 Program Management for a Sustainable Organization Type: ongoing	Program Activity: Research and Development* and Technology and Industry Support* *Program Activities' contributions to this priority are significantly supported by NRC's Corporate Branches which provide policy, program advice and executive support for the coordination and direction of NRC's operations and its governing Council. The Corporate Branches also specialize in finance, information management, human resources, administrative services and property management, and corporate services.	68.28	70.06	69.28
	Expected Results: • Establishment of clear corporate strategic direction • Enhanced corporate governance • Enhanced decision support • Effective research management practices • Long-term stability of financial, human and capital resources • Effective communications with NRC stakeholders			

Priority 1	Research and Development for Canada: Economy, Environment, Health and Safety

Research and innovation are critical to Canada's future economic growth and an improved quality of life for Canadians. As Canada's foremost R&D agency, NRC concentrates its efforts on two vital elements of R&D excellence: quality and relevance. For the planning period, NRC will play a key role in helping Canada reach its full potential in research performance in fields that are of current and future importance to the Canadian economy and that address important public and Government priorities. To achieve this, NRC will work in collaboration with industry, university and government partners in Canada and abroad. Creating value from knowledge, providing a national S&T infrastructure, maintaining and fostering international alliances and supporting the commercialization of federal R&D are integral parts of NRC's business.

Planned Strategies

Over the planning period, NRC will:

- Create value through R&D in sectors with the greatest economic impact for Canada (Aerospace, Manufacturing, Information and Communications Technologies)
- Invest in leading-edge research including increased horizontal and multi-disciplinary R&D (Nanotechnology, Fuel Cells, Life Sciences, Genomics and Health).

- Build sustainability through research in the Environment, Oceans Management, Coastal Science and Engineering.
- Support Canadian industry and the research community through codes standards and investments in large-scale R&D infrastructures.
- Continue to implement Canada's Long Range Plan for Astronomy and Astrophysics.

Plan Rationale / Key Influencing Factors

Aerospace, Manufacturing and Information and Communications Technologies (ICT) are important economic engines for Canada: Canada's aerospace sector is the country's leading advanced technology sector, investing $900 million [2] in R&D. Its annual output of $21.5 billion makes Canada the third largest global supplier after the United States and the European Union. In 2003, Canada's manufacturing sector contributed 17% of GDP, 70% of total exports and represented almost 62% of private industrial R&D[3]. Canada is a significant player in the global ICT industry. Canada's 32,000 ICT companies employ more than 579,000 skilled Canadian workers and generate over $125 billion in revenues[4]. The communication equipment manufacturing sector alone is the largest R&D spending industry, representing 12.1% of total R&D spending in Canada.[5]

Nanotechnology is a strategically important area of research for Canada with substantial potential application and economic value for Canadians – The rich diversity of invention enabled by nanotechnology may allow revolutionary developments in medicine, materials, pharmaceuticals, and electronics. The economic and social impact of nanotechnology may be profound: discoveries and applications of nanotechnology could lead to a new industrial revolution in the coming century, and to commercial markets as large as $1.5 trillion per year within 10-15 years. Nanotechnology is a fast-growing and revolutionary field in which Canada needs to build and sustain world leadership. NRC is helping Canada stake its place in nanotechnology through its research in applications for medical devices, electronics, fuel cells and construction materials and the development of its new National Institute for Nanotechnology (NINT) – a partnership with the University of Alberta and the Province of Alberta.

Life Sciences, Genomics and Health research are fundamental to addressing critical public concerns such as controlling and fighting infectious diseases, developing more effective drug therapies, diagnostic tools and equipment – The global market for life sciences is estimated at $500 billion and is growing at 20% annually.[6] NRC has had significant success in this research area, providing important value to Canada and the world, including a number of world-firsts such as a non-invasive test for colon cancer and a new vaccine against meningitis C.

Climate change, future energy sources and the environment continue to be major national issues – Climate change exposes Canada to significant risks. The disruption of ocean currents and weather patterns threaten habitats and coastal regions. Elimination of toxins from our air, water and soil and the production and use of more clean and efficient sources of energy are also issues of concern. A number of NRC research programs (e.g. ocean science, biotechnology, manufacturing, construction, aerospace, chemical processes and environmental technology) focus on the physical environment and ways to reduce and reverse industrial environmental impacts.

[2]Statistics Canada, Industrial Research and Development, 2004 Intentions, Cat. No 88-202-XIE
[3]Industry Canada, Industrial Analysis Branch, Sept. 2004
[4]http://strategis.ic.gc.ca/epic/internet/inict_c-g_tic.nsf/en/home
[5]Statistics Canada, Service Bulletin, June 2005, Cat. No. 88-001-XIE
[6]NRC Atlantic Initiatives: Building Technology Clusters, 2004. *Life Sciences* National Research Council Canada, p. 9

Over the coming year, the Minister of Industry will be developing a science and technology strategy, in collaboration with the Minister of Finance, that will encompass the broad range of government support for research, including knowledge infrastructure.[7] NRC's focus on expanding horizontal and multi-disciplinary R&D across the organization and with other federal S&T organizations will support this strategy – NRC research is dismantling longstanding barriers between many different research domains (i.e. life sciences and information technology) to create powerful new technology platforms and partnerships to serve the interests of Canadian society and businesses. NRC is also actively working with other science-based departments and agencies to address horizontal management issues related to federal S&T collaborations and infrastructure renewal. NRC is participating in a number of S&T initiatives with other government organizations to combine efforts to better meet federal priorities such as the Canadian Biotechnology Strategy, Ocean Action Plan, the Chemical, Biological, Radiation and Nuclear Research and Technology Initiative and others.

Priority 2	Technology and Industry Support: Serving as a Catalyst for Industrial Innovation and Growth

The forces of globalization are placing increasing pressure on Canada's competitiveness – making innovation an imperative for economic survival. In 2004, Canada's ratio of Gross Expenditures in Research and Development (GERD) to Gross Domestic Product (GDP) (1.91%) fell short of the Organisation for Economic Co-operation and Development (OECD) average of 2.24%.[8] While Canada's Industrial Research and Development spending is set to rise 1.6%, $13.8 billion, in 2005[9] it remains 3.3% below the peak level of $14.3 billion observed in 2001.

In Canada 97.6% of firms have fewer than 100 employees, the majority of which do not have the resources or the capacity to either develop their own or contract out significant R&D projects. With its industrially-focused technology support, NRC's role becomes even more important. For the planning period, NRC will build upon its critical mass and expertise in key technologies, knowledge transfer mechanisms, business support facilities and services across Canada to strengthen innovation and growth in Canadian businesses. It will also continue to develop strategic initiatives to help Canadian businesses better compete in the global marketplace.

Planned Strategies

Over the planning period, NRC will:

- Increase the innovation capacity of small and medium-sized enterprises (SMEs)[10]: grow SMEs to Medium-sized enterprises (MSEs).
- Contribute to Canada's commercialization priority by strengthening industry's ability to generate and apply new ideas and foster commercial application of S&T.
- Enhance industry knowledge through development and dissemination of scientific, technical and medical information and intelligence.
- Facilitate the integration of intellectual property management strategies in institute strategic plans.

[7] Budget 2006: Focusing on Priorities, May 2006, http://www.fin.gc.ca/budget06/bp/bpc3be.htm
[8] OECD, Main Science and Technology Indicators, GERD as a percentage of GDP, p.18, Volume 2005/1
[9] Statistics Canada, Service Bulletin, Science Statistics, Industrial Research and Development, June 2005
[10] Firms having 500 or fewer employees

Plan Rationale / Key Influencing Factors

NRC is contributing to the Government of Canada's commercialization priority – NRC is examining commercialization from three perspectives: talent, ideas and capital. It is doing so to ensure continued progress and success in a broad set of commercialization activities for firms that include: access to knowledge, expertise and technology licensing; provision of pre-commercialization assistance, mentoring and business intelligence; access to vital national and international networks, knowledge and expertise; assistance in creating new products and / or technologies; new company creation where there is no outside receptor capacity; and the development and nurturing of unique technology clusters across Canada. NRC will build on these strengths to develop strategic initiatives with key partners.

SMEs are a key source of innovation for Canada but challenges still exist – SMEs are predominant in Canada's economy (99% of all Canadian businesses), yet their full potential remains remarkably untapped. SMEs, especially innovative ones, can make important contributions to Canada's economic performance, notably in terms of increased employment and productivity. However, SMEs are struggling to survive and grow. The survival rate of new companies is low – only 32% survive after five years in business. In Canada, 91% of firms with fewer than 20 employees remained in the same employment size category between 1991 and 2001.[11] The majority of SMEs are also slow adopters of new technologies due to their limited financial resources and difficulty in obtaining R&D financing. Continued support of SMEs is essential to building Canadian industrial innovation and growth.

Priority 3	Enhancing Development of Sustainable Technology Clusters for Wealth Creation and Social Capital

Dynamic economies based on niche technologies are emerging in communities and regions around the world. Driven by cooperation and a shared vision between stakeholders, many of these technology clusters receive critical support from associations, public research institutions and governments. As these micro-economies mature (often over 15 to 20 years) they can foster significant local and regional growth – accelerating company expansion, spurring the emergence of new firms and attracting dynamic talent to the region. Canada faces unique economic challenges with its vast geography, relatively small population and predominance of SMEs.

Over the last five years, the Government of Canada has provided resources to support emerging technology clusters in a number of communities across Canada. Continuing with this strategy, it has provided NRC with $110 million in additional funds over the next five years to further develop its cluster initiatives in Atlantic Canada. NRC will continue to nurture cluster growth in the Atlantic region by providing specialized research and development capabilities and encouraging commitment and leadership among cluster partners. NRC will also be seeking to renew its funds in 2006-2007 for its other technology cluster initiatives in Eastern, Central and Western Canada (Round II Clusters).

[11] Statistics Canada, Business Dynamics in Canada, 2005

Planned Strategies

Over the planning period, NRC will:

- Focus on cluster growth through targeted R&D programs and partnerships with other S&T organizations.
- Pursue long-term investment and management strategy centered on sustained effort and patient investment
- Sustain continuous improvement through unique and innovative performance measurement strategies.

Plan Rationale / Key Influencing Factors

NRC is actively supporting the Government of Canada's priority for regional and economic development through community-based technology cluster initiatives – NRC's technology cluster activities build on existing local strengths by: undertaking R&D that responds to cluster needs; collaborating with partners (particularly firms); fostering networking; and providing industry with access to pre-commercialization assistance, such as incubation opportunities and financial and technical advisory services.

Development of sustainable technology clusters requires attraction and retention of sustained resources from key cluster stakeholders – Dynamic technology clusters require specialized infrastructure, highly-qualified people, risk capital and the ongoing and active support of local stakeholders to sustain growth and generate economic and social benefits to Canadian communities.

NRC is implementing new tools and approaches to track the growth of the clusters – NRC has developed a unique cluster measurement approach that collects comprehensive data on cluster development and the role of NRC. This cluster measurement approach will be used as part of the evaluation of NRC's Round II Clusters and will enable NRC and its partners to track cluster growth over time and identify areas for concerted action.

Priority 4	Program Management for a Sustainable Organization

The ability to perform at the leading-edge of R&D and to support Canadian industry in becoming more technology intensive and innovation-driven requires the best available equipment and facilities and highly qualified scientists, engineers, technicians and other professionals. NRC faces challenges in sustaining these key resources and will continue to focus on strategies to address these challenges.

Planned Strategies

Over the planning period, NRC will:

- Reposition for the future through the NRC Renewal initiative;
- Address its Management Accountability Framework commitments; and
- Continue to address the recommendations of the Auditor General of Canada.

Plan Rationale / Influencing Factors

Looking forward: science and technology for the 21st century – NRC will build on the successes and lessons learned from implementing Vision 2006 – reviewing the value and continuing relevance of its activities and refocusing its research efforts as appropriate. NRC's Renewal Initiative has included foresight enquiry, studies of global and national challenges, national stakeholder consultations and dialogue with the federal science community and central agencies about the role and expectations for NRC. All these activities have widened the range of strategies being considered by NRC's management. The results were crafted into a new vision and strategic direction in the Spring of 2006. Since then, the Renewal Initiative has moved into Phase 4 to focus on the implementation and monitoring of NRC's new strategic plan.

Taking action to be a more flexible, adaptable organization – Today's organizations must be able to make timely decisions in order to respond quickly and appropriately to constantly changing external opportunities, challenges and risks. NRC will continue to develop an integrated planning, risk and performance management solution to support effective decision-making and priority-setting by senior management and NRC institutes, programs and branches.

Need for attraction, training and retention of highly qualified personnel – The core of NRC's performance and success is the knowledge, imagination, dedication and creativity of its staff and its ability to attract, train and retain highly qualified S&T people. NRC faces stiff competition from around the world in attracting researchers. In addition, about 25% of NRC's S&T professionals and over 38% of NRC's management cadre will be eligible for retirement in the next five years.

Need for increasing horizontal S&T linkages among S&T-based departments and agencies – The Government is striving to increase horizontal S&T linkages among S&T-based departments and agencies to ensure the effective optimization of federal S&T investments. To this end, NRC is actively involved in the S&T Integration Board and the Senior ADM Advisory Committee (SAAC). To optimize its future performance, NRC will need to manage its human resources along cross-functional, cross-organizational and multi-disciplinary lines.

Addressing significant budget pressures around NRC's on-going operations, buildings and equipment – Through its Renewal Exercise, NRC is formulating a long-term financial strategy to deal with significant pressures ranging from a relatively flat A-base (operating and capital) over the past decade to ever-increasing facilities and equipment pressures arising largely out of the rapid pace and evolution of science and technology, higher industry standards, and the natural ageing of our infrastructure. A Long-Term Capital Plan is under development, looking at the challenges of maintaining and repairing 175 buildings across the country, 60% of which were constructed over 30 years ago. Furthermore, NRC continues to address significantly rising energy costs. Despite a number of innovative measures to achieve energy savings, these costs have risen from $19 million in 1998-99 to $32.25 million in 2004-05. A sound financial strategy is an essential cornerstone of NRC's immediate and long-term capacity to contribute to Canada's productivity, standard of living, and other key national priorities. Priority-setting and resource allocation decisions will be central to this strategy.

Addressing recommendations made by the Office of the Auditor General of Canada and Management Accountability Framework commitments – NRC will continue to address the Auditor General's recommendations in regard to NRC's corporate governance and strategic direction, research management at the institute level, human resources management and performance measurement and reporting. NRC's integrated planning, risk and performance management solution will be an important business process that will address the Auditor General's recommendations and the organization's Management Accountability Framework commitments.

Section II – Analysis of Program Activities

This section provides an overview of NRC's Program Activities (based on the new Program Activity Architecture established in 2004) and how they will be contributing to the organization's priorities and strategic outcome - *an innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support*.

Overview of Program Activities

NRC Program Activities are structured along two business lines (Research and Development, and Technology and Industry Support). These provide a balance between conducting R&D and delivering technical and innovation support services to industry and the public.

Table 2-1: Program Activity Profiles

<table>
<tr><td colspan="6">NRC's Strategic Outcome:
An innovative, knowledge-based economy for Canada through research and development, technology commercialization and industry support</td></tr>
<tr><td colspan="3">Research and Development</td><td colspan="3">Technology and Industry Support</td></tr>
<tr><td colspan="3">Description:
Includes research programs, technology development initiatives and management of national science and engineering facilities. These efforts all focus on key technological and industrial areas of Canada's economy where NRC has specific roles and recognized competencies, and where it can have a significant impact.</td><td colspan="3">Description:
Includes dissemination of scientific, technical and medical information; provision of innovation assistance and engineering and technology-based facilities; contributions to the commercialization process; intellectual property management; new company creation and strategic partnerships for Canadian SMEs, NRC institutes, the public and other government research organizations.</td></tr>
<tr><td colspan="3">Objectives:
1) Achieve sustained knowledge-based economic and social growth in Canada through R&D and innovation in key areas; and 2) Provide efficient, client-focused services that enhance NRC's effectiveness as an integrated S&T organization.</td><td colspan="3">Objectives:
1) Improve the innovative capability of Canadian firms; 2) Stimulate wealth creation for Canada through technological and financial assistance, information and access to other relevant resources; and 3) Provide efficient, client-focused services that enhance NRC's effectiveness as an integrated S&T organization.</td></tr>
<tr><td colspan="3">Financial Resources ($ millions)</td><td colspan="3">Financial Resources ($ millions)</td></tr>
<tr><td>2006-2007</td><td>2007-2008</td><td>2008-2009</td><td>2006-2007</td><td>2007-2008</td><td>2008-2009</td></tr>
<tr><td>508.9</td><td>447.3</td><td>439.4</td><td>205.2</td><td>212.4</td><td>212.0</td></tr>
<tr><td colspan="3">Human Resources (FTEs)</td><td colspan="3">Human Resources (FTEs)</td></tr>
<tr><td>2006-2007</td><td>2007-2008</td><td>2008-2009</td><td>2006-2007</td><td>2007-2008</td><td>2008-2009</td></tr>
<tr><td>3,148</td><td>3,192</td><td>3,237</td><td>885</td><td>898</td><td>904</td></tr>
</table>

NRC Programs

During the planning period, in addition to its specific Research and Development and Technology Industry Support activities, NRC will be focusing its efforts on programs that also support important Canadian priorities. Many of these are horizontal, multi-disciplinary, cross-organizational initiatives that encompass a number of NRC entities (e.g. research institutes, laboratories, centres, facilities, programs and services). These collaborative programs address the Government's priorities on optimizing its S&T investments and expanding its value and reach. Examples of NRC's programming efforts in these areas can be found in the following "program spotlights" sections:

- The Genomics and Health Initiative (GHI) – See page 19
- The Industrial Research Assistance Program (NRC-IRAP) – See page 24
- The Canada Institute for Scientific and Technical Information (NRC-CISTI) – See page 26

Contribution of Program Activities to NRC Plans and Priorities

Priority 1	Research and Development for Canada: Economy, the Environment, Health and Safety
Key contributor	Program Activity: Research and Development
Planned results (Results expected over the long term)	• Leadership in new and emerging research domains • Excellence in R&D and innovation • Stewardship of large-scale S&T infrastructure • Contribution to federal strategies and initiatives • Research that benefits Canadians • Harmonization of international standards • New international S&T alliances
Performance Indicators (To assess progress against Planned Results)	• Technology transfer (patents, licences) • Spin offs/ ins • Publications in refereed journals / proceedings and technical reports • Citations comparison • External grants • Leadership and contribution to federal horizontal initiatives • Multi-researcher networks and centres of excellence • Number and value of international collaborative agreements

The Research and Development portfolio will contribute to areas that are recognized as priorities for Canada through its core strengths: national research institutes and innovation dedicated to technology fields important to Canada; value creation through knowledge and technology transfer; the pursuit of leading-edge and integrated research in emerging cross-disciplinary fields; and the creation of economic and social benefits for Canadians. Continued support of Canadian industry and the research community through codes and standards, access to national facilities and stewardship of Canada's "big science" will remain an underlying foundation to global marketplace access and international R&D alliances. The portfolio will also continue to develop new technologies leading to commercialization opportunities for Canadian industry.

PLANNING HIGHLIGHTS

Strategy: Creating value through R&D in sectors with the greatest economic impact for Canada

Facilitate technology advantage for next generation aerospace industry – Two new research groups have been introduced to existing NRC's Institute for Aerospace Research (NRC-IAR) capability in aerodynamics, structures and materials performance and flight research. The NRC's Aerospace Manufacturing Technology Centre (NRC-AMTC) works with SMEs to develop and implement modern next-generation aerospace manufacturing methods that have potential for significant cost savings. The NRC's Gas Turbine Laboratory (NRC-GTL) conducts research in technologies related to aerospace propulsion and ground-based gas turbine engines.

Position Canadian industry as a key player in advanced manufacturing – Collaboration with industrial, university and government partners in virtual and reconfigurable manufacturing and precision and freeform fabrication will continue to be part of the Integrated Manufacturing Technologies Institute (NRC-IMTI) portfolio. These efforts are designed to help Canadian firms develop and market new leading-edge manufacturing systems and integrated technologies worldwide for application in the automotive, aerospace, medical and electronics, machinery and equipment sectors. The Institute for Chemical Process and Environmental Technology (NRC-ICPET) will continue to focus on two major research thrusts: energy-oriented processes and solution-driven materials, targeting applications in the oil sands, fuel cell and bioproducts industries. The Industrial Materials Institute (NRC-IMI) will continue to focus on the materials processing and forming industry, performing R&D and providing open laboratories and partnership opportunities to innovative companies.

Reduce industry risks and costs of working on next generation information and communications technology – Enabling technologies related to future hardware and software (Pathfinder, 3D Imaging) requirements for information processing, transmission acquisition and display are being developed through collaboration between the Institute for Information Technology (NRC-IIT) and the Institute for Microstructural Sciences (NRC-IMS). Staff from both institutes participate in over 100 national level committees, contributing expertise to government-funded initiatives such as NSERC, PRECARN and CANARIE.

NRC-IIT's participation in the Language Technologies Research Centre (LTRC) – in collaboration with the Université de Québec en Outaouais, Canada Economic Development for Quebec Regions (CED) and the Translation Bureau – is now in its capacity building phase. Construction has begun on a new building to house the LTRC partners, including NRC-IIT's Language Technologies group. Co-funded by the provincial government and CED, the building should be completed in 2006. The LTRC focuses on developing new technologies related to translation, multilingual content management, language training and speech processing. A key activity for 2006-2007 will be the PORTAGE project, which aims to develop state-of-the-art software to permit computer translations from one human language to another.

Strategy: Invest in leading-edge research including increased horizontal and multi-disciplinary R&D

Supporting Canada's leadership in Fuel Cells - The Fuel Cell and Hydrogen Program mobilizes fuel cell expertise and research strength from a network of NRC research institutes across Canada. A total of $6.2M over five years from 2003-04 to 2007-08 has been allocated to NRC and will be applied to its Fuel Cell and Hydrogen Program – a key horizontal initiative. In 2005-06, 12 projects at six NRC institutes were approved. These will be the focus of research during the planning period. Each participating institute will work with regional R&D providers, universities, government agencies and local industry to support the development of regional fuel cell clusters. By linking these institutes through a coordinated national program, the NRC will help build a strong Canadian fuel cell industry.

The Institute for Fuel Cell Innovation (NRC-IFCI) will play a key role in fuel cell and hydrogen research through the development of next generation Polymer Electrolyte Membrane Fuel Cells and Solid Oxide Fuel Cells aimed at reducing fuel cell costs and improving reliability and durability. NRC-IFCI's Technology Centre and its Incubation/Acceleration and Networking Facility will also provide a focus for integrated technology demonstrations and industry-university-government partnerships. NRC-ICPET's fuel cell-related projects will focus on polymeric materials of fuel cell applications, virtual engineering of fuel cells, advanced materials research for an intermediate temperature Solid Oxide Fuel Cell and electrocatalysis. In total, these integrated research activities represent over $13 M in annual support for Canada's fuel cell and hydrogen industry.

Increase synergies in biomanufacturing and bioprocessing – NRC's Biotechnology Research Institute (NRC-BRI) and Laborium ™ Biopharma Inc. renewed their strategic alliance in August 2005 to offer complementary services in biomanufacturing. The company will build a current Good Manufacturing Practices (cGMP) facility on NRC-BRI premises to manufacture Phase I and II therapeutic proteins. NRC-BRI will conduct additional research for developing and improving biomanufacturing methods and train bioprocessing specialists for the company. The institute is also collaborating with McGill University and John Abbott College to develop and train a specialized biomanufacturing workforce for Canada. McGill and John Abbott will develop curriculae in bioprocessing while NRC-BRI will train the specialists at its bioprocessing facilities.

Support health for Canadians: Vaccines, immunology and neurodegenerative diseases – Building on the success of its meningitis C vaccine for people of all ages, NRC's Institute for Biological Sciences (NRC-IBS) will continue to address important public health concerns through the application of neuro- and glycosciences to reduce the impact of age-related and infectious diseases by, among other things, developing an effective vaccine against Alzheimer's disease and conducting research on brain repair solutions through a new neuroglycobiology program. It will also continue its collaboration with Dow AgroSciences to reduce the load of food-borne pathogens in animals thereby contributing to the safety of the world's meat supply.

Support National Security – Chemical Biological Radiological Nuclear (CBRN) Research Technology Initiative – In May 2002, as a response to the events of 9/11, the Government of Canada allocated $170 million to the Department of National Defence (Defense Research and Development Canada) to help Canada respond to chemical, biological, radiological and nuclear

incidents through the CBRN Research and Technology Initiative (CRTI). NRC is the lead on one project and participates in three others. In partnership with the Steacie Institute for Molecular Sciences (NRC-SIMS), Laval University, Health Canada and DRDC Suffield, NRC-IMI will design and fabricate plastic-based substrates and devices for micro-magnetic manipulation for detection purposes.

Integrate nanotechnology research and innovation – NRC's nanotechnology research is targeted at three main application areas that directly impact Canadian competitiveness: new materials and coatings; quantum devices for next generation computing and communications; and novel nanostructure devices for photonic, sensing and biological applications. For example, the Institute for Construction (NRC-IRC) is applying nanotechnology science to enhance concrete placement technology, a contributing factor in the sustainable development of the built environment. In other areas, the Industrial Materials Institute (NRC-IMI) is conducting research on alternative fabrication of nanomaterials supported by its NanoImprint Lithography Prototyping Facility. This R&D and prototyping facility will support companies in commercializing innovative products.

To build its competencies and leverage its resources and knowledge, NRC will develop a horizontal nanotechnology program that will increase the integration of expertise across the NRC as well as facilitate collaborations with external partners, including other government departments, universities and industry. The program will work in concert with a nascent nanotechnology network growing around the National Institute for Nanotechnology (NINT), in which specialized nano centres across Canada are linking together to share information and enable collaborative ventures. It is expected that the program will not only increase Canadian capacity in nanotechnology but will prove to be a training ground for young researchers entering this important new sector. In the context of its renewal exercise, NRC will select a limited number of projects of focus in the first year, growing the program over a five-year period. Projects will be cross-disciplinary in nature and will involve multiple collaborators.

Program Spotlights - NRC Genomics and Health Initiatives (GHI): Address key social and economic challenges through integrated Genomics and Health Research

Description: NRC conducts over half of all biotechnology research performed by the federal government and is a major player in the Canadian Biotechnology Strategy, contributing to important advances in genomics, proteomics and health research through NRC's Genomics and Health Initiative (NRC-GHI). NRC-GHI was established in 1999 to strengthen NRC's capabilities in genome and health science, integrate research capabilities across NRC, and contribute to national genomics and health research efforts in collaboration with other federal agencies, industries and universities. NRC-GHI currently comprises six large-scale and diverse biotechnology research programs, supported by three technology platforms (DNA Microarray, DNA Sequencing and Proteomics). NRC-GHI is NRC's flagship horizontal life sciences initiative and currently involves ten NRC Institutes and more than 400 personnel.

Plans: In 2006-07, NRC-GHI will be entering the second year of its third phase of research activity. The initiative will continue to focus its efforts on six research programs oriented towards diagnosing, treating and preventing human and animal disease, developing technologies for pathogen detection, and advancing new technologies for cardiac care and the production of commercially valuable agricultural crops. NRC completed an evaluation of the Genomics and Health Initiative (GHI) in 2005-2006. The results of this study will feed into a broader evaluation of the interdepartmental Genomics R&D Initiative in 2005-2006 and 2006-2007. NRC is leading this evaluation on behalf of the six participating departments.

Recognized Program Management and Governance Process: NRC is committed to effective research program management practices and has integrated lessons learned from the first two phases of NRC-GHI to refine the competitive program selection process for the third phase. An external Expert Panel with industry representation has reviewed all program proposals for quality and relevance. NRC uses selection criteria that favour integration of research capabilities across institutes, collaboration with external partners in other government departments, academia and industry, as well as commercial potential. NRC has also instituted formal program management for all NRC-GHI programs, tracking progress against explicit milestones and deliverables; progress is evaluated quarterly as well as annually. A new comprehensive governance model for NRC-GHI was assembled for the third phase to ensure that various accountabilities and responsibilities are clarified and understood. Approved by NRC Senior Executive Committee, the NRC-GHI governance structure is being promoted as a model for horizontal programs within NRC.

Financial Resources

2006-2007	2007-2008	2008-2009*
$11.00 million	$11.00 million	$11.00 million

*$6 million of annual funding is subject to Treasury Board renewal

Planned Results: NRC-GHI has five primary goals:

- Create a knowledge base in genomics that will contribute to Canada's competitiveness in the 21st Century.
- Create and use new genomics or health-related technologies to support Canadian industrial sectors such as aquaculture, agriculture, environment and health.
- Support and participate in the development of sectoral, national and international genomics and health-related innovation networks.
- Foster increased cooperation and integration in genomics and health-related research and innovation programs across NRC and with public and private sector partners.
- Foster excellence in horizontal research program management and accountability.

Performance Indicators:

Stewardship

- Program progress and reporting of scientific output.
- Degree of integration between NRC research institutes in research program formation and activities; degree of collaboration with partners external to NRC in academia, other government departments and industry.

Economic Benefits

- Analysis and surveys indicating royalties, patents, licenses, spin-offs, and technology transfers (can only be measured in the mid-to-long term).

Citizenship Engagement

- In addition to website feedback, NRC-GHI will be hosting a NRC Partners in Education session. The session will be aimed at providing local high-school students with a better understanding of how NRC is contributing to Canada's genomics and health research sector.

Participating NRC Research Institutes (2006-2007): NRC-BRI, NRC-IIT, NRC-IBD, NRC-IMB, NRC-IBS, NRC-PBI, NRC-SIMS, NRC-IMI, NRC-NINT,
NRC-IMS

Website: http://ghi-igs.nrc-cnrc.gc.ca/

Strategy: Build sustainability through research in the Environment, Oceans Management, Coastal Science and Engineering

Continue to support Canada's commitment to reduce green house gas emissions and improve the environment[12] – A number of NRC research institutes and programs are applying their knowledge and competencies to climate change, energy, the environment and sustainable development. These research efforts include: NRC's Fuel Cell and Hydrogen Program, involving NRC's Institute for Fuel Cell Innovation (NRC-IFCI) and five other institutes; work on advanced materials and energy-efficient processes for manufacturing; NRC-IRC's development of new materials for buildings and construction and codes for sustainable municipal infrastructure; the application of biotechnology to the remediation contaminated lands and water; and development of new infrastructure in support of the aerospace sector (NRC-IAR's Gas Turbine Laboratory). A horizontal program on sustainable technologies is under development to capture the future opportunities identified in these areas by the NRC Renewal Initiative. NRC will continue to participate in the Program for Energy Research and Development and the Climate Change Technology and Innovation. It will also contribute to the federal energy S&T strategy led by Natural Resources Canada to ensure that its planned activities are aligned with federal priorities.

Build sustainability through oceans science – Canada's oceans are a strategic resource of prime importance to humanity, the environment and industry. An integral part of global climate and food supply systems, they are a rich source of energy, medicinal and mineral resources. The NRC's Institute for Ocean Technology (NRC-IOT) integrates advanced technologies to achieve innovative solutions to meet the challenges relating to safe and effective shipping, energy exploration and drilling and other human activities on the oceans. NRC-IOT and other institutes and centres provide broad research capabilities in oceans management, coastal science and engineering to ensure that Canada is able to deliver on its ambitious Ocean Action Plan (OAP). In 2005, NRC's Industrial Research Assistance Program (NRC-IRAP) received two-year funding under the umbrella of the OAP to contribute to networking efforts that promote oceans science and technology. This has led to the creation of the Ocean Science and Technology Partnership Organization (OPO), a federally-incorporated not-for profit entity that will encourage national linkages between regional oceans networks. Properly supported, these relationships will lead to increased and timely information-sharing, awareness-building and new technology demonstrations, partnerships and joint ventures.

Strategy: Support Canadian industry and research community through codes, standards and investments in R&D infrastructures

Harmonize international measurement standards – NRC's Institute for National Measurement Standards (NRC-INMS) is Canada's national metrology institute (NMI), determining standards and methods of measurement that impact directly on the ability of Canadian firms to trade

[12]As a Schedule II (*Financial Administration Act*) departmental corporation, NRC is not subject to the 1995 amendments to the *Auditor General Act* requiring the preparation of a Sustainable Development Strategy. However, NRC has an Environmental Management Policy to ensure that its operations contribute to sustainable development. NRC fosters the integration of sustainable development strategies and practices across Canada and in the innovation processes of Canadian SMEs.

internationally. NRC-INMS plays a vital role in assuring global market access to Canadian industry by reducing non-tariff trade barriers. The institute, in collaboration with the Standards Council of Canada, provides technical assessment services and certification of specific measurement capabilities to Canadian laboratories, which in turn perform 150,000 calibrations per year, primarily for Canadian manufacturers. Over 30 NRC-INMS personnel are now able to perform ISO/IEC audits as part of the Calibration Laboratory Assessment Service (CLAS) that certifies Canadian laboratories seeking ISO/IEC 17025 accreditation. Over the planning period, NRC-INMS will be accelerating its progress towards ISO 17025 accreditation for all its calibration and measurement services. INMS will also play a key role in the newly created ISO technical committee for nanotechnologies. Participation in early discussions in metrology for nanotechnology will be key to providing insights into measurement issues to the benefit of Canadian industry.

Objective-based model construction codes - clarity, flexibility and uniformity – NRC's Institute for Research in Construction (NRC-IRC), through the Canadian Codes Centre, ensures that the best available knowledge from across Canada and around the world is utilized in the development of the national building code. In mid-2005, in partnership with the provinces and territories, the institute released new objective-based model construction codes aimed at facilitating the use of innovative solutions that promise to reduce the cost of construction, while meeting societal expectations for health, safety and accessibility in buildings. The institute is working with the provinces and territories to enable their early adoption of the codes, with a view to encouraging greater uniformity throughout the Canadian building regulatory system. In a related national thrust, NRC-IRC will continue to collaborate with the Federation of Canadian Municipalities in adding new Best Practices to the National Guide to Sustainable Municipal Infrastructure (InfraGuide).

Leverage "Big Science" partnerships – TRIUMF (Tri-University Meson Facility) is one of the country's key investments in "Big Science" infrastructure. It provides world-class facilities for research in sub-atomic physics, nuclear physics, nuclear astrophysics, life sciences and condensed matter and encourages the transfer of technology developed at the laboratory to the marketplace. NRC provides funding for the facility on behalf of the Government of Canada via a contribution agreement. TRIUMF is currently in its first year of its 2005-2010 Plan, with five-year funding totalling $222 million. TRIUMF is also seeking additional funding from other sources for the ATLAS Data Hub.

Strategy: Continue to implement Canada's Long Range Plan for Astronomy and Astrophysics

NRC's Herzberg Institute for Astrophysics (NRC-HIA) plays a unique role in the implementation of Canada's Long Range Plan for Astronomy (LRP), a national strategy for astronomy research – NRC-HIA not only manages national astronomy observatories but also facilitates access for Canadian researchers to international facilities including the Canada-France-Hawaii Telescope (CFHT), the James Clerk Maxwell Telescope (JCMT) and the Gemini Telescopes. In addition, NRC-HIA provides data management and processing support allowing astronomers world-wide to work with the latest information. Canada's participation in these international initiatives has allowed Canadian astronomers to become leaders in the field – in fact, Canada was rated first in the world for astronomy citations in a 2005 study conducted by the Institute for Scientific Information. To maintain this standing, Canada will need to ensure that its scientists continue to have access to the latest facilities and data.

Implementation of Phase II of the LRP

Astronomy facilities are becoming increasingly sophisticated and larger-scale, requiring many partners to provide both specialized expertise and a level of funding impossible for any single country to cover. Typically, these facilities require a very long-term commitment – first through the design and building phase, which can take 10-15 years, then through the operating life of the telescope, which may be 20 years or more. Canada's 2000 Long Range Plan (LRP) for Astronomy is composed of broadly complementary initiatives that provide a range of realistic challenges for the Canadian astronomy community, with recommendations on which international projects are significant for Canada. In 2004, a panel of internationally-renowned astronomers carried out a Mid-Term Review of the plan that examined the continued relevance of the LRP and identified key priorities. While the Mid-Term Review Committee (MTRC) prioritized future projects requiring new resources, it also recognized the value of current telescope agreements, and noted the difficulties NRC is experiencing in meeting international commitments. Enhanced operations, currency fluctuations and inflation have forced NRC to increase its contribution to international telescope agreements.

The 2000 LRP proposed that Canada participate in three new ground-based facilities. To date, the Atacama Large Millimeter Array (ALMA) is the only new international project in the LRP to which Canada is fully committed. NRC has signed two agreements on behalf of Canada to participate in ALMA, whose construction spans a ten-year period.

In 2006-07 NRC will be undertaking the evaluation of the implementation of NRC's activities under LRP Phase I that received funding for the period 2002-03 to 2006-07. New funding will be required for NRC share of Phase II of the LRP to meet international obligations in ALMA and to establish the infrastructure required to support the initiative, and to secure ongoing funding for the lifetime of NRC's international telescope agreements.

The Canadian astronomy community is also facing funding pressures as it considers Canada's involvement in the two other ground-based facilities proposed in the LRP: the next generation optical observatory, Thirty Metre Telescope (TMT); and the Square Kilometre Array (SKA), a future generation radio astronomy installation. TMT and SKA are projects championed by the Association of Canadian Universities for Research in Astronomy (ACURA). NRC and ACURA have been working together to maintain Canada's scientific and industrial interest in these potential opportunities. The construction phase of the TMT is expected to begin in 2007 and the design phase of SKA will be starting in 2006. A decision will be required on whether Canada remains a full partner for construction and operations in TMT and SKA, and funding sources will have to be identified.

Priority 2	Technology and Industry Support: Serving as a Catalyst for Industrial Innovation and Growth
Key Contributor	Program Activity: Technology and Industry Support
Planned results (Results expected over the long term)	• Creation of new technology-based companies • Access to new technologies for Canadian companies through patents and licensing • Enhanced innovation capacity of firms • Improved dissemination of knowledge • Supporting the Canadian industry
Performance Indicators (To assess progress against Planned Results)	• Technology transfer • Knowledge dissemination • Highly-qualified personnel to Canada • Client success • Economic, social and environmental impact

In support of the Government of Canada's commercialization priority, the NRC's Technology and Industry Support portfolio (TIS) will work closely with NRC's Research and Development portfolio to increase the commercialization of research through: technology licensing; provision of pre-commercialization assistance, mentoring and business intelligence to Canadian firms; access to vital national and international networks; knowledge dissemination and expertise; and helping companies create new products and/ or new technologies. In addition, it will collaborate with key partners to develop strategic initiatives to accelerate the successful competitiveness / commercialization of new technologies. TIS will also help to fuel the growth and innovative capacity of SMEs, and continue to streamline its approach to intellectual property management and the transfer of technology.

PLANNING HIGHLIGHTS

Strategy: Increase the innovation capacity of small and medium-sized enterprises (SMEs): Growing SMEs to medium-sized enterprises (MSEs)

Program Spotlights - Industrial Research Assistance Program (NRC-IRAP: Grow SMEs through innovation capacity support and expertise

Description: NRC-IRAP is the agency's innovation and technology assistance program in support of Canadian SMEs. Since its inception close to 60 years ago, the program has broadened its strategic purpose from a limited focus on technology transfer to its current strategic objective of increasing the innovative capabilities of Canadian SMEs. Today NRC-IRAP provides comprehensive innovation assistance to technology-based SMEs in almost every industrial sector of importance to Canada's current and future economic development.

Plans: SMEs engaging in high-risk, technologically sophisticated R&D face increasingly complex challenges. NRC-IRAP will support these technology-based SMEs in growing and becoming more competitive by focusing on: increasing the rate of growth of SMEs; expanding the number of SMEs that successfully commercialize their products, services and processes; assisting with potential international

collaborations on technology development projects; and providing international opportunities to clients looking to gain knowledge to advance their R&D projects.

Build on the success of the Competitive Technical Intelligence (CTI) pilot program: NRC-IRAP and NRC-CISTI will continue to develop CTI services in order to provide best-in-class strategic advice to Atlantic cluster participants and optimize NRC investments. For example, NRC-IRAP and NRC-CISTI are currently adding a Technical Business Analyst presence in St. John's NL and are integrating CTI advice into NRC-IRAP's portfolio of services to Atlantic and Nunavut firms. NRC-CISTI and NRC-IRAP are also working together to provide CTI to SMEs in other parts of Canada. NRC-IRAP has developed an in-house capability to capture CTI, and as a next step, will integrate this information into the strategic planning and business strategies of client firms.

Financial Resources

2006-2007	2007-2008	2008-2009
$143.3 million	$163.9 million	$164.1 million

Planned Results: - To increase the innovation capacity of Canadian SMEs
- To increase the growth of Canadian SMEs

Performance Indicators:

Immediate Outcomes

- Increased skills, knowledge and competencies of Canadian SMEs
- Improved management practices of Canadian SMEs
- Increased and enhanced innovation services and support for SMEs
- Enhanced strategic linkages for Canadian SMEs

Intermediate Outcomes

- Increased innovation capacity of Canadian SMEs
- Improved financial performance of Canadian SMEs
- Increased number of SMEs successfully commercializing their technologies
- Enhanced productivity of SMEs
- Enhanced Canadian innovation infrastructure

Ultimate Outcomes

- Stimulate wealth creation for Canada through technological innovation
- Stimulate innovation in Canadian SMEs

Participating NRC Research Institutes: NRC-IRAP partners with all NRC institutes to support technology projects that meet SME needs and are aligned with the technology focus of NRC institutes.
Website: http://irap-pari.nrc-cnrc.gc.ca/english/main_e.html

Strategy: Contribute to Canada's commercialization priority by strengthening industry ability to generate and apply new ideas and foster commercial applications of S&T

NRC is exploring how to complement and build upon its internationally recognized industrial support programs and R&D programs in order to contribute to the overall strengthening of Canada's commercialization efforts - Furthermore, NRC continues to nurture technology cluster growth across the nation and is doing so with commercialization as a guiding light. In carrying out this strategy, NRC intends to build on the strengths of both the public and private sectors – nationally, regionally and at the community level.

Strategy: Enhance industry knowledge through development and dissemination of scientific, technical and medical information and intelligence

Program Spotlights - Canada Institute for Scientific and Technical Information (NRC-CISTI): Exploiting information for innovation

Description: The Canada Institute for Scientific and Technical Information (NRC-CISTI) is Canada's national science library, and the largest comprehensive source of scientific, technical and medical (STM) information in North America. Through its publishing arm, NRC Research Press, NRC-CISTI is also Canada's foremost scientific publisher.

Plans: NRC-CISTI's Strategic Plan 2005-2010 sets out its vision: to be a leader in driving the exploitation of scientific information to create value for Canadians. Its mission is to advance research and innovation through high-value information and publishing services in science, technology and medicine.

NRC-CISTI will create value for Canadians by improving the flow of scientific information in three ways:

- An integrated "infostructure:" storage of and access to electronic scientific information, using intelligent search and analysis tools. Partnership will be key to developing this system.
- Scientific publishing infrastructure, using online peer review, editing and publishing tools that will shorten the time between discovery and publication without sacrificing quality.
- Services to support commercialization and SMEs, such as Competitive Technical Intelligence and patent information analysis – "actionable" information.

Companies in NRC industrial partnership facilities are key clients and will be offered enhanced services to support their research and development activities.

Financial Resources

2006-2007	2007-2008	2008-2009
$47.8 million	$46.8 million	$46.8 million

Planned Results:

- An integrated national information infrastructure to provide seamless, permanent access to scientific, technical and medical information resources, readily accessible to all Canadians.
- Robust, innovative scientific publishing systems to enable researchers and entrepreneurs to advance and exploit knowledge.
- Leadership of scientific, technical and medical (STM) information communities across Canada to become a national force for innovation.
- Information services that contribute to successful commercialization activities across Canada.

Performance Indicators:

- The Federal Science eLibrary is operational by 2008.
- Canada's scientific infostructure is in place by 2007.
- A viable scientific publishing infrastructure is in place to support scholarly communication in Canada by 2010.
- CISTI services to support commercialization are available in each region of Canada by 2007.
- A national alliance is formed that includes key members of the STM information community in Canada by 2010.

Participating NRC Research Institutes: NRC-CISTI partners with the outreach activities of all NRC institutes to promote and deliver an integrated package of scientific and technical information services to

support Canadian firms.
Website: http://cisti-icist.nrc-cnrc.gc.ca/cisti_e.shtml

Strategy: Facilitate the integration of intellectual property management strategies in institute strategic plans

Improve NRC's Intellectual Property Management – Guided by a 2003 benchmarking study of best practices in Intellectual Property (IP) management in NRC's research institutes and other leading research-based organizations in Canada and abroad, NRC will continue to strengthen its IP management. TIS will work with institutes to facilitate the integration of IP management strategies in institute strategic plans. Specific activities will include: increased focus on high-value IP and effective market opportunity assessments; improved marketing and communications of technology transfer opportunities to attract new business partners; enhanced management and decision-making support tools; adoption of world standard best practices and evaluation tools; and development of a balanced portfolio of technology transfer activities.

Priority 3	Enhancing Development of Sustainable Technology Clusters for Wealth Creation and Social Capital
Key Contributors	Program Activity: Research and Development Program Activity: Technology and Industry Support (NRC-IRAP & NRC-CISTI)
Planned results (Results expected over the long term)	• Competitive research and development base for cluster development • Innovative firms and deep talent pools in regions across Canada • Community ownership of cluster initiatives – local leadership and strategies • Improved quality of life through increased productivity and new technology-based solutions in health, for industry, the environment, etc.
Performance Indicators (To assess progress against Planned Results)	• Size of network and degree of interaction among cluster partners • Increase in research collaborations, licensing, joint patent applications, etc. • New firm formation (firms gravitate to the cluster, incubating firms and co-locating firms, etc.) • Investment attracted to the cluster

NRC is committed to fostering the growth of community-based technology clusters across Canada. NRC's technology cluster strategy builds on existing local strengths by: implementing R&D programs that support local industry needs; providing state-of-the-art facilities, trained personnel, business incubation opportunities and other specialized services (NRC-IRAP, NRC-CISTI); and supporting the alignment of key stakeholders around community strengths. NRC has received new funding ($110 million over the next five years) to further implement its national Technology Cluster Strategy in Atlantic Canada and will be seeking new funding in 2006-2007 for its Round II Clusters in Eastern, Central and Western Canada. The ultimate benefit for Canadians will be the emergence of globally competitive technology clusters leading to higher productivity, new jobs and expanded trade.

PLANNING HIGHLIGHTS

Strategy: Focus on cluster growth through targeted R&D programs and partnerships with other S&T organizations

Build on successes from NRC's Atlantic Initiatives, Phase I – NRC will continue to nurture the growth of its Atlantic cluster initiatives by maintaining leading-edge research capabilities (infrastructure and human capital), developing research collaborations with cluster firms, fostering increased networking and knowledge-sharing, and supporting the involvement of firms and other partners in the cluster.

- Information Technology (New Brunswick) – NRC's Institute of Information Technology (NRC-IIT) will build on New Brunswick's vision to become a global leader in the digital economy of the 21st century. It will continue to be the key provider of innovation infrastructure and programs to bridge R&D to innovative New Brunswick products. NRC-IIT will also play a key role in helping partners define their research and commercialization agendas to achieve cluster objectives. NRC-IIT will contribute to creating an environment that induces companies to move to the region and to stay.
- Ocean Technologies (Newfoundland and Labrador) –NRC's Institute for Ocean Technology (NRC-IOT) will continue to lead the ocean technology cluster-building process by working with industry, government and academia. Building on Atlantic Investment Partnership (AIP) funding, NRC-IOT has opened the Ocean Technology Enterprise Centre (OTEC), a hub designed to bring together key services (SME partners, IRAP, CISTI and cluster initiatives) to develop new economic development endeavours and support ocean technology company growth. NRC-IOT will also work with Ocean Advance to develop and implement a community-wide action plan.
- Life Sciences (Nova Scotia) – NRC's Institute for Marine Biosciences (NRC-IMB) will undertake a formal road mapping exercise to support a better alignment of its resources to the cluster's vision and objectives. Plans are underway to establish an Atlantic Commercialization Centre (ACC) at the NRC-IMB's Industry Partnership Facility (IPF). The Centre will provide commercialization services to the entire life sciences community, including private industry and promising ventures flowing out of research activity in the region.

  NRC's Institute for Biodiagnostics in the Atlantic (NRC-IBD Atlantic) – a satellite of the NRC Institute for Biodiagnostics (NRC-IBD) headquartered in Winnipeg – is also involved in the development of Nova Scotia's life sciences cluster. NRC-IBD Atlantic will continue conducting world-class collaborative research that leads to advances in the evaluation, diagnosis and treatment of brain diseases and disorders. It will also continue to transfer medical technology innovations that will benefit Atlantic Canada's economic sectors.

Encourage more involvement / commitment of cluster partners – During the planning period, NRC will follow up on lessons learned from the evaluation of its Atlantic Canada cluster initiatives, and will build upon existing successes, such as:

- Medical Devices Technologies (Manitoba) – NRC-IBD will make expansion of the Winnipeg-based biomedical cluster a priority in the coming years, focusing on the development of diagnostic and imaging devices. These activities will be linked with the Infectious Disease Program established by IBD and Health Canada, which will further foster relationships with other departments including the Department of National Defence. The Centre for the

Commercialization of Biomedical Technology, which officially opened in October 2005, will catalyze cluster development by supporting new company formation, spin-offs and SME growth in the coming years.

- Canadian Photonics Fabrication Centre (Ontario) – The Canadian Photonics Fabrication Centre (NRC-CPFC) was officially opened in May 2005, and has already delivered nearly half a million dollars of materials to clients. The fabrication facility, unique in Canada, helps bridge the gap between research and commercialization by providing firms with commercial-grade prototyping and testing services. In addition, CPFC provides clients with access to expertise and collaborations in the photonics sector. CPFC, a joint initiative of NRC and Carleton University, links together key Canadian players in the photonics industry, including the National Capital Institute of Telecommunications, the Canadian Institute for Photonic Innovation, the Ottawa Photonics Research Alliance and the Canadian Photonics Consortium. The facility is continuing to ramp up production, hiring new staff and increasing interactions with photonics clusters on a national basis.

From emerging to developing – Moving cluster initiatives forward – The majority of NRC's recently-launched cluster activities are still in the very early stages of development, focused on establishing facilities, attracting skilled human resources, and developing networks of public and private sector partners and R&D support. During the planning period, NRC will foster their growth by developing a solid base of networks / partners, strengthened infrastructure, highly-qualified researchers and strategic R&D support. NRC will also continue its involvement in mature clusters such as the plant biotechnology (Saskatoon) and biopharmaceuticals (Montreal) clusters. The following are examples of early-stage cluster initiatives that NRC intends to move forward:

- Nanotechnology (Alberta) – NRC is helping Canada stake its place in nanotechnology through its new National Institute for Nanotechnology (NINT). Established in 2001, NINT is a multi-disciplinary institution jointly-funded with the University of Alberta and the Government of Alberta. The main focus of NINT's research is the integration of nano-scale devices and materials into complex nanosystems that are connected to the outside world. The long-term objective is to discover "design rules" for nanotechnology, and to develop platforms for building nanosystems and materials that can be constructed and programmed for specific applications. Four research groups have been established: Materials and Interfacial Chemistry; Molecular Scale Devices; Supramolecular Nanoscale Assembly; and Theory and Modelling of Nanoscale Objects, Interactions and Processes. NINT is continuing to build capacity by hiring new staff and adding new equipment to its facility. A cluster has begun to take shape through nanoMEMS Edmonton, a community-based development organization bringing together the City of Edmonton, the University of Alberta, Micralyne Inc, Bigbandwidth and other local proponents to accelerate the growth of nanotechnology in the region. On 22 June 2006, NINT celebrated the opening of one of the world's most technologically advanced research facilities. This new facility includes a suite of characterization labs, touted by scientists as "Canada's quietest space." These labs will provide Canada's leading nano scientists with ideal research conditions, such as ultra-low vibration and minimal acoustical noise or electro-magnetic interference – conditions that are essential for research at the nano scale.
- Aluminum Technology (Québec) – The NRC Aluminum Technology Centre (NRC-ATC) in Saguenay officially opened in November 2004. NRC-ATC provides Canadian industry with the expertise and technical support needed to develop high valued-added aluminum products and services. The goal of the NRC-ATC is to develop, in concert with its partners, leading-edge technologies attractive to the aluminium parts manufacturing industry. NRC-ATC will support

the aluminum production industry shift to higher value-added aluminum transformation in Canada.

- Urban Infrastructure (Saskatchewan) – Budget 2003 allocated $10M over 5 years for NRC to establish the Centre for Sustainable Infrastructure Research (NRC-CSIR) in Regina. Partners include the City of Regina, the University of Regina and Western Economic Diversification Canada. The objectives are to establish a research program to serve as a catalyst for the growth of a technology cluster in the region on the theme of sustainable infrastructure / sustainable cities and an environment that builds on the local industry and R&D capacity. The initiative will help Regina develop cost-effective, community-based plans to meet its existing and future infrastructure challenges in sustainable ways, and to become a national centre for environmental infrastructure management research and innovation.

Expand network of Industrial Partnership Facilities (IPFs) – In support of its cluster development activities, NRC will continue to develop, build and operate Industry Partnership Facilities across Canada. These unique facilities are workplaces for collaborative research and the incubation of new firms and NRC spin-offs. They also serve as community resources for access to mentoring, innovation financing and competitive technical intelligence for new enterprises. In 2004-2005, NRC had 15 IPF locations across the country with a complement of 109 incubating firms and 14 graduating tenants. By 2006-2007, two new facilities will open (Edmonton and Charlottetown), bringing the total space available in IPFs to 35,342 square feet.

Engage and link community groups through horizontal support (NRC-IRAP and NRC-CISTI) – A priority for NRC-IRAP over the past several years has been to engage and link regional groups as part of developing the technical, financial and business networks vital to cluster development. NRC-IRAP will take on a leadership role in collaborating and developing partnerships between regional players in order to strengthen the regional innovation infrastructure required to foster cluster development. In various clusters, NRC-CISTI has established NRC Information Centres (NIC), co-located at NRC institutes. NICs offer scientific, technical, medical and business-related information and analysis services to NRC researchers, companies located onsite and external clients in the region. NRC-CISTI will partner with institute outreach activities to promote and deliver an integrated package of services to regional clientele.

Strategy: Pursue long-term investment and management strategy centered on sustained effort and patient investment

Enhance collaborative partnerships – The full development of NRC cluster initiatives is expected to be a long-term commitment, with a cluster taking at least 15 to 20 years to reach full maturation. NRC will increase its efforts to develop collaborations and partnerships with industry and engage stakeholders to contribute to the development of clusters across Canada. In the short term, two key projects will be the development of baseline measures that can track the progress of cluster development and the evaluation of NRC's cluster initiatives in Winnipeg, Saskatoon, Edmonton, Vancouver, the Saguenay and Ottawa. These activities will provide information to support efforts to renew cluster initiatives funding. Table 3-2 provides a list of the cluster initiatives and financial resources involved.

Table 2-3: Allocation of Resources for NRC Technology Cluster Development

Location	Focus	Resources
2005-2006 to 2009-2010		
Halifax, NS	Life Sciences (NRC-IMB and NRC-IBD)	$19.5 million
Fredericton, Moncton and Saint-John, NB	Information Technology	$48.0 million
St. John's, NF	Ocean Technology	$16.0 million
Atlantic Canada	Coordination, administration, special studies, innovation assistance, S&T knowledge,/ information dissemination	$26.5 million
2002-2003 to 2006-2007		
Saguenay-Lac-Saint-Jean, QC	Aluminium technologies	$27.0 million[1,2]
Ottawa, ON	Photonics	$30.0 million
Winnipeg, MB	Medical device technologies	$10.0 million
Saskatoon, SK	Plant Nutraceuticals	$10.0 million
Edmonton, AB	Nanotechnology	$60.0 million[3]
Vancouver, BC	Fuel cells	$20.0 million
2003-2004 to 2007-2008		
Victoria / Penticton (BC)	Astronomy	$ 20.0 million
Charlottetown (PEI)	Nutrisciences and health	$ 20.0 million
Regina (SK)	Sustainable urban infrastructure	$ 10.0 million

1: An additional $5 million was received in 2001-2002
2: CED contributed an equal amount
3: The Province of Alberta also contributed $60 million

Strategy: Sustain continuous improvement through unique and innovative performance measurement strategies

NRC has developed a cluster measurement approach that builds on a solid base of research into clusters carried out by Canada's Innovation Systems Research Network. Tailored to NRC, this approach incorporates a model of cluster development that reflects NRC's role and contribution as well as those of other key stakeholders (firms, governments, customers and competitors). Key components include a framework that lays out an overarching set of indicators of cluster development, and a series of tools to determine where each cluster is situated in terms of development. These include a comprehensive survey of cluster firms, interviews with firms and key stakeholders and social network analysis.

NRC is continuing its commitment to assessing the progress of its cluster initiatives to ensure they are on track to meet objectives. During 2005-06 and 2006-2007, NRC will evaluate the cluster initiatives that received funding for the period between 2002-03 and 2006-07 (Round II Clusters). NRC gathers data from multiple lines of evidence, including reviews of performance data, documentation and literature, interviews with stakeholders and NRC representatives, and situation analysis drawn from the baselines. Evaluations examine the relevance of the initiatives, their success to date, their effectiveness and opportunities for improvement.

Priority 4	Program Management for a Sustainable Organization
Key Contributor	NRC-Wide Contribution: Program Activity: Research and Development* Program Activity: Technology and Industry Support* *(NRC's Corporate Branches actively support the Program Activities' contributions to this priority. The Corporate Branches provide policy, program advice and executive support for the coordination and direction of NRC's operations and its governing Council. They also specialize in finance, information management, human resources, administrative services, property management and corporate services.)
Planned results (Results expected over the long term)	• Establishment of clear corporate strategic direction • Enhanced corporate governance • Enhanced decision support • Effective research management practices • Long-term stability of financial, human and capital resources • Effective communications with NRC stakeholders
Performance Indicators (To assess progress against Planned Results)	• HR turnover rates • Sustained investments in priority areas • Evaluation of research management practices • Extent that corporate management framework is used to support/ identify priorities and make management decisions • Extent that NRC Governing Council fulfills its mandated role • Survey with key stakeholders on perception of NRC

NRC's Renewal Initiative is a key element in addressing the organization's sustainability. An essential objective of this initiative is to review the value and continuing relevance of NRC's program activities. From an operational perspective, NRC is exploring ways to sustain its asset base in the face of annual inflationary pressures, aging buildings and equipment and a static core budget. The organization will focus on strengthening its management systems and its financial base for future sustainability. This will include the continuation of addressing recommendations made by the Auditor General of Canada (OAG) in its March 2004 Report.

PLANNING HIGHLIGHTS

Strategy: NRC Renewal - Reposition for the Future and Address Management Accountability Framework Commitments

Key projects supporting the NRC Renewal Initiative include:

New corporate strategic direction – Over the past year, NRC's Renewal Initiative has been developing a new corporate strategic direction for NRC. Upon finalization of this framework, NRC will begin to define its direction for the next five-year period. Key considerations will include: anticipate and respond to important national priorities; collaboration with other science-based departments and agencies on cross-cutting issues; potential strategies with their impacts and

appropriate time sequencing; required investments in competencies; resource capture and allocation; structure, process and infrastructure alignment; and fine-tuning of the governance structure. The results of this work have been articulated in a corporate strategic plan, "Science at Work for Canada: A Strategy for the National Research Council 2006-2011". This will in turn guide subsequent renewal initiatives focusing on capability building, testing and adaptation for future implementation across NRC.

An integrated solution to planning, risk and performance management – Over the next three years, NRC will develop and implement an integrated management framework for providing senior management and NRC Institutes, Programs and Branches with the planning and performance information they need to support integrated decision-making, resource allocation and functional planning (human resources, capital assets and finance). This system will embed modern management practices in the planning and performance management process (e.g. risk and research management) and minimize the reporting burden (one-pass planning and reporting). As part of this solution, NRC will review its Program Activity Architecture (PAA) annually to ensure that it reflects the level of performance and reporting needed to effectively support the organization's strategic direction and resource management requirements.

Strategies for sustainable resources – Faced with ongoing resource pressures, NRC will need to make more strategic choices regarding the use of future resources. This will involve:

- Addressing funding issues – NRC will continue to prioritize key R&D and technology and industry support activities, initiatives and programs in the context of the organization's renewal and strategic directions. It will also produce strategies and mechanisms for ongoing reallocation and conduct efficiency improvement reviews to ensure effective investment of resources for sustainability in priority areas.
- Recruiting, retaining and training S&T people – NRC's Human Resources Management (HRM) strategy involves three fundamental priorities: to ensure the organization's continued capacity to cover a wide range of scientific disciplines; to partner, collaborate and participate in international research and markets; and to develop, support, and reward personal growth, development and productivity. During the planning period, NRC will implement an action plan that focuses on five broad themes, linked to organizational priorities as follows: recruit outstanding people; develop leadership at all levels; build cross-functional cross-cultural capabilities; align compensation and reward practices; and update the HR performance management framework.

  NRC has been an active member of the S&T Human Resources (HR) community since 1995. Along with other science-based departments and agencies, NRC rallied around an Office of the Auditor General report that highlighted the S&T Community as a "community at risk." NRC is participating in the Senior ADM Advisory Committee (SAAC) on Human Resources. More recently, the Director of Human Resources, Planning and Development has been asked to co-chair the Strategic Renewal Group (SWG), which supports the SAAC. This active involvement clearly demonstrates NRC's commitment to work with the S&T Human Resources community to find solutions to HR problems unique to the world of federal S&T. The Senior ADM Advisory Committee, through the effort of the SWG, is focusing on matters of recruitment, learning and overall HR planning. SAAC and the SWG are also working closely with the S&T Integration Board (IB) and the central agencies responsible for Human Resources management in the public service.

HRB and Corporate Services are working in tandem to harmonize the overall performance management agenda, spearheading efforts to develop better and more meaningful planning and reporting instruments that are intricately tied to the organization's overall objectives. IT/IM systems and performance indicators will also be brought into better alignment.

- Maintaining and upgrading NRC S&T infrastructure – In addition to ongoing infrastructure modifications and upgrades to address specific research/program requirements, NRC has budgeted $2.5M annually to address urgent rust-out concerns identified through a Long Term Capital Planning exercise. Projects with a health and safety component will be the top priority, followed by those that address life cycle management. The Treasury Board Secretariat-led Capital Asset Review will provide additional context regarding how NRC manages its assets. NRC is also currently developing the NRC Long Term Capital Plan 2006-2010, which will address recommendations that may arise from the Capital Asset Review and the Barriers to Science and Technology integration exercise.
- Developing three-year NRC Communications Outlook – NRC will develop and implement a three-year Communications Outlook (to be updated annually) that will position, profile and promote the organization's unique contributions to national S&T and innovation priorities in support of industry, as well as the creation of true economic value and social benefits for Canada and all Canadians. NRC will complete and implement recommendations from a comprehensive NRC Communications Situation Assessment undertaken to align and position NRC's communications function, organization, structure and resources in support of major NRC and relevant Government of Canada business priorities. In addition, NRC will continue its involvement in interdepartmental and government-wide horizontal S&T and innovation initiatives, including the Oceans Action Plan, the Canada-U.S. Enhanced Representation Initiative, the Canadian Biotechnology Strategy, the S&T Integration Board Communications Committee and the Government of Canada S&T web portal. Finally, NRC will develop and implement a strategy to guide NRC internal communications, with particular focus on supporting the implementation of outcomes from the NRC Renewal Initiative.
- Creation of an Audit, Evaluation and Risk Management Committee of Council – NRC recognized the importance of the internal audit function through the creation in 2005 of an independent Audit, Evaluation and Risk Management Committee of Council, which includes external members. NRC is committed to having and maintaining a strong and effective internal audit infrastructure in the years ahead. This will be accomplished through the provision of adequate financial and staffing resources to fully carry out its mandate. NRC will also amend its Internal Audit Charter to reflect the provisions of the government's new 2006 Internal Audit Policy.

Strategy: Continue to address recommendations of Auditor General of Canada

Implement Action Plan on recommendations of the Auditor General of Canada – The Office of the Auditor General of Canada (OAG) conducted an audit of NRC in 2003-2004 to assess NRC's systems and practices for setting strategic directions for its research activities, to determine whether NRC managed activities to maximize results, and to assess whether NRC measured and appropriately reported the results and impacts of its efforts. Below is a summary of NRC's Action Plan for the next three years in response to the OAG's recommendations (March 2004 report). Many aspects of NRC's Renewal Initiative and integrated planning, risk and performance management solution will address the recommendations (http://www.oag-bvg.gc.ca/domino/reports.nsf/html/20040301ce.html)

NRC Action Plan 2006-2007 to 2008-2009

OAG Recommendations	NRC Response
Corporate Governance	• Implement plan for new NRC Council Governance Model (effective February 2005) • Operationalize new Standing Committees of NRC Council • Implement NRC's new senior management and accountability structures (effective October 2005 - NRC has increased the number of VP positions, from 3 to 5, including the creation of a VP Corporate Services)
Setting Corporate Strategic Direction	• Continue to use Executive Committees in support of NRC priority-setting • Develop and implement new NRC Strategic Plan • Implement Integrated Planning, Risk & Performance Management Solution • Use NRC Corporate Risk Profile and provide NRC Institutes, Programs and Branches with a risk management approach and supporting tools
Research Management at Institute Level	• Provide NRC Institutes, Programs and Branches with Research Management Self-Assessment Tool
Human Resources Management	• Continue to implement Human Resources Management Plan (effective May 2004) and align with new NRC Strategic Plan • Operationalize new Human Resources Standing Committee of NRC Council (effective October 2005)
Performance Measurement and Reporting	• Revise NRC Performance Management Framework to align with new NRC Strategic Plan

Section III – Supplementary Information

Organizational Information

NRC Mandate

Under the National Research Council Act, NRC is responsible for:

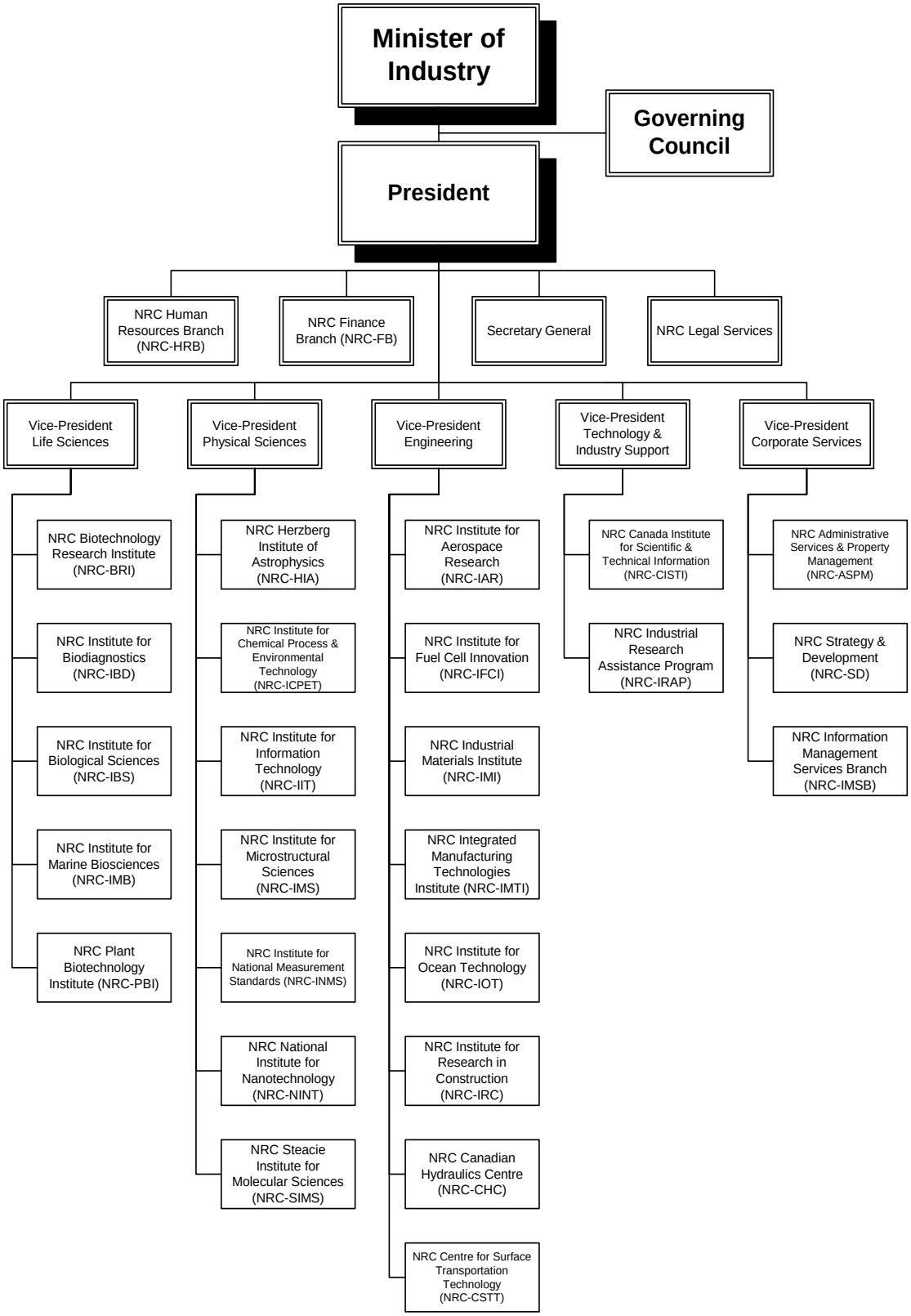
- Undertaking, assisting or promoting scientific and industrial research in different fields of importance to Canada.
- Establishing, operating and maintaining a national science library.
- Publishing and selling or otherwise distributing such scientific and technical information as the Council deems necessary.
- Investigating standards and methods of measurement.
- Working on the standardization and certification of scientific and technical apparatus and instruments and materials used or usable by Canadian industry.
- Operating and administering any astronomical observatories established or maintained by the Government of Canada.
- Administering NRC's research and development activities, including grants and contributions used to support a number of international activities.
- Providing vital scientific and technological services to the research and industrial communities.

Consult http://laws.justice.gc.ca/en/n-15/87335.html for more details about NRC's legislative framework.

NRC Accountability Framework

NRC reports directly to the Parliament of Canada through the Minister of Industry. NRC works in partnership with the members of the Industry Portfolio to leverage complementary resources and exploit synergies in areas such as innovation of firms through S&T, growth of small and medium-sized firms (SMEs) and economic growth of Canadian communities. The NRC Governing Council provides strategic direction and advice to the President and reviews organizational performance. The President is the leader, responsible for fulfilling corporate strategies and delivering results. Five Vice Presidents (Life Sciences, Physical Sciences, Engineering, Technology and Industry Support and Corporate Services) are responsible for a portfolio of research institutes, programs, and centres. Figure 3-1, provides an overview of NRC's organization.

Figure 3-1: NRC Organizational Chart



NRC Resources

Table 3-1: Agency Planned Spending and Full-Time Equivalents

($ millions)	Forecast Spending 2005-2006[1]	Planned Spending 2006-2007	Planned Spending 2007-2008	Planned Spending 2008-2009
Research and Development	438.6	498.0	442.7	428.0
Technology and Industry Support	203.1	194.4	217.5	217.4
Budgetary Main Estimates (gross)	641.7	692.4	660.2	645.4
Non-Budgetary Main Estimates (gross)	0.0	0.0	0.0	0.0
Less: Respendable revenue	0.0	0.0	0.0	0.0
Total Main Estimates	641.7	692.4	660.2	645.4
Adjustments:**				
Procurement Savings:				
Research and Development	(0.4)	(1.5)		
Technology and Industry Support	(0.2)	(0.7)		
Biotechnology Budget 99				6.0
Capital Carry Forward		0.9		
Collective Bargaining 05-06		13.5		
Collective Bargaining 05-07 Employee Benefits Plan		2.7		
Climate Change		(0.4)	(0.5)	
Canadian Police Research Centre (CPRC)		1.0		
TRIUMF		6.2		
Governor General Warrant:				
Funding to continue base research programs in subatomic physics, materials research, the life sciences and medical therapy, and to maintain the operations of the Tri-University Meson Facility	23.1			
Funding to strengthen Atlantic Canada's capacity to innovate and complete in the knowledge-based economy (Atlantic Canada Technology Cluster Initiatives)	16.2			
Relocation of the Institute for Fuel Cell Innovation within the campus of the University of British Colombia	10.3			
Funding to continue Government's plan to establish core genomics research and development capacity	6.0			
Operating Budget Carry forward	5.0			
Changes to Revenue	4.2			
Additional funding for regional innovation and commercialization strategies to provide research and expertise to small business	3.8			
Funding to undertake projects related to improvements to core infrastructure and to purchase equipment needed for specific research and development projects	3.1			
Funded related to government advertising programs	0.7			
Funding to undertake projects related to the development and application of biotechnology (Canadian Biotechnology Strategy)	0.2			
Funding to ensure the sustainable development and management of Canada's oceans (Oceans Action Plan)	0.1			
Operating Budget Conversion Factor	(0.4)			
2004-2005 Capital adjustment	(0.7)			

($ millions)	Forecast Spending 2005-2006[1]	Planned Spending 2006-2007	Planned Spending 2007-2008	Planned Spending 2008-2009
2005-2006 Capital Carry Forward	(0.9)			
Other:				
Treasury Board Vote 15	11.3			
Employee Benefits Plan (EBP)	2.3			
Total Adjustments[2]	*83.7*	*21.7*	*(0.5)*	*6.0*
Total Planned Spending	725.4	714.1	659.7	651.4

Total planned Spending Less: Spending of Revenues Pursuant to section 5(1)(e) of the NRC Act	75.8	73.5	75.4	77.3
Plus: Cost of services received without charge	21.5	25.9	25.9	25.9
Total Departmental Spending	671.1	666.6	610.2	599.9
Full time Equivalents	3,988	4,033	4,090	4,141

Note: Due to rounding, figures may not add to total shown

[1] Reflects best forecast of total planned spending to the end of the fiscal year.

[2] Adjustments are to accommodate approvals obtained since the Main Estimates and are to include Budget, Initiatives, Supplementary Estimates, etc.

Table 3-2: Resources by Program by Activity

2006-2007									
Budgetary									
Program Activity	Operating[1]	Capital	Grants	Contributions and Other Transfer Payments	Gross	Spending of Revenues	Total Main Estimates	Adjustments (planned spending not in Main Estimates)	Total Planned Spending
Research & Development	347.8	45.7	0.7	58.2	452.3	45.7	498.0	10.9	508.9
Technology and Industry Support	93.8	1.3	0.2	71.2	166.6	27.8	194.4	10.8	205.2
Total	441.6	47.0	0.9	129.4	618.9	73.5	692.4	21.7	714.1

[1]Includes Employee Benefits.

Table 3-3: Voted and Statutory Items ($ millions)

Vote or Statutory Item	Truncated Vote or Statutory Wording	Current Main Estimates	Previous Main Estimates
55	Operating expenditures	393.5	356.4
60	Capital expenditures	47.0	53.9
65	Grants and contributions	130.3	113.8
(S)	Spending of revenues pursuant to paragraph 5(1)(e) of the National Research Council Act	73.5	71.6
(S)	Contributions to employee benefits plans	48.1	45.9
	Total Agency	692.4	641.7

Note: Due to rounding, figures may not add to total shown.

Budgetary/ ($ millions)			Loans, Investments and Advances ($ millions)		
2005-2006	2006-2007	Net Increase/(Decrease)	2005-2006	2006-2007	Net Increase/ (Decrease)
641.7	692.4	50.7	---	---	---

Explanation of Major Changes

The Main Estimates for the National Research Council are $692.4 million, a net increase of $50.7 million. The major changes are as follows:

Increase of $50.7 million in budgetary spending due to:

Operating $41.1 million:

- an increase of $20.5 million in accordance with approved cash flows related to the Atlantic Canada Technology Cluster Initiatives;
- an increase of $10.7 million for salaries and employee benefits;
- an increase of $6.0 million for Genomics-based research under the CBS program;
- an increase of $2.0 million related to additional funding for regional innovation and commercialization strategies to provide research and expertise to small businesses;
- an increase of $1.8 million in forecasted statutory revenue;
- a decrease of $2.0 million, NRC's contribution to the $1B Government-wide reallocation initiative.

Capital $(6.9) million :

- an increase of $4.0 million related to the transfer from Canadian Economic Development-Québec (CED-Q) to NRC's IAR Aerospace Manufacturing Technology Centre (AMTC) in support of two capital projects;
- a decrease of $1.0 million in accordance with approved cash flows under the technology cluster initiatives in the areas of astrophysics and astonomy (British Columbia), sustainable urban infrastructure (Regina) and bioactives for human and marine health (Prince Edward Island);
- a decrease of $1.1 million for the sunset of funding related to the transfer from NRCan for the Federal House in Order Initiative;
- a decrease of $2.0 million in accordance with approved cash flows, representing an adjustment to the transfer from Canada Economic Development-Québec (CED-Q) for the Aluminum Technology Centre Initiative located in Chicoutimi, Québec;
- a decrease of $2.5 million related to funding received from the University of British Columbia for the construction of a new building to house the Institute for Fuel Cell Innovation;
- a decrease of $3.7 million for the sunset of funding related to the Regional Innovation/National Innovation Infrastructure Program in Atlantic Canada.

Transfer Payment – Contributions & Other $17.1 million:

- an increase of $26.3 million for TRIUMF;
- an increase of $3.0 million related to additional funding for regional innovation and commercialization strategies to provide research and expertise to small businesses;
- a decrease of $5.0 million , NRC's contribution to the $1B Government-wide reallocation initiative;
- a decrease of $9.0 million for the sun-setting of funding transferred from Canadian Economic Development - Québec ($3.0 million), Atlantic Canada Opportunities Agency ($3.0 million) and Western Economic Diversification ($3.0 million).

Table 3-4: Services Received Without Charge

2006-2007 ($ millions)	Total
Accommodation provided by Public Works and the Government Services Canada (PWGSC)	0.2
Contributions covering employer's share of employees' insurance premiums and expenditures paid by TBS (excluding revolving funds), Employer's contribution to employees insured benefits plans and expenditures paid by TBS	24.4
Worker's compensation coverage provided by Human Resources and Skills Development Canada	0.3
Salary and Associated expenditures of legal services provided by Department of Justice Canada	0.4
Audit Services provides by the Office of the Auditor General	0.4
Payroll Services provided by Public Works and Government Services Canada	0.2
2006-2007 Services Received Without Charge	25.9

Table 3-5: Summary of Capital Spending by Program Activity

($ millions)	Forecast Spending 2005-2006	Planned Spending 2006-2007	Planned Spending 2007-2008	Planned Spending 2008-2009
Research and Development	64.2	49.2	35.2	34.0
Technology and Industry Support	2.3	1.6	1.4	1.4
Total	66.5	50.8	36.6	35.4

Table 3-6: Details of Revenue

Spending of revenues pursuant to the NRC Act ($ millions)	Forecast Revenue 2005-2006	Planned Revenue 2006-2007	Planned Revenue 2007-2008	Planned Revenue 2008-2009
Research and Development				
Fee for Service	34.8	31.4	32.7	34.2
Rentals	2.9	3.1	3.4	3.5
Royalties	6.0	5.5	5.7	7.5
Publications	6.7	7.3	6.7	6.1
Other	3.6	2.7	3.1	2.4
Technology and Industry Support				
Fee for Service	0.3	1.1	1.2	1.2
Rentals	0.2	0.2	0.2	0.2
Royalties	0.1	0.1	0.1	0.1
Publications	20.7	21.4	21.4	21.4
Other	0.5	0.7	0.9	0.7
Total	75.8	73.5	75.4	77.3

Table 3-7: Resource Requirements by Branch or Sector

2006-2007			
($ millions)	Business Lines		
Organization	Research and Development	Technology and Industry Support	Total
Research Institutes	521.3		521.3
Industrial Research Assistance Program		143.3	143.3
Scientific and Technical Information		47.8	47.8
Technology Centres		1.7	1.7
Total	521.3	192.8	714.1

Table 3-8: User Fees (see note)

NRC collects between $60 million to $70 million in revenues annually; however, none of it is applicable to the User Fee Act (UFA) for the following reasons:

- As the definition and criteria upon which a User Fee is determined is very specific to the operations and legislative framework within each department, Treasury Board advised departments to seek legal counsel within their own department to assess its application.
- NRC's Legal and Financial Advisory Services examined the application of the (UFA) as it related to the various sources of NRC's revenue. This examination resulted in the legal opinion that the UFA was not applicable to NRC because NRC does not fix its fees pursuant to the authority of an act of Parliament and that NRC uses its common law right of the Crown to contract. None of NRC's revenue is derived as a result of regulation and most of its revenue is based upon negotiated agreements.

Table 3-9: Project Spending

Over the next three years, NRC expects to undertake the following projects that require Treasury Board approval as they exceed NRC's delegated authority level. Further information on these projects may be found at http://www.tbs-sct.gc.ca/est-pre/20062007/p3a_e.asp.

2006-2007
Lease Project Approval for the Institute for Nutrisciences and Health, Project Implementation Phase (Prince Edward Island) I-APL
Aluminum Technology Centre- Project Close-out Phase (Quebec) F-AEP
Lease Project Approval for the National Institute for Nanotechnology – Project Implementation Phase (Alberta) I-APL
Move of the NRC's Innovation Center - Project Close-out Phase (British Columbia) S-AEP

Table 3-10: Transfer Payment Programs

Over the next three years, the National Research Council will manage the following transfer payment programs valued at over $5 million. Further information on the Transfer Payments may be found at http://www.tbs-sct.gc.ca/est-pre/20062007/p3a_e.asp.

2006-2007 to 2008-2009
Tri-University Meson Facility (TRIUMF)
Industrial Research Assistance Program
International Astronomy Observatories and Canadian Participation in International Facilities

Table 3-11: Horizontal Initiatives

Over the next three years, NRC will be partners in the following horizontal initiatives. Further information on the Horizontal Initiatives may be found at http://www.tbs-sct.gc.ca/est-pre/20062007/p3a_e.asp

2006-2007 to 2008-2009
Canadian Biotechnology Strategy*
Ocean Action Plan
CBRN Research and Technology Initiative
Climate Change Technology and Innovation
Enhanced representation Initiative
Program for Energy R&D
Public Security Technical Program
Youth Employment Strategy

* NRC is the lead on the Genomics R&D Initiative which is a major component of the Canadian Biotechnology Strategy.

Table 3-12: Internal Audits and Evaluations

Name of Internal Evaluations / Audits	Estimated starting time	Estimated completion time
Evaluations*		
Implementation Evaluation of the Aluminium Technologies Centre (NRC-IMI-ATC) – A Round II Technology Cluster initiative)	November 2005	June 2006
Implementation Evaluation of Canadian Photonics Fabrication Centre (NRC-IMS-CPFC) – A Round II Technology Cluster initiative)	December 2005	June 2006
Implementation Evaluation of Centre for the Commercialization of Biodiagnostics (NRC-IBD) – A Round II Technology Cluster initiative)	December 2005	June 2006
Implementation Evaluation of the Nutraceuticals and Functional Foods Research Program (NRC-PBI) – A Round II Technology Cluster initiative)	December 2005	June 2006
Implementation Evaluation of the National Institute for Nanotechnology (NINT) – A Round II Technology Cluster initiative)	September 2005	June 2006
Evaluation of the Institute for Fuel Cell Initiatives (NRC-IFCI) – A Round II Technology Cluster initiative)	December 2005	June 2006
Summary of the Implementation Evaluations of the Round II Technology Cluster Initiatives	January 2006	June 2006
Evaluation of the Implementation of NRC's activities under the Long Range Plan for Astronomy (NRC-HIA)	January 2006	September 2006
Evaluation of the Interdepartmental Genomics R&D Initiative	November 2005	October 2006
Implementation Evaluation of the Sustainable Urban Infrastructure Initiative (NRC-IRC) – A Round III Technology Cluster initiative)	September 2006	June 2007
Implementation Evaluation of the Nutri-Sciences and Health (NRC-IMB-INH) – A Round III Technology Cluster initiative)	September 2006	June 2007
Implementation Evaluation of the Astrophysics and Astronomy Initiative in Penticton (NRC-HIA) – A Round III Technology Cluster initiative)	September 2006	June 2007
Summary of the Implementation Evaluations of the Round III Technology Cluster Initiatives	January 2007	June 2007
Evaluation of Industrial Research Assistance Program (NRC-IRAP)	September 2006	September 2007
Evaluation of the Industrial Partnership Facilities	September 2007	September 2008
Audits		
Follow-up to 2004 OAG Audit with a specific emphasis on: • corporate performance • internal collaborations and horizontal initiatives • strategic planning	March 2006	February 2007
Audit of IP Management	March 2006	February 2007

*****Evaluations scheduled for FY2006-2007 and FY2007-2008 are subject to the update of the risk-based evaluation plan and the approval of Senior Executive Committee.

Section IV – Other Items of Interest

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Institute for Biological Sciences (NRC-IBS) – Ottawa, ON
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Institute for Marine Biosciences (NRC-IMB) – Halifax, NS
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General Inquiries: (902) 426-8332 http://imb-ibm.nrc-cnrc.gc.ca

Plant Biotechnology Institute (NRC-PBI) – Saskatoon, SK
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Institute for Chemical Process and Environmental Technology (NRC-ICPET) – Ottawa, ON
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Institute for Information Technology (NRC-IIT) – Ottawa, ON, Gatineau, QC, Fredericton, NB, Moncton, NB, Saint John, NB, Sydney, NS
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Institute for Microstructural Sciences (NRC-IMS) – Ottawa, ON
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Institute for National Measurement Standards (NRC-INMS) – Ottawa, ON
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National Institute for Nanotechnology (NRC-NINT) – Edmonton, AB
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Steacie Institute for Molecular Sciences (NRC-SIMS) – Ottawa and Chalk River, ON
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Institute for Fuel Cell Innovation (NRC-IFCI) – Vancouver, BC
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Industrial Materials Institute (NRC-IMI) – Longueuil and Saguenay, Quebec
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Industrial Research Assistance Program (NRC-IRAP) – Ottawa, ON with offices across Canada
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