ESTIMATES

National Research Council Canada

2002-2003
Estimates

Part III – Report on Plans and Priorities

Canada

The Estimates Documents

Each year, the government prepares Estimates in support of its request to Parliament for authority to spend public monies. This request is formalized through the tabling of appropriation bills in Parliament. The Estimates, which are tabled in the House of Commons by the President of the Treasury Board, consist of three parts:

Part I – The Government Expenditure Plan provides an overview of federal spending and summarizes both the relationship of the key elements of the Main Estimates to the Expenditure Plan (as set out in the Budget).

Part II – The Main Estimates directly support the *Appropriation Act*. The Main Estimates identify the spending authorities (votes) and amounts to be included in subsequent appropriation bills. Parliament will be asked to approve these votes to enable the government to proceed with its spending plans. Parts I and II of the Estimates are tabled concurrently on or before 1 March.

Part III – Departmental Expenditure Plans which is divided into two components:

(1) **Reports on Plans and Priorities (RPPs)** are individual expenditure plans for each department and agency (excluding Crown corporations). These reports provide increased levels of detail on a business line basis and contain information on objectives, initiatives and planned results, including links to related resource requirements over a three-year period. The RPPs also provide details on human resource requirements, major capital projects, grants and contributions, and net program costs. They are tabled in Parliament by the President of the Treasury Board on behalf of the ministers who preside over the departments and agencies identified in Schedules I, I.1 and II of the *Financial Administration Act*. These documents are tabled in the spring and referred to committees, which then report back to the House of Commons pursuant to Standing Order 81(4).

(2) **Departmental Performance Reports (DPRs)** are individual department and agency accounts of accomplishments achieved against planned performance expectations as set out in respective RPPs. These Performance Reports, which cover the most recently completed fiscal year, are tabled in Parliament in the fall by the President of the Treasury Board on behalf of the ministers who preside over the departments and agencies identified in Schedules I, I.1 and II of the *Financial Administration Act*.

The Estimates, along with the Minister of Finance's Budget, reflect the government's annual budget planning and resource allocation priorities. In combination with the subsequent reporting of financial results in the Public Accounts and of accomplishments achieved in Departmental Performance Reports, this material helps Parliament hold the government to account for the allocation and management of public funds.

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Report on Plans and Priorities

National Research Council Canada

2002-2003
Estimates

Allan Rock
Minister of Industry

Canada

ACOA	Atlantic Canada Opportunities Agency
AMTC	Aerospace Manufacturing Technology Centre
ATC	Aluminium Technology Centre
BRI	Biotechnology Research Institute
CED	Canada Economic Development for Quebec Regions
CHC	Canadian Hydraulics Centre
CISTI	Canada Institute for Scientific and Technical Information
CLS	Canadian Light Source
CSTT	Centre for Surface Transportation Technology
CTN	Canadian Technology Network
FTE	Full-Time Equivalent
GTERC	Gas Turbine Environmental Research Centre
HIA	Herzberg Institute of Astrophysics
HPC	High Performance Computing
IAR	Institute for Aerospace Research
IBD	Institute for Biodiagnostics
IBS	Institute for Biological Sciences
IC	Innovation Centre
ICPET	Institute for Chemical Process and Environmental Technology
IIT	Institute for Information Technology
IMB	Institute for Marine Biosciences
IMD	Institute for Marine Dynamics
IMI	Industrial Materials Institute
IMS	Institute for Microstructural Sciences
IMTI	Integrated Manufacturing Technologies Institute
INMS	Institute for National Measurement Standards
IP	Intellectual Property
IPF	Industry Partnership Facility
IRAP	Industrial Research Assistance Program
IRC	Institute for Research in Construction
ITA	Industrial Technology Advisor
NIC	NRC Information Centre
NINT	National Institute for Nanotechnology
NRC	National Research Council Canada
NSERC	Natural Sciences and Engineering Research Council of Canada
PBI	Plant Biotechnology Institute
R&D	Research and Development
RMAF	Results-based Management and Accountability Framework
S&T	Science and Technology
SIG	Special Interest Group
SIMS	Steacie Institute for Molecular Sciences
SME	Small and medium–sized enterprises
SMIP	Strategic Management of Intellectual Property
STM	Scientific, Technical and Medical
TRIUMF	Tri-University Meson Facility
UCCB	University College of Cape Breton

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Section 1 – Messages

Minister's Portfolio Message

Today, our people, our universities and our industries are successfully competing around the globe. At the same time, we have a democratic society and way of life that continues to be judged one of the best in the world. To continue our economic growth and social development, indeed, to continue our success as a nation, we must strive to be among the best in creating and commercializing new knowledge. We are committed to building a world-leading, knowledge-based economy and we need to be more innovative to stay competitive.

To support a nation of innovators, we are investing in the skills and abilities of all Canadians so that they can actively contribute to and participate in today's knowledge-based economy. By harnessing our human potential and talent, we can continue our economic success.

The Government of Canada is investing in research and development to improve the capability of our universities and private sector firms to compete internationally. To foster a culture of innovation, we are creating an environment that is favourable to innovation, an environment of trust and confidence, where the public and private interests are protected and there are marketplace incentives for innovation.

Whether stimulating the creation and use of knowledge, supporting the creation and development of businesses and industries, promoting inclusive economic growth, or ensuring a fair and equitable marketplace, each of the fifteen member organizations of the Industry Portfolio is contributing to Canada's innovation strategy. Their work with public and private sector partners across the country is key to Canada's success.

The Industry Portfolio organizations are:

- Atlantic Canada Opportunities Agency
- Business Development Bank of Canada*
- Canadian Space Agency
- Competition Tribunal
- Copyright Board Canada
- Canada Economic Development for Quebec Regions
- Canadian Tourism Commission*
- Enterprise Cape Breton Corporation*
- 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*
- Statistics Canada
- Western Economic Diversification Canada

* Not required to submit Reports on Plans and Priorities

I am pleased to present the Report on Plans and Priorities for the National Research Council of Canada (NRC), which describes NRC's expected achievements and results over the next three years. NRC's plans and priorities centre on the implementation of the five strategic pillars laid out in its new *Vision to 2006*. This strategy, coupled with new federal investment, sharpens NRC's focus on national needs and opportunities and will enhance its contributions to Canada's economic growth, quality of life and innovation system. NRC will pursue five strategic priorities:

- Leading and excelling in the critical science and technology (S&T) fields that Canada needs to capitalize on the opportunities of the global knowledge economy;

- Fostering community-based innovation across Canada through new partnerships, strategies and investments. The goals are to stimulate research and development efforts, strengthen the innovative capabilities of local firms, build new alliances within and beyond the community, and encourage the creation of knowledge-based companies, jobs and products;

- Generating more value for Canada through enhanced technology and knowledge transfer and through innovative S&T commercialization practices. The goals are to create new firms and jobs, help companies boost their innovation capacity, attract new direct foreign investment, and improve Canadians' access to and use of the very latest in scientific, technical and medical information;

- Expanding global reach and connections for Canada's business and research communities. The goals are to help Canadians gain access to the world's leading-edge research performers, facilities and networks, open up opportunities for Canadian firms to form international alliances and enter new markets, and collaborate with other countries in key S&T fields to advance the world's stock of knowledge; and

- Becoming an exemplary employer and being recognized, by staff and peers alike, as an organization where outstanding people are able to make outstanding contributions to Canada. The goal is to help Canada attract, train, retain and be a preferred home for the "best of the best" in S&T fields.

To secure Canada's continued success in the 21st century, we are committed to nurturing and developing the potential of all our citizens in every community across our nation. By investing in organizations like the NRC, we will continue building an innovative economy and society for the benefit of all Canadians.

_____

The Honourable Allan Rock

Message from the Secretary of State (Science, Research and Development)

The citizens of our nation represent a virtually limitless talent pool; we can and will develop and use their ideas and skills to continue building a world-class science, research and development community. With strategic investments and targeted programming, this community can propel Canada to become one of the top-ranked countries in the world in terms of investment in research and development. Advancing such an ambitious goal is a major challenge. As a start, the government is committed to doubling its own investment in research and development by 2010.

Government efforts alone, however, will not suffice. That is why we are also investing to increase and strengthen the research capacity of our industrial and academic sectors. And to make sure that these sectors can advance, we are also working to develop the requisite highly skilled people they need to do the research and, through the commercialization of this research, to bring Canadian innovation to market.

We are committed to improving our overall level of innovation and to this end we have launched a number of initiatives to invigorate the development of our knowledge infrastructure, our commercial environment, our universities, and our human capital. Within the Industry Portfolio, the National Research Council of Canada, the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Social Sciences and Humanities Research Council of Canada (SSHRC) play a major role in advancing these objectives.

This report illustrates how NRC's initiatives are making and will continue to make a strategic contribution to the advancement of our scientific, research and development community. These are the types of initiatives that are needed to help turn the promise of Canadian know-how and ingenuity into reality.

The Honourable Maurizio Bevilacqua

Management Representation Statement

Management Representation

Report on Plans and Priorities 2002-2003

I submit, for tabling in Parliament, the 2002-2003 Report on Plans and Priorities (RPP) for the National Research Council of Canada.

To the best of my knowledge the information:

- Accurately portrays the agency's plans and priorities.
- Is consistent with the reporting principles contained in the *Guide to the Preparation of the 2002-2003 Report on Plans and Priorities.*
- Is comprehensive and accurate.
- Is based on sound underlying agency information and management systems.

I am satisfied as to the quality assurance processes and procedures used for the RPP production.

The reporting structure, on which this document is based, has been approved by Treasury Board Ministers and is the basis for accountability for the results achieved with the resources and authorities provided.

Name:_____

Date:_____

Section 2 – Raison d'être

2.1 Mission

Our mission as the National Research Council of Canada is to lead in the development of an innovative, knowledge-based economy for Canada through science and technology (S&T).

During 2000-2001, NRC undertook the most extensive consultations in its history to chart its course for the next five years. It engaged hundreds of stakeholders inside NRC, as well as from government, industry, academia and key interest groups. In June 2001, NRC's Governing Council approved the outcome of these consultations, *Vision to 2006*. The *Vision* serves to focus NRC's efforts to the benefit of all Canadians.

NRC's Vision

Recognized globally for research and innovation, NRC is a leader in the development of an innovative, knowledge-based economy for Canada through science and technology.

This Vision is founded on five strategic pillars:

- ***Outstanding people - Outstanding employer:*** *recognition as a leading research organization distinguished by creativity and innovation;*
- ***Excellence and leadership in research & development:*** *integration of public and private strengths to create new opportunities and meet national challenges for Canada;*
- ***Technology clusters:*** *development of the innovative capacity and socio-economic potential of Canada's communities;*
- ***Value for Canada:*** *commitment to the creation of new technology-based enterprises, technology transfer and knowledge dissemination to industry; and*
- ***Global reach:*** *access to global research & information networks and science facilities, stimulation of enhanced international opportunities for Canadian firms and technologies.*

2.2 Creating Value for Canada through Science, Technology and Innovation

NRC creates value for Canada and Canadians in many ways through its core strengths: some 3,400 highly skilled staff, 18 research institutes, two technology centres (on cost recovery), the Industrial Research Assistance Program (IRAP) and the Canada Institute for Scientific and Technical Information (CISTI). NRC enhances Canadian research and development (R&D) performance. It develops new technologies and technology-based enterprises, technology transfer mechanisms and knowledge transfer systems, the cornerstones of wealth creation. It strengthens Canada's innovation system and fosters a culture of innovation essential to success in the global economy.

NRC works with partners from all sectors to build and improve the effectiveness of Canada's innovation systems by nurturing national and international networks and collaborations and fostering the growth of community-based technology clusters. It also forges new alliances that anticipate future knowledge-based industries and generates and diffuses its new knowledge through commercialization, technology transfer and entrepreneurship activities.

NRC continually develops new solutions, technologies and innovations that safeguard our environment, improve and protect health, and create new sources of wealth. New, higher paying jobs in exciting new industries, cleaner production processes, new medical devices and treatments, and health management practices and technologies are just a few of our contributions that improve the quality of life for Canadians and spark real opportunities for economic growth.

NRC has a strong focus on entrepreneurship, encouraging new research-based enterprises to spin out of its laboratories, enhancing its licensing activities and improving its dissemination and diffusion of technical information and advice. During 2000-2001, more than 75 firms were incubating at NRC. In the past six years, NRC created nearly 50 firms, participated in literally thousands of collaborations and issued hundreds of licenses to commercialize discoveries – activities that have generated valuable intellectual property, thousands of new technology-based, high-talent jobs and revenues for firms in excess of one billion dollars.

NRC creates value for Canada through:

- Advances in scientific knowledge
- National & international networks, linkages and partnerships
- Technology transfer activities
- R&D assistance to Canadian companies
- New and improved technologies
- Creation of new companies and jobs
- Community-based technology cluster and innovation initiatives
- Scientific, technical & medical information
- Incubator facilities for young companies
- Standards, codes and measurement activities

Section 3 – Plans and Priorities by Strategic Outcomes

3.1 Planning Context

Looking back: The year 2001 underscored that change and uncertainty remain constants. In January, the Government announced its commitment to help position Canada to become one of the top five countries for R&D performance by 2010. Unexpectedly, economic growth in all major economies slowed sharply in the first half of the year. Of particular note, the phenomenally successful information and communications technology sector suffered dramatic declines in sales and underwent major restructuring. The terrorist events of September 11th delivered a further shock to the global economy, causing disruptions in various industry sectors and undermining consumer confidence. National security became the top priority for the Canadian and American governments, which, in turn, caused new funding pressures for both. By the end of the year, some countries began to slide into recession. For the first time in many years, the global economy experienced a slowdown, rather than steady growth.

Looking forward: The period ahead is one of significant economic uncertainty throughout the world. Forecasters expect the present weakness in the United States' (US) economy to continue during the first part of the year, followed by a rebound in the latter half. Should US consumer and business confidence erode further, global growth could remain weak and recovery could be delayed. Since the US is Canada's largest trading partner, the state of its economy and the functioning of the Canada-US border have direct impacts on our economic health.

Despite the prevailing economic conditions, technological change and the generation of new knowledge will continue to accelerate. There will be exciting new developments in technologies that cut across disciplines and industries, such as genomics, information technologies, new materials and nanotechnology. Intellectual capital and innovation will become even more important sources of value for the next generation of wealth creators.

Many countries are examining the emergence of technology clusters – cities and regions that have achieved critical mass and explosive growth in the knowledge economy – and are considering how they can foster more of these community-based hubs of research, innovation, investment and entrepreneurial activity. The National Innovation Systems project of the Organisation for Economic Co-operation and Development has demonstrated the increasing importance of clusters in determining the innovation performance of firms, regions and nations. Canada can point to its own successes, such as the aerospace and pharmaceuticals clusters in the Montreal area, the information and communications technologies cluster in Ottawa, the agriculture and agri-food cluster in Saskatoon and the emerging ocean technology cluster in St. John's. However, Canada needs to build even stronger innovative capacity so as to ensure its economic growth and quality of life in the future.

The road ahead for NRC: Through its research, technology and innovation efforts, NRC works continually to develop new solutions and technologies that help Canada adapt to and succeed in rapidly changing circumstances. Furthermore, recognizing that today's research is the source of tomorrow's opportunities, NRC strives to identify emerging fields of national importance where sustained research will advance the frontiers of knowledge and bring future benefits to Canada. NRC, with its national R&D infrastructure and capabilities and international linkages, is well-positioned to lead in

improving Canada's R&D performance, building essential networks of researchers and entrepreneurs, providing the training ground for the next generation of highly skilled workers, and translating new knowledge into economic and social benefits for Canadians.

In many ways, NRC is a unique S&T asset for Canada because of its contributions to the national system of innovation. First, NRC spans the innovation spectrum from research discovery to technology commercialization. Second, NRC is a national organization with a strong regional and community presence. Stretching from St. John's to Victoria, NRC is physically located in over 90 communities across Canada through its 260 Industrial Technology Advisors (ITAs) in IRAP, 1,000 Canadian Technology Network (CTN) members, 18 research institutes and 2 technology centres. Third, NRC is a strategically focused, integrated and adaptive knowledge organization that helps leverage the value of its investments in people, infrastructure and knowledge for the benefit of all Canadians. Finally, NRC has developed invaluable international networks of technological and scientific intelligence that are strategically important to Canada. This knowledge and expertise is used not only to transfer S&T information to Canadian firms and universities, but also to leverage innovation opportunities for Canadian industry internationally.

Changes from previous plans and priorities

A new five-year plan: The year 2001 marked a major transition from the previous five-year plan, *Vision to 2001*, to the new one, *Vision to 2006*. During 2001-2002, the individual organizations that comprise NRC began reviewing and adjusting their activities and long-term plans to align them with the new Vision. What distinguishes the new plan from the previous one is the central importance NRC attaches to the quality and motivation of its workers, our new approach to community-based innovation through technology clusters, our new emphasis on global connections and research, and our shift to emerging, multidisciplinary S&T fields that offer potentially enormous opportunities and will enable Canada's consolidation as a leading knowledge-based economy.

Rationale for NRC's new plan: As noted in section 2.1, our *Vision to 2006* is the culmination of the most extensive consultation ever undertaken by NRC with its internal and external stakeholders. We listened to and took into account the views of many experts and clients about the S&T challenges facing Canada and how NRC could best position itself to help meet those challenges more effectively in the future.

Our plan was also informed by the lessons we learned while implementing our previous five-year plan. We learned, for example, that collaboration and networks are crucial to helping improve firms' innovative performance. We learned that NRC staff could be entrepreneurs, as well as R&D performers. We learned that regional and community-based innovation initiatives call for substantial consultations, new management models and greater flexibility on the part of NRC. We benefited by working more horizontally across NRC and across government, but learned that working this way creates new management challenges and raises new issues, such as governance. We gained many significant results from our international S&T activities, but recognize that more needs to be done to help Canadian researchers and industry access new knowledge sources and markets. The government has given a substantial endorsement of NRC's future directions by providing new investments, as described below.

New federal funding – New priorities for NRC: In August 2001, the Prime Minister of Canada and the Premier of Alberta announced the creation of a new institute dedicated to the research and development of nanotechnology, a cutting-edge science that is rapidly advancing areas from health care to energy to computer technologies. The National Institute for Nanotechnology (NINT) will be a centrepiece of Canada's emerging nanotechnology sector and will integrate and leverage the strengths of NRC, the University of Alberta, and the Province of Alberta in this field. The collaboration among the three partners goes beyond anything that has been tried before and will enable Canada to be a front-runner in this high technology field. The federal investment will be $60 million over five years along with an annual commitment of $12 million for operations after 2006. The Province of Alberta will match the initial $60 million by committing the same amount to building and equipment costs associated with the Institute.

The December 2001 Budget announced that NRC would be allocated an additional $110 million over three years for leading-edge technologies and to expand NRC's regional innovation and technology cluster initiative beyond Atlantic Canada. The funding will support NINT, the Aluminium Technology Centre (ATC) in Quebec, a new nutraceuticals research program at the Plant Biotechnology Institute in Saskatoon, fuel cell research in British Columbia, a photonics fabrication centre in Ontario and an industrial partnership facility for medical diagnostics and manufacturing in Manitoba. Moving forward on these technology cluster initiatives will be a major priority for NRC over the planning period.

Major factors influencing NRC's plans

Impacts arising from a continued economic slowdown: There are a number of potential effects on NRC arising from the state of the national economy. If the current weakness continues over a long period, it may reduce or eliminate the ability of some of our current partners to enter into or maintain collaborative or joint projects. We may see some partners reducing or eliminating their R&D programs. On the other hand, some of our client firms in the security or anti-terrorism arena may see increased R&D and business opportunities by helping Canada achieve its national security and border management goals. Firms might need the services and assistance of NRC's Industrial Research Assistance Program even more in the future, but they may be less able to contribute their share of the R&D costs.

A continuing weak economy would have an impact on the business climate and the availability of venture capital, which, in turn, would likely affect the launching of new technology-based businesses, including NRC's own start-ups and spin-offs. At this stage, it is difficult to predict future energy costs and potential impacts. Last year, NRC reported financial pressures because of rapidly rising utility and fuel costs. In the latter months of 2001, however, fuel costs dropped significantly. Also, changes in the value of the Canadian dollar affect NRC's operating expenditures. NRC purchases much of its scientific and technical equipment and reference documents in the US. Furthermore, participation in international consortia and projects often requires contributions in US dollars.

***Recruiting and retaining outstanding people**:* The foundation of NRC's vision and contributions to Canada is its people. The core of NRC's performance and success is the knowledge, imagination, dedication and creativity of its staff and its ability to attract, retain and be a preferred home for the "best of the best". NRC is not alone in searching for talented people. We face stiff competition from universities and private sector companies, both within Canada and from abroad. Further, there are significant demographic shifts on the horizon, including an upcoming surge in retirements from the current working population and major shortages of replacements for these retirees. However, as a result of the economic downturn and uncertain outlook, we may find it easier to find excellent staff in certain fields. During the planning period, NRC will strive to continue to be a magnet for the most talented and imaginative people.

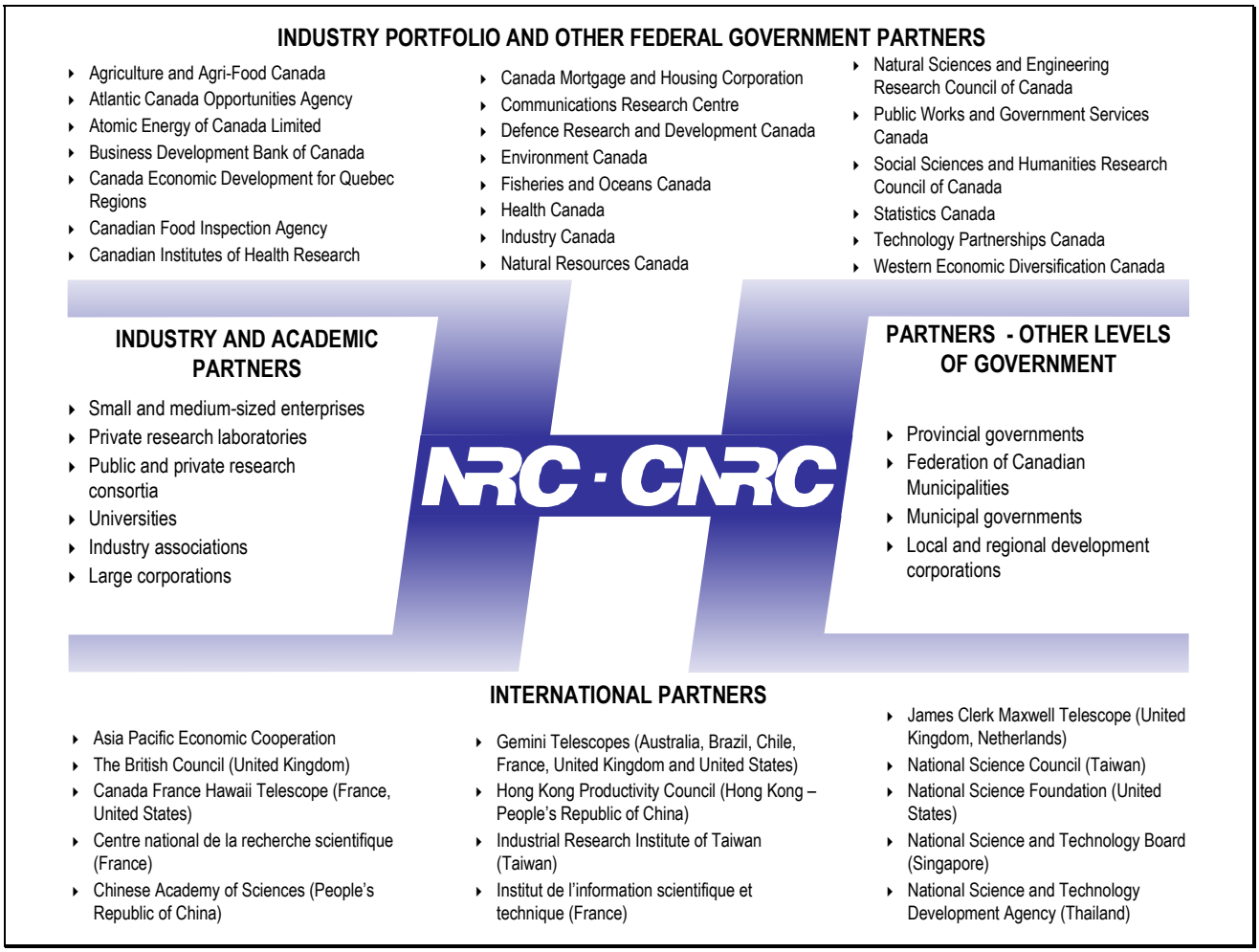
Maintaining world-class research facilities and equipment: To work at the leading edge of science and technology requires the best available tools, equipment and facilities. Not only do facilities and equipment affect the quality of outcomes that can be achieved, they also figure prominently in the ability of a research organization to attract and keep top talent. NRC operates a number of unique national facilities for scientific and engineering research, along with some 200 laboratories, test facilities and offices across Canada. Many of these were constructed many years ago, and now require considerable upgrades. Reinvestment is also needed to maintain many large pieces of research and related equipment. Upgrades, whether of buildings or equipment, are costly. This issue is not unique to NRC. Other federal science-based departments and agencies face the same challenge. The Council of Science and Technology Advisors in their report, *Building Excellence in Science and Technology (BEST),* considered the government's existing S&T capacity, including facilities and platforms, and noted that there are important issues to be addressed in ensuring the adequacy of federal S&T facilities and equipment to support current and future mandates.

Partnerships

Collaborations and partnerships are fundamental to NRC's way of doing business. Over the past five years, NRC's partnerships with industry have doubled, while those with public organizations have nearly tripled, and those with university organizations have grown five-fold. The value of agreements and collaborations reached nearly $400 million in 2000-2001. NRC will continue to identify and respond to partnering opportunities that will help move Canada's innovation agenda forward.

From NRC's experience, one of the best ways to transfer knowledge is through collaborative research. NRC research institutes team up with industrial partners to co-develop new technologies and maximize success in commercialization. Under such arrangements, both sides share funding and management of medium to long-term research. Industry partners are involved early to ensure that projects align with both marketplace needs and NRC capabilities. Partners work side-by-side with NRC teams, increasing technical expertise in the firm and improving the odds for commercial success. Collaborations range from projects with single companies to multi-partner arrangements with small and large firms, as well as university partners.

The diagram on the following page provides an overview of the many organizations with whom NRC partners.


INDUSTRY PORTFOLIO AND OTHER FEDERAL GOVERNMENT PARTNERS
Agriculture and Agri-Food Canada
Atlantic Canada Opportunities Agency
Atomic Energy of Canada Limited
Business Development Bank of Canada
Canada Economic Development for Quebec Regions
Canadian Food Inspection Agency
Canadian Institutes of Health Research
Canada Mortgage and Housing Corporation
Communications Research Centre
Defence Research and Development Canada
Environment Canada
Fisheries and Oceans Canada
Health Canada
Industry Canada
Natural Resources Canada
Natural Sciences and Engineering Research Council of Canada
Public Works and Government Services Canada
Social Sciences and Humanities Research Council of Canada
Statistics Canada
Technology Partnerships Canada
Western Economic Diversification Canada
INDUSTRY AND ACADEMIC PARTNERS
Small and medium-sized enterprises
Private research laboratories
Public and private research consortia
Universities
Industry associations
Large corporations
NRC · CNRC
PARTNERS - OTHER LEVELS OF GOVERNMENT
Provincial governments
Federation of Canadian Municipalities
Municipal governments
Local and regional development corporations
INTERNATIONAL PARTNERS
Asia Pacific Economic Cooperation
The British Council (United Kingdom)
Canada France Hawaii Telescope (France, United States)
Centre national de la recherche scientifique (France)
Chinese Academy of Sciences (People's Republic of China)
Gemini Telescopes (Australia, Brazil, Chile, France, United Kingdom and United States)
Hong Kong Productivity Council (Hong Kong – People's Republic of China)
Industrial Research Institute of Taiwan (Taiwan)
Institut de l'information scientifique et technique (France)
James Clerk Maxwell Telescope (United Kingdom, Netherlands)
National Science Council (Taiwan)
National Science Foundation (United States)
National Science and Technology Board (Singapore)
National Science and Technology Development Agency (Thailand)

3.2 Outcome #1: Excellence and Leadership in Strategic S&T Fields

Strategic Outcome: By 2006, NRC will assume a leadership position in at least three new vital domains of scientific and engineering research needed for Canada to meet national challenges and capitalize on the opportunities of a global knowledge economy.

Background: In the new century, Canada faces major challenges in areas such as industrial competitiveness and productivity, security, global climate change, energy efficiency, a clean environment, and a cost-effective, quality health system. These and other areas of knowledge exploration have the potential to reshape the lifestyle, quality of life, and environment for future generations of Canadians.

As an integrated, dynamic, national R&D organization, NRC can help address these challenges by working with industry, academia and government through strategically focused collaborative research teams. NRC will pursue research in emerging cross-disciplinary fields such as photonics, genomics, bio-informatics and nanotechnology, and continue to play an enabling role as a key participant in research consortia and networks across Canada and internationally. As the keystone of the national innovation system, NRC will enhance Canadian research investment in these new areas and identify other promising opportunities to build the future technological capacity that Canada will need to succeed.

Strategy and Goals: NRC will participate with industry, government and academia to build emerging fields that offer solutions to major national issues. Our goals include:

- Establishing NRC as a leader and integrator in new and emerging domains of research, including multidisciplinary areas that will be required to meet national challenges;
- Sustaining excellence in existing research and engineering domains where NRC is a Canadian R&D leader;
- Providing stewardship for strategic national investments in large-scale S&T infrastructure to strengthen and extend Canada's innovation system;
- Contributing effectively to federal strategies such as sustainable development, national security, climate change, health, and innovation;
- Developing an internationally recognized capacity for technology forecasting; and
- Deriving maximum benefit for Canadians from research results.

Highlights of plans include:

Nanotechnology: One of NRC's priorities over the planning period is to move forward on the creation of the National Institute for Nanotechnology, a $120 million world-class facility at the University of Alberta in Edmonton, Alberta. We are aiming for NINT to be ranked among the top five nanotechnology research centres in the world. NINT will be an integrated, multidisciplinary institution involving researchers in physics, chemistry, engineering, biology, informatics, pharmacy and medicine from the outset.

NINT will have a national mandate for molecular and nano-scale technology research, development and commercialization. Through interdisciplinary biology, electronics and materials research platforms, it will enable developments in biotechnology, energy, and information and communications technology:

- "Lab-on-a-chip" nanotechnology - integrating biology with electronics to build bio-smart devices;
- Quantum and molecular computing – the next generation of computation;
- Nano-engineered devices with new surface properties, such as fuel cell catalysts and bio-compatible medical implants;
- Protein and DNA tools that produce self-assembled structures; and
- Genomics, materials science and instrumentation research.

NINT will deliver:

- A 12,000 square metre research and industry partnership/incubation facility;
- 150 permanent highly skilled research jobs;
- A program for 45 guest workers from industry and universities every year; and
- Training opportunities for some 275 post-graduate and post-doctoral researchers annually.

Genomics and biotechnology: NRC will be embarking on a comprehensive strategic planning exercise with its five biotechnology institutes that will refocus the biotechnology R&D program on emerging opportunities and align it with NRC's new Vision. The plan will build on the findings of the Biotechnology Group Evaluation released in June 2001 and will be completed within eighteen months.

High Performance Computing (HPC): NRC's inter-institute High Performance Computing (iHPC) Forum, created in 2001, will work with other national and international initiatives to implement a GRID-based super computing environment in Canada. This will link NRC's high performance computers across Canada through high-speed Internet communications into a massively parallel computing network to create a seamless, powerful new computing resource. GRID computing allows researchers to tackle larger, more data intensive and complex computing problems that outstrip the capacity of individual computer clusters. NRC has launched a three-year $1.5 million HPC Challenge matching fund to leverage matching contributions from its participating institutes that will provide the resources for them to collaborate. The goal is to achieve scientific breakthroughs using GRID super computing, providing the results using advanced visualization systems.

NRC will continue to support the C3.ca Association, which serves the needs of HPC users (universities, colleges, industry and governments) across Canada, by providing funding for the C3 Coordinating Office (CCO), as of April 1, 2002. NRC will also support the C3.ca Association in the development of a long-range plan to meet Canada's HPC requirements. To coordinate future GRID activity across Canada, NRC will work with its partners, C3.ca and CANARIE, through the newly formed group, GridCanada.

Astrophysics and astronomy: The Herzberg Institute of Astrophysics (HIA) will continue to support and perform leading-edge astrophysical research and strengthen even further its close relationship with researchers in Canada's leading universities. HIA will continue developing innovative scientific instruments and software tools for its facilities, planning and developing future telescope projects appropriate for Canadian

research community needs, and educating the Canadian public about astronomy. In this context, HIA will continue to explore ways to implement key elements of the Long Range Plan for Canadian Astronomy and Astrophysics, including a commitment to Canadian participation in the Atacama Large Millimetre Array and the Extended Very Long Array projects, as well as in preliminary studies for the Large Optical Telescope, Square Kilometre Array and Canadian Large Adaptive Reflector projects. All of these initiatives would involve strong collaboration with Canadian industry, regional innovation and technology development.

Photonics – Light-speed technology for Canada: Photonics – the science and technology of generating and harnessing the power of light – holds the promise of opening new horizons for Canada in information technologies and telecommunications, manufacturing, transportation, biotechnology, health, medical devices and other industrial sectors. With leading researchers and research teams in universities and government laboratories across the nation, NRC believes that Canada has the potential to become a world leader in building new industries and industrial applications in Canada through photonics research and technology development over the coming decade.

The new Canadian Photonics Fabrication Centre (described in section 3.3) will be an important resource for Canadian companies, researchers and students in building prototypes, fabrication and testing. In February 2002, NRC joined the new Ottawa Photonics Research Alliance (OPRA), a research partnership that includes such members as the University of Ottawa, Carleton University, Algonquin College, the Canadian Research Commission, and the Université du Québec à Hull. OPRA will increase communication and collaboration among researchers from government, educational institutions and the private sector. As well, NRC will continue to strengthen its R&D efforts in photonics over the planning period.

Supporting national security and defence: NRC is currently working in partnership with Defence Research and Development Canada (DRDC) on a number of S&T projects under the *NRC/DRDC Strategic Alliance.* Budget 2001 provided $513 million over five years to develop responses to chemical, biological, radiological and nuclear (CBRN) attacks. Of this amount, $170 million will be used to enhance the existing laboratory networks so that they will be able to detect and identify possible CBRN threats more quickly. NRC will support DRDC in implementing this initiative.

Better buildings and municipal infrastructure for Canadians: Over the 2002-2005 period, the Institute for Research in Construction (IRC) will launch the first ever objective-based national building codes and performance-oriented documents. The first issue of these codes is expected in 2005. NRC is also working to finalize an agreement with the provinces and territories on the new integrated code-development system. The goal is to encourage greater innovation within the building industry, while safeguarding the health and safety of Canadians.

With the help of a $12.5 million investment (Phase 1 - $6.5 million until March 2003; Phase 2 - $6 million until March 2005) from the federal Infrastructure Canada Program, the Institute for Research in Construction, in partnership with the Federation of Canadian Municipalities, will also release the first edition of the *National Guide to Sustainable Municipal Infrastructure* in the upcoming period. The *Guide* will facilitate the use of best

practices across Canada and assist municipal planners and decision-makers in selecting the most cost-effective and durable strategies for infrastructure renewal and rehabilitation. Savings of over a billion dollars per year for municipalities are anticipated.

Manufacturing technologies for the future: The newly established Virtual Materials Processing Laboratory, located at the Industrial Materials Institute (IMI) in Boucherville, Quebec, will bring together the latest computer technologies with a top research team to develop the tools needed by the manufacturing community of the future. With an investment of $2.1 million, these new facilities will enable the researchers to continue their work in developing software tools for parts manufacturing in such industrial sectors as aerospace and automotive. The facility will work on the next generation of automated design and optimization software, as well as virtual manufacturing visualization tools.

Oceans and marine engineering: NRC's Governing Council approved the strategic plan for the Institute for Marine Dynamics (IMD) in June 2001. IMD's research program will grow in a number of key areas, namely, offshore oil and gas (including deepwater technology), ice effects on marine systems, underwater vehicle technology and engineering challenges in aquaculture. It will continue to develop its physical and numerical modelling expertise and pursue research in ocean technology with a focus on commercialization opportunities.

New aeronautics facilities and research directions: Over the planning period, the Institute for Aerospace Research (IAR) will put into operation the new Aerospace Manufacturing Technology Centre (AMTC) to be located on the campus of the Université de Montréal, Quebec, and the new Gas Turbine Environmental Research Centre (GTERC) to be located in Ottawa. Construction of AMTC will begin in 2002. The funding for AMTC, announced in October 2000 and totalling $46.5 million over five years, including a $25 million contribution from Canada Economic Development for Quebec Regions (CED), will be used to develop core competencies and demonstrate modern manufacturing methods that have the potential to deliver significant cost savings to the aerospace industry, while maintaining quality, reliability and performance. AMTC will employ up to 100 staff in four major research programs: advanced metal products; information systems and computational models; advanced composite products; and functional materials.

Construction of GTERC, funded at $23.4 million, will also commence in early 2002 and be completed in 2003. GTERC will support Canada's aeronautics industry in developing gas turbine engines for operation at high altitudes and low temperatures, in compliance with increasingly stringent environmental and safety standards.

Canadian Light Source (CLS): As part of its commitment to provide Canadians with leading-edge research facilities, NRC, in partnership with the University of Saskatchewan, is involved in developing the synchrotron facility in Saskatchewan. CLS is scheduled for completion by 2003. NRC researchers from five institutes in manufacturing, biotechnology and molecular sciences will continue to be heavily involved in the beamline programs. NRC will contribute $4 million over two years towards the capital cost of construction and is committed to annual contributions of $2 million during the operating phase, starting in 2004.

New industry-focused R&D: Special Interest Groups (SIGs) provide the entry for small and medium-sized manufacturers to work with NRC and participate in setting the research agenda to meet their needs. By joining a SIG, SMEs get a first look at discoveries emerging from NRC laboratories and to share information on technologies that are important to their growth. During 2001, the Integrated Manufacturing Technologies Institute (IMTI) launched a Precision and Freeform Fabrication SIG with eleven member organizations. A second SIG in Virtual Manufacturing - Automotive is being developed and will come to fruition in 2002-2003. Plans are to have 20 to 25 member organizations in each group within three years. Work is under way to develop two new SIGs over the next two years in Medical Devices Manufacturing Technologies and Virtual Vehicle Manufacturing Technologies.

3.3 Outcome #2: Community-based Innovation through Technology Clusters

Strategic Outcome: By 2006, NRC will contribute to the development of new, sustainable and competitive innovation clusters in at least ten Canadian communities.

Background: The emerging international phenomenon of innovation at the local level is based on private and public sector teamwork, partnerships and networks. Canada, given its vast geography, relatively small population and predominance of small and medium-sized enterprises, has increasingly adopted these approaches in fostering innovation over the past decade.

NRC is a nationally accessible, community-based S&T resource for Canadians and Canadian businesses. With its world-class research institutes, its renowned Industrial Research Assistance Program to provide technology advice and support to small and medium-sized enterprises and the Canada Institute for Scientific and Technical Information as a leading information resource, NRC has long played an active, dynamic local role in many Canadian communities. NRC will augment this role to respond more effectively to the growing needs and opportunities of stakeholders across Canada. Efforts will include working closely with Canadian communities to help develop their innovative capacity in key technology fields through jointly formulated long-term strategies to foster the growth of new and emerging clusters.

Building Technology Clusters: The Key Components

Strategy and Goals: NRC will continue to develop and expand its local innovation activities with key private and public sector stakeholders across Canada. Our goals include:

- Creating a globally competitive research and technology base for cluster development at the community level;
- Fostering community leadership, champions and knowledge-based strategies;
- Leveraging funding and new investment in community clusters with stakeholders; and
- Stimulating the emergence of new firms, jobs, exports and investment growth.

Highlights of plans include:

New technology clusters across Canada

New federal investment: Budget 2001 provided $110 million over three years to expand NRC's technology cluster initiatives to other parts of Canada. Working in close consultation with its partners, NRC will use the new funds to identify and develop detailed plans for technology clusters in each region. NRC will also spend funds on the establishment of the new program areas, e.g., hiring staff, setting up offices and purchasing equipment to fit up laboratories and facilities. The new technology clusters are described below.

British Columbia: NRC's Innovation Centre in Vancouver is primarily engaged in fuel cell research and development. With the new funding provided in the Budget, NRC will be able to ramp up its activities into a full-fledged Fuel Cell Research, Technology Development and Commercialization Program, linking expertise in British Columbia to R&D strengths across Canada. NRC plans to perform an enabling role in promoting the growth of a viable and environmentally sound fuel cell industry in the region and across Canada.

Alberta: Through its collaboration with universities and industry, NINT will help stimulate the emergence of new nanotechnology-based industries in Alberta and across Canada. NINT will undertake six roles:

- lead nanotechnology research in specialized theme areas (refer to section 3.2);
- train a new generation of nanotechnology researchers through partnerships with universities;
- create a national nanotechnology network of Canadian researchers in partnership with the Natural Sciences and Engineering Research Council, the Social Sciences and Humanities Research Council, the Canadian Institutes of Health Research and the Canada Foundation for Innovation;
- provide researchers from across the country with access to a national infrastructure through investment in state-of-the-art equipment for fabrication, characterization and modeling;
- enable research in related areas such as proteomics through its advances in molecular science; and
- transfer technology to the private sector and help with the creation of new businesses.

Saskatchewan: NRC will create a new research program - Crops for Enhanced Human Health - at its Plant Biotechnology Institute (PBI) in Saskatoon. The program will focus on high-quality crops and naturally derived compounds to produce all manner of products involving nutraceuticals (crops that are designed to promote and restore good health in humans), functional foods and pharmaceuticals important to human health. This initiative will support the accelerated growth of a competitive, Prairies-based nutraceutical/functional food industry based on a strong research and technology platform. A national technology roadmap for nutraceuticals, launched in December 2001, will identify promising key technologies and lead to the development of a national action plan during the planning period.

Manitoba: NRC intends to enhance its research program in medical devices and software, and build a research program to support local manufacturing opportunities (e.g., precision and virtual manufacturing). A major component of the proposal is to build an Industry Partnership Facility (IPF) at NRC's Institute for Biodiagnostics (IBD) in Winnipeg that would promote the development of manufacturing technologies, in particular, medical diagnostic technologies. It would also act as a focal point for linkages among local firms, universities, R&D organizations and NRC's manufacturing and information technology institutes. The IPF would house spin-off firms from IBD and other companies with related manufacturing technologies, providing them with access to business support services, other commercialization support and NRC's research programs. The new partnership facility will include an industrial workshop that will allow the manufacture of large, high-tech products, such as magnetic resonance imaging devices. No such facility exists currently in Winnipeg.

Ontario: NRC will establish a Canadian Photonics Fabrication Centre in Ottawa, attached to its Institute for Microstructural Sciences (IMS). Photonics is the technology of generating and harnessing light, with applications primarily in the information and telecommunications industry. Other sectors that use photonic technologies include manufacturing, environmental monitoring, health, transportation and aviation. The Centre will serve as a unique national resource that will give the Canadian photonics industry the edge it needs to lead the global market in this rapidly developing sector. It will provide a facility to develop and test prototypes of new photonic devices, train highly qualified personnel and serve as an R&D resource for university researchers and industry. The Centre will help address the critical shortage of people in this important sector through remote and on site-training, internships and re-skilling programs.

Quebec: NRC will move forward with plans to support the growth of a value-added aluminium products industry in the Saguenay-Lac St-Jean region, an initiative to which Canada Economic Development has contributed $25 million. The centrepiece is the construction of an Aluminium Technology Centre on the Université du Québec à Chicoutimi campus. ATC will provide Canadian industry with the technical support and expertise required to develop value-added aluminium-based products and services. It will combine R&D activities for leading-edge aluminium-based materials manufacturing technology, and process simulation and instrumentation used in transforming aluminium into finished and semi-finished products. The Centre will be home to some 80 researchers, technicians and technical staff working to support industry, mostly SMEs.

Technology clusters already under way in Atlantic Canada

The Atlantic Canada Innovation Initiative: In June 2000, NRC received $110 million for its five-year Atlantic Canada Innovation Initiative, a key component of the government's $700 million Atlantic Investment Partnership. Our Atlantic Initiative is designed to forge partnerships and build on the region's existing strengths to create globally competitive technology clusters. During 2000-2001 and 2001-2002, through a series of roundtables and consultations, NRC worked with industry stakeholders, research, academic and health-care institutions, and local governments to foster new visions, forge new partnerships, and formulate action plans that will enhance Atlantic Canada's economic prospects. In the coming years, as described below, NRC will continue to facilitate and coordinate efforts to develop and strengthen technology clusters in Atlantic Canada.

New Brunswick: Building on the province's excellent infrastructure for research, NRC will construct a new research institute devoted to information technology relating to e-business on the Fredericton campus of the University of New Brunswick. The institute, to be opened in 2002, will eventually house some 40 NRC researchers and a similar number of guest workers, visiting scientists and industrial researchers. The institute will establish research collaborations and close working relationships with companies, universities, and other partners across the provinces, and will tie in closely with NRC's national facilities and institutes. In addition, CISTI will establish a new NRC Information Centre (NIC) at the institute.

With an additional $12 million investment provided by the Atlantic Canada Opportunities Agency (ACOA) and the Government of New Brunswick under the Regional Economic Development Agreement, NRC will create satellite e-business/information technology laboratories in Saint John and Moncton, as well as connect its laboratories with partners through a broadband research network.

Nova Scotia: NRC will allocate additional funding to its Institute for Marine Biosciences (IMB) to expand its capabilities in genomics, proteomics, bioinformatics and advanced imaging that will, in turn, strengthen the region's innovation capacity. NRC will also establish an Industry Partnership Facility at IMB to foster technology transfer and commercialization. In partnership with Dalhousie University, the Queen Elizabeth II Health Sciences Centre and the Halifax medical community, NRC will establish a strong research presence and business development program at the new Brain Repair Centre in Halifax. NRC's major contribution will be the installation and operation of a functional magnetic resonance imaging system developed by NRC's Institute for Biodiagnostics in Winnipeg.

NRC will also establish a nucleus of information technology (IT) research staff in Sydney connected to its national capacity and R&D strengths in IT. The group, to be located at the University College of Cape Breton (UCCB), will help develop core competencies in software engineering for real-time control and embedded systems and for short-range dynamically re-configurable wireless networks. The province has designated UCCB as a Centre of Excellence for IT. In partnership with UCCB, NRC will help establish the Information Technology Innovation Centre, a facility that will support start-up companies and encourage technology transfer. In addition, IRAP is initiating an internship project with UCCB for up to 10 graduates per term to join the new NRC IT research group.

Prince Edward Island: NRC is supporting an initiative to assess opportunities for PEI to build on its traditional economic strengths in primary resources and develop them into a sustainable bioresources technology cluster. A key milestone during the planning period will be the completion of a bioresources technology roadmap under the leadership of the Institute for Chemical Process and Environmental Technology (ICPET) for NRC, ACOA and the Province of Prince Edward Island. In addition, CISTI has established an NRC Information Centre in the province, and IRAP will expand its ITA presence there.

Newfoundland: An ocean technology cluster is emerging in St. John's, around NRC's Institute for Marine Dynamics, Memorial University of Newfoundland and a number of area firms. NRC will expand core research programs at IMD to respond to the industry's future R&D requirements, establish an Industry Partnership Facility to support young, local entrepreneurs, start-ups and spin-offs from NRC and increase support from its IRAP, CTN and CISTI programs. Furthermore, NRC, along with Industry Canada and other public and private sector partners, is leading a national Marine and Ocean Industry Technology Roadmap initiative to identify the future market opportunities and technological requirements of Canada's marine and energy industry sector. A series of stakeholder workshops is currently under way. The Roadmap, to be finalized in late 2002, is one of the government actions announced in *A New Policy Framework for the Canadian Shipbuilding and Industrial Marine Industry: Focusing on Opportunities 2001.*

3.4 Outcome #3: Value for Canada through Technology and Knowledge Transfer

Strategic Outcome: By 2006, NRC will be recognized by its partners and government stakeholders as Canada's leading developer of new research and technology-based enterprises and respected for its innovative S&T commercialization practices.

Background: NRC creates value for Canada and its industry through research, innovation and commercialization activities. Over the past five years, NRC has grown into a more adaptive and agile institution through the development and promotion of an entrepreneurial culture. In 1996, NRC showed its ability to lead institutional innovation in government when it launched its Entrepreneurship Program to maximize the commercialization of its technologies.

This included a major commitment and dedicated effort to actively encourage the spin-off of new research-based enterprises from its laboratories. Over 100 firms have been incubated or spun off by NRC, several hundred licenses have been signed, and the diffusion of technical information and advice has been enhanced. These activities have generated valuable intellectual property, hundreds of new technology-based jobs and revenues for firms of over $1 billion.

Strategy and Goals: NRC will continue to foster entrepreneurial thinking and action at all levels of the organization and seek to accelerate its technology transfer, knowledge dissemination and development of new research-based technology enterprises. Our goals include:

- Creating new firms and technology-based jobs;
- Enhancing innovative capacity of existing firms;
- Attracting direct foreign investment in technology-based enterprises; and
- Improving dissemination of knowledge to industry.

Highlights of plans include:

Creating new businesses: NRC will continue to generate or assist in the creation of new companies. In particular, NRC will continue to encourage and help its employees to turn their R&D outcomes into new businesses. During 2001-2002, ten new companies started up from within NRC. We anticipate creating a comparable number of new businesses each year during the planning period.

Helping new companies to start up: Most of NRC's research institutes have the means to incubate new, small, technology-based firms. By co-locating with NRC, firms have direct access to NRC facilities, the expertise of its researchers, its extensive national networks and its other knowledge resources. Our Industry Partnership Facilities continue to operate at full capacity and have proven to be so successful that in the future, they will be an integral part of any new NRC research facility that is constructed. Over the planning period, NRC will build new IPFs in Winnipeg, Saskatoon, Montreal, Halifax, St. John's and Edmonton. Furthermore, in 2002-2003, we will undertake a

survey on best practices in company incubation to determine what improvements we can make to stimulate the emergence of new firms and more rapid adoption of next generation technologies.

Helping Canadian businesses with their technology needs: The core competency of the Industrial Research Assistance Program is the provision of technological advice, financial assistance and referrals to some 12,000 small and medium-sized enterprises each year. An evaluation of IRAP, currently under way, will be completed in fall 2002 and will provide valuable input into the development of IRAP's new five-year strategic plan, also scheduled for completion in 2002. IRAP is working to ensure that it continues to provide relevant, high-quality services to its clients as their needs evolve in a complex and changing environment. It is examining how it can best assist its clients in gaining improved access to international markets and knowledge sources. Furthermore, IRAP will continue to strengthen its relationships and collaborations with its Network Members and CTN member organizations.

Improving scientific, technical and medical (STM) information services and products: As the nation's science library and largest scientific publisher, CISTI provides vital STM information services and products to researchers and innovators across Canada. To increase flexibility, efficiency and cost-effectiveness, CISTI will adopt an integrated information management approach to the development and delivery of its products and services. It will implement an innovative e-business environment that will facilitate access to and extend the reach of its information products and services. CISTI will also enhance knowledge sharing nationally and internationally through its peer-reviewed publications and new integrated electronic publishing tools and services. CISTI will also create a unique electronic infrastructure that will provide permanent access to the world's STM information resources. In conjunction with IRAP, other federal departments and organizations, CISTI will extend its outreach to Canadian SMEs and industry associations and offer new products and services, such as competitive technical intelligence, technology roadmapping, and technology forecasting.

Improving the value derived from intellectual property: Over the planning period, NRC will continue to improve how it manages and protects the intellectual property (IP) it generates and how it moves IP into the private sector for commercial exploitation. Recently, several NRC institutes participated in the initial benchmarking phase of a Strategic Management of Intellectual Property (SMIP) Best Practices Pilot Project. They identified several opportunities to improve NRC's IP management practices. In 2002-2003, other research institutes will take part in the project and contribute to the development of a new NRC intellectual property management strategy.

3.5 Outcome #4: Global Research and Connections

Strategic Outcome: By 2006, NRC will be recognized by its stakeholders for its contributions to a more effective Canadian innovation system that assures access to international facilities and research networks, provides opportunities for Canadian firms and builds new research and technology alliances.

Background: International technology, business and investment opportunities have risen significantly since 1995 and are projected to further accelerate by 2006. In the words of the Prime Minister's Advisory Council on S&T, "Canada will become a country that, within the limits of our resources, takes maximum possible advantage of international opportunities in support of advancing scientific research, industrial innovation and improvements in the quality of life for Canadians."

Because of its long-standing reputation as a Canadian scientific authority and proven integrator in such areas as national measurement standards, astrophysics, and building codes, NRC has developed a valuable international network of technical and scientific intelligence of strategic importance to Canada. This knowledge and expertise can be used not only to transfer S&T information back to Canadian firms and universities, but also to leverage new innovation opportunities for Canadian industry internationally. NRC can play a pivotal role in providing Canada with strategic S&T information, intelligence, technology foresight, as well as greater connectedness to the centres of advanced technological generation around the world.

Strategy and Goals: NRC will enhance its knowledge, technology and network building activities through strategic international collaborations and investments. These efforts will enable NRC and its partners to develop new capabilities that are not possible through domestic activities alone. Our goals include:

- Gaining recognition as an effective integrator and facilitator of international research;
- Promoting international standards harmonization;
- Developing new international S&T alliances to benefit NRC and its partners;
- Securing access to international research facilities for Canadians;
- Improving S&T foresight and forecasting for new research and technology domains; and
- Stimulating new foreign direct investment in Canada.

Highlights of plans include:

Revitalized International S&T Strategy: NRC will revisit its International S&T Strategy over the planning period and update it to reflect its *Vision to 2006* and international developments. The new Strategy will be completed in 2002.

Promoting Bilateral and Multilateral Cooperation: NRC will continue to foster and expand its bilateral and multilateral S&T collaborations with innovative organizations around the world to ensure that Canadian scientists and industry have access to leading-edge R&D performers and facilities. For example, in 2001, NRC signed an S&T agreement with Germany, which will support collaborative research over the next three years at $1.5 million per year. As another example, NRC will continue its involvement in the Canadian-European Research Initiative on Nanostructures project with the European Union. This group of 17 European and 8 Canadian nodes is carrying out research three to ten years ahead of industry needs that covers new process technologies for next generation chips, optoelectronic components, microsystems, solar cells, sensors and new design technologies for systems on a chip.

Helping Canadian SMEs to make international linkages: IRAP's international activities focus on participating in technology missions, establishing formal linkages with other countries and receiving foreign missions in Canada. For example, in 2000-2001, IRAP participated in three technology missions to Asia involving 29 SMEs, organized 44 information-sharing events and signed two new international agreements, one with the Agence nationale de valorisation de la recherche, France, the other with the Canada-Israel Industrial Research and Development Foundation, Israel. As IRAP develops its new strategic plan, it will be examining how it can become more effective in helping SMEs make international connections.

International Astronomy: HIA will continue to play a lead role in providing Canadians with access to and participation in major international astronomical research facilities and programs, such as the Canada-France-Hawaii Telescope, the James Clerk Maxwell Telescope, the Canadian Galactic Plane Survey and the Wide Field Infrared Camera. The Institute will continue to manage Canada's contribution to and involvement in the twin Gemini telescopes in Hawaii and Chile.

Reducing technical barriers to trade: Meeting international technical standards is crucial to the competitiveness of many Canadian companies that export. As Canada's National Metrology Institute (NMI), our Institute for National Measurement Standards (INMS) is the lead agency for the development and implementation of major international metrology cooperations aimed at reducing technical barriers to trade. For example, INMS is one of 42 signatories to the Mutual Recognition Arrangement that provides for internationally recognized equivalence of national measurement standards and procedures. Assuring that Canada's measurement standards and calibration and accreditation procedures are accepted without question means that Canadian companies can gain access to international markets without being impeded by technical questions. INMS's strategic plan, which is under development, is being designed to ensure Canada's ongoing position in the international measurement system.

Supporting the export of Canadian building products and technologies: The regulatory systems of many countries are prescriptive-based, which can have the effect of creating a non-tariff barrier to trade. In the case of building codes and standards, there is a global trend to develop and adopt an alternative approach - performance or objective-based systems – that provide a common basis upon which products can be compared and assessed. NRC's Institute for Research in Construction is coordinating Canada's move to an objective-based system for building products. This will provide international credibility for our products and facilitate their acceptance in foreign markets. Building on its success in promoting the adoption of Canadian code requirements by

China and Poland and the acceptance of Canadian building products in Russia and Poland, IRC will continue to support initiatives aimed at introducing Canadian wood-frame technology and construction products into new international markets.

3.6 Outcome #5: Outstanding People – Outstanding Employer

Strategic Outcome: By 2006, NRC will be regarded by staff and their peers as a major innovator in human resource management, as a place where outstanding people are encouraged and are able to make outstanding contributions to Canada, and as an outstanding employer offering a great place to work.

Background: Great people. Great minds. NRC's success lies with the talented men and women that give it life. Over NRC's 85-year history, its people have earned an international reputation for excellence and creativity in leading-edge research and innovation - they have won the highest regard in a wide range of fields. The core of NRC's performance and success is the knowledge, imagination and dedication of its staff. NRC has consistently shown the ability to attract, retain and be a preferred home for the "best of the best".

Strategy and Goals: NRC will provide an exciting and rewarding working environment and become widely regarded as a prestigious employer in the service of Canada. Our goals include:

- Embracing the new Employment Philosophy, which seeks to recruit and retain outstanding people and to provide them with significant opportunities for professional, scientific and creative development;
- Being an outstanding employer that rewards people for both their level of professional development and productivity in order to ensure the best research and innovation talent for Canada, and an exciting research environment;
- Creating value for Canadians through excellent management of intellectual capital and knowledge;
- Developing and maintaining leading-edge research facilities, equipment and practices; and
- Providing an environment to enhance the creativity of employees in anticipating the future, taking action in building new research programs, and laying the research foundations for Canada's future growth.

Highlight of plans:

NRC's Employment Philosophy: In 2000-2001, NRC launched its *Employment Philosophy*, a comprehensive strategy for developing the human and intellectual capital that is crucial to driving innovation and discovery. The *Philosophy* rests on four principles:

- Recruit and retain outstanding people;
- Give them the opportunity to grow professionally, to utilize their strengths and to deliver to the maximum of their capabilities;
- Reward them based on both their level of professional development and their level of productivity; and
- Create a respectful partnership with them based on trust and understanding.

The *Employment Philosophy* will guide our actions over the next years. We will continue to explore means and opportunities to ensure that NRC is the preferred home for the "best of the best".

3.7 Managing to Realize our Vision to 2006

Comptrollership: Sustained focus on progress and outcomes is required to achieve NRC's vision. This is facilitated by a modernized approach to comptrollership that emphasizes results and values, rather than control and compliance. Modern comptrollership at NRC is expected to help strengthen the management infrastructure that will support the five strategic pillars of NRC's vision.

To this end, NRC will be undertaking an organization-wide assessment of its management capabilities in comptrollership during summer/fall 2002, with a view towards developing and implementing a strategy and action plan to address priority areas where a strengthened capability is desired. The broad areas that will be assessed are: leadership, people, accountability, stewardship, risk management, shared values and ethics, and integrated performance information. This initiative will be integrated with, and build on, other management initiatives already in place, or being planned.

Results-based management: The new *Vision to 2006* has created the opportunity for NRC to revisit its results-based management system. NRC is revising and updating its corporate results-based management framework. As part of this initiative, we are developing a corporate-wide Results-based Management and Accountability Framework (RMAF) in 2002 based on consultations with NRC institutes, programs and branches. The RMAF will provide performance measures and evaluative criteria to determine the performance of NRC in fulfilling the plans and priorities outlined in *Vision to 2006*. To implement the RMAF, NRC will also be working to improve its planning, performance monitoring, reporting and decision-making systems.

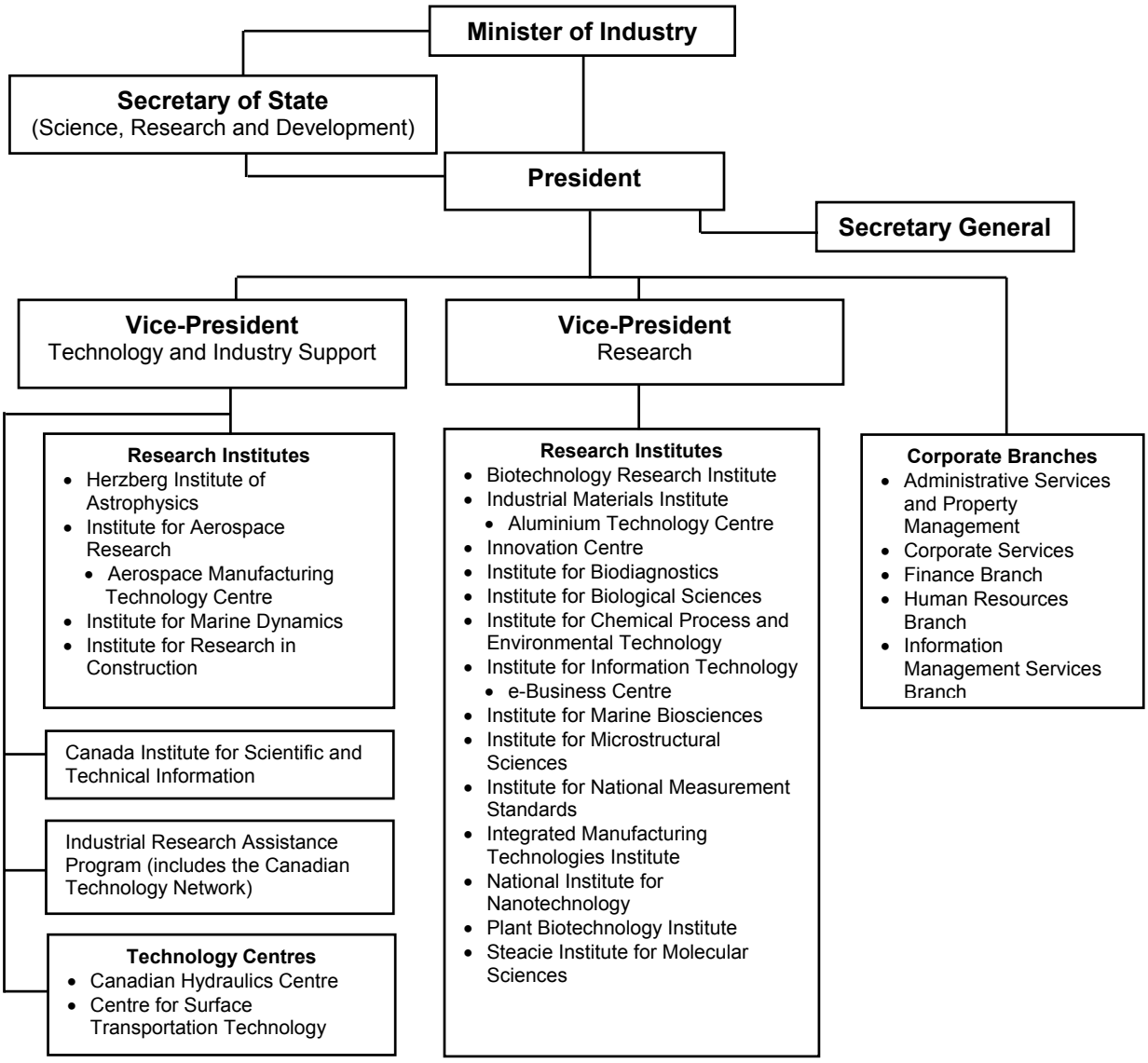
***Assessing our performance*:** During 2001-2002, NRC had the opportunity to supplement its resource levels to carry out assessment work in light of the government's new evaluation and internal audit policies, and financial assistance to help implement the policies. NRC has reviewed its assessment schedule and plans to carry out the following work over the next few years.

NRC Assessment Schedule (2001-2002 to 2003-2004)
AUDIT
Management of S&T Activities (Follow-up to Auditor General's 1994 Audit)
S&T Management Capabilities (Follow-up to Auditor General's 1999 Audit on Management of Science and Technology Personnel)
Construction Contracting
Partnerships
Information
EVALUATION
Industrial Research Assistance Program & Canadian Technology Network
Manufacturing Technologies Group (ICPET & IMI)
Canadian Bio-informatics Resource
Evaluation Follow-ups (IMD, CISTI, IAR, IRC, HIA, INMS)
CORPORATE RESULTS-BASED MANAGEMENT
Managing NRC Vision to 2006: Phase I – Review & Update NRC Corporate Performance Framework Phase II - Review & Improve NRC-wide Results-based Management System
Facilitate development of Performance Frameworks for new initiatives

Section 4 – Organization

4.1 Accountability

Organizational Chart of National Research Council Canada
(April 1, 2002)



4.2 Program Mandate

The *National Research Council Act* and the *Weights and Measures Act* set out the legislative framework that guides NRC.

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;
- 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;
- providing vital scientific and technological services to the research and industrial communities. This mandate is discharged to a great extent through IRAP, CISTI and CTN; and
- establishing, operating and maintaining a national science library and publishing, selling and otherwise distributing scientific, technical and medical information.

Under the *Weights and Measures Act*, NRC has a specific mandate relating to "the investigation and determination of standards and methods of measurements including, length, volume, weight, mass, capacity, time, heat, light, electricity, magnetism and the investigation and determination of physical constants and the fundamental properties of matter."

4.3 NRC's Business Lines

NRC is divided into three business lines, which provide a balance between conducting R&D, offering technical and financial assistance to industry and the public, and supporting the organization with corporate services.

BUSINESS LINE 1 – RESEARCH AND TECHNOLOGY INNOVATION

Objective
To achieve sustained knowledge-based economic and social growth in Canada through research and development and innovation in key areas.

Description
The business line includes the research programs, technology development initiatives and the management of national science and engineering facilities along with research and collaborations with firms, universities and public institutions. 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 has the ability to have an impact.

Associated institutes

- **Biotechnology** – Biotechnology Research Institute, Institute for Biodiagnostics, Institute for Biological Sciences, Institute for Marine Biosciences and Plant Biotechnology Institute
- **Information and Communications Technologies** – Institute for Microstructural Sciences and Institute for Information Technology (including e-Business Centre)
- **Manufacturing Technologies** – Industrial Materials Institute (including Aluminium Technology Centre), Institute for Chemical Process and Environmental Technology, Integrated Manufacturing Technologies Institute and Innovation Centre
- **Aerospace Technologies** – Institute for Aerospace Research (including Aerospace Manufacturing Technology Centre)
- **Ocean Engineering and Marine Industries** – Institute for Marine Dynamics
- **Astronomy and Astrophysics** – Herzberg Institute of Astrophysics
- **Construction** – Institute for Research in Construction
- **Molecular Sciences** – Steacie Institute for Molecular Sciences
- **Measurement Standards** – Institute for National Measurement Standards
- **Nanotechnology –** National Institute for Nanotechnology

Business Line 1: Planned Spending and Full Time Equivalents (FTE)

($ millions)	Forecast Spending 2001-2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005
Net Business Line Spending:				
Research and Technology Innovation	357.4	**368.4**	338.0	342.7
FTEs	2,177	**2,264**	2,264	2,264

BUSINESS LINE 2 – SUPPORT FOR INNOVATION AND THE NATIONAL SCIENCE AND TECHNOLOGY INFRASTRUCTURE

Objective

- To improve the innovative capability of Canadian firms through the provision of integrated and co-ordinated technological and financial assistance, information and access to other relevant resources; and
- To stimulate wealth creation for Canada through technological assistance, information and access to other relevant resources.

Description

The business line reinforces NRC's role as a major R&D participant within the larger Canadian science and technology infrastructure. It encompasses the dissemination of scientific and technical information and the provision of innovation assistance to industrial research. NRC also maintains key engineering and technology-based facilities to support specific industrial sectors of the economy.

Associated programs and centres

- **Innovation Assistance to Firms** – Industrial Research Assistance Program
- **Scientific and Technical Information** – Canada Institute for Scientific and Technical Information
- **Technology Centres** – Canadian Hydraulics Centre, Centre for Surface Transportation Technology

Business Line 2: Planned Spending and Full Time Equivalents (FTE)

($ millions)	Forecast Spending 2001-2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005
Net Business Line Spending:				
Support for Innovation and the National Science and Technology Infrastructure	155.2	**164.1**	174.5	176.7
FTEs	479	**498**	498	498

BUSINESS LINE 3 - PROGRAM MANAGEMENT

Objective

To provide efficient, client-focused services, which enhance NRC's effectiveness as an integrated, dynamic science and technology organization.

Description

The business line provides policy, program advice and executive support for the coordination and direction of NRC's operations and its Governing Council. It also supports and enables effective and efficient management of NRC's resources through its specialization in finance, information management, human resources, administrative services and property management and corporate services.

Associated corporate branches

- **Administrative Services and Property Management**
- **Corporate Services**
- **Finance Branch**
- **Human Resources Branch**
- **Information Management Services Branch**

Business Line 3: Planned Spending and Full Time Equivalents (FTE)

($ millions)	Forecast Spending 2001-2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005
Net Business Line Spending:				
Program Management	64.5	**67.5**	70.5	67.9
FTEs	568	**590**	590	590

Strategic Outcomes and Business Lines: The following chart provides a crosswalk between NRC's three business lines and its five strategic outcomes.

Business Lines*	**Strategic Outcomes**				
	Excellence and Leadership in Emerging S&T Fields	Community-based Innovation through Technology Clusters	Value for Canada through Technology & Knowledge Transfer	Global Research and Connections	Outstanding People Outstanding Employer
1	√	√	√	√	√
2	√	√	√	√	√
3		√	√	√	√

* 1 - Research and Technology Innovation, 2 - Support for Innovation and the National Science and Technology Infrastructure, 3 - Program Management

4.4 Agency Planned Spending

($ millions)	Forecast Spending 2001-2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005
Research and Technology Innovation	357.4	**368.4**	338.0	342.7
Support for Innovation and the National Science and Technology Infrastructure	155.2	**164.1**	174.5	176.7
Program Management	64.5	**67.5**	70.5	67.9
Budgetary Main Estimates (gross)	577.1	**600.0**	583.0	587.3
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	577.1	**600.0**	583.0	587.3
Adjustments *	61.5	**63.3**	57.0	56.0
Net Planned Spending	638.6 **	**663.3**	640.0	643.3
Less: Spending of Revenues Pursuant to section 5(1)(e) of the NRC Act	71.7	**67.1**	73.9	77.2
Plus: Cost of services received without charge	14.6	**14.0**	13.3	13.3
Net Cost of the Department	581.5	**610.2**	579.4	579.4
Full Time Equivalents	3,224	**3,352**	3,352	3,352

* Adjustments are to accommodate approvals obtained since the Main Estimates and are to include Budget initiatives, Supplementary Estimates, etc.

** Reflects best forecast of total planned spending to the end of the fiscal year.

Section 5 – Annexes

5.1 Financial Information

5.1.1 Capital Spending by Business Line

($ millions)	Forecast Spending 2001-2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005
Research and Technology Innovation	59.0	**82.1**	41.7	41.1
Support for Innovation and the National Science and Technology Infrastructure	0.0	**0.0**	0.0	0.0
Program Management	8.0	**6.3**	7.5	6.5
Total	67.0	**88.4**	49.2	47.6

5.1.2 Capital Projects by Business Line

($ millions)	Currently Estimated Total Cost	Forecast Spending to March 31, 2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005	Future Years' Requirements
Research and Technology Innovation						
New Brunswick						
E-Business Centre (S-EPA)	9.1	5.0	**4.1**			
Quebec						
Aerospace Manufacturing Technology Centre (S-EPA)	34.1	7.5	**14.5**	6.1	6.0	
Aluminium Technology Centre (S-EPA)	34.4	4.5	**15.9**	6.0	5.0	3.0
Ontario						
Gas Turbine Environmental Research Centre (S-EPA)	27.5	4.6	**19.6**	3.3		
Saskatchewan						
Addition to Plant Biotechnology Institute Building (S-EPA)	9.0	7.0	**2.0**			
British Columbia						
Upgrade and Expansion of the Herzberg Institute of Astrophysics Facilities (S-EPA)	9.6	9.6				
New Building at Dominion Radio Astrophysical Observatory (S-EPA)	3.0	2.1	**0.9**			

5.1.3 Summary of Transfer Payments

($ millions)	Forecast Spending 2001-2002	**Planned Spending 2002-2003**	Planned Spending 2003-2004	Planned Spending 2004-2005
Grants				
Program Management	1.0	**1.0**	1.0	1.0
Total Grants	1.0	**1.0**	1.0	1.0
Contributions				
Research and Technology Innovation (1)	52.7	**46.7**	45.5	45.5
Support for Innovation and the National Science and Technology Infrastructure (2)	96.3	**85.0**	93.4	93.4
Total Contributions	149.0	**131.7**	138.9	138.9
Total Grants and Contributions	150.0	**132.7**	139.9	139.9

(1) Details

Tri-University Meson Facility (TRIUMF): Located on the campus of The University of British Columbia, TRIUMF was established in 1968 and is Canada's national laboratory for research in particle and nuclear physics. An internationally recognized laboratory, TRIUMF is managed as a joint venture by a consortium of five universities (Universities of Alberta, British Columbia, Carleton, Simon Fraser and Victoria) and operated with contribution funds from the Government of Canada, which are managed by NRC.

International telescopes: NRC supports the construction and operation of international telescopes in order to ensure that Canadian researchers and students - spanning several professional disciplines - have access to sophisticated, cutting edge astronomical facilities. NRC currently supports the Canada-France-Hawaii Telescope and the James Clerk Maxwell Telescope in Hawaii and the Gemini Telescopes, twin facilities in Chile and Hawaii.

(2) Details

Industrial Research Assistance Program (IRAP): IRAP is NRC's principal program to help stimulate the innovative capacities of SMEs. Through expert advice and financial assistance, the program provides customized services to some 12,000 Canadian industrial firms every year to help them increase their innovative capacities. In 2000-2001, IRAP's total level of activity amounted to $142.61 million, including $95.7 million in contributions directly to 3,382 SMEs for 3,877 innovation capacity building projects, and $25.47 million in IRAP-Technology Partnerships Canada (TPC) contributions for pre-commercialization assistance. Through its expenditures, IRAP helps to build SME innovation capacity in terms of: (1) increased skills, knowledge, technical competencies and innovation; (2) improved management practices; (3) enhanced linkages; and (4) improved financial performance.

5.1.4 Details of Revenue

Spending of revenues pursuant to the NRC Act ($ millions)	Forecast Revenue 2001-2002	**Planned Revenue 2002-2003**	Planned Revenue 2003-2004	Planned Revenue 2004-2005
Research and Technology Innovation				
Fee for Service	27.2	**21.2**	21.6	22.4
Rentals	2.0	**1.6**	1.7	1.8
Royalties	3.8	**4.9**	6.0	6.0
Publications	2.3	**1.7**	1.6	3.8
Other	0.2	**0.4**	1.0	0.5
Support for Innovation and the National Science and Technology Infrastructure				
Fee for Service	6.5	**6.1**	6.5	6.8
Royalties	0.1	**0.1**	0.1	0.1
Publications	25.9	**28.0**	29.6	31.4
Other				
Program Management				
Fee for Service	1.0	**0.8**	0.8	0.8
Rentals	0.7	**0.5**	0.6	0.6
Other	2.0	**1.8**	4.4	3.0
Total	71.7	**67.1**	73.9	77.2

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

5.1.5 Net Cost of Program for the Estimates Year

($ millions)	**Total**
Planned Spending	**663.3**
Plus:	
Services Received without Charge	
Employer's share of health and employment insurance premiums paid by Treasury Board Secretariat	**13.3**
Employee compensation under Workers Compensation Acts paid by Human Resources Development Canada	**0.3**
Accommodation - Public Works and Government Services Canada	**0.2**
Cost of legal services provided by the Department of Justice Canada	**0.2**
	14.0
Total Cost of Program	**677.3**
Less:	
Spending of revenues pursuant to the NRC Act	**67.1**
2002-2003 Net Cost of Program	**610.2**

5.2 Government-wide and Horizontal/Collective Initiatives

Government-wide initiatives

Government-on-Line initiative: NRC will contribute to and support enhancements to the Science and Technology component of the Information and Service Gateways for Canadians and to the Innovation in Canada Portal.

The Canada Institute for Scientific and Technical Information will take a leadership role in supporting the introduction and use of collaborative software, extensive searching tools for information databases, and other Internet tools of use to the Government-on-Line Initiative. CISTI has introduced an e-commerce application and will develop new access and delivery mechanisms for electronic commerce over the Web. The result will be maximized utilization of CISTI's collections of scientific, technical and medical information, introduction of new desktop information delivery technologies and extension of client support services to all Canadians.

Collective initiatives

Industry Portfolio: As a Schedule II organization, NRC reports directly to the Parliament of Canada through the Minister of Industry and is one of fifteen departments and agencies that make up the Industry Portfolio. Together these organizations are uniquely positioned to advance the government's agenda in building national innovative capacity and help Canada move forward as a leading knowledge-based economy.

The Industry Portfolio is …

Atlantic Canada Opportunities Agency
Business Development Bank of Canada
Canadian Space Agency
Competition Tribunal
Copyright Board Canada
Canada Economic Development for Quebec Regions
Canadian Tourism Commission
Enterprise Cape Breton Corporation
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
Statistics Canada
Western Economic Diversification Canada

Through partnerships and projects, NRC has worked closely with Industry Portfolio partners over the years to leverage complementary resources and exploit synergies. During 2001, the members of the Industry Portfolio agreed upon four priority areas of cooperation in the future:

- ***Innovation*** – stimulating the creation and use of knowledge for the benefit of all Canadians;
- ***Business development*** – supporting the creation and growth of businesses (primarily SMEs) and industries;
- ***Sustainable communities*** – promoting inclusive economic growth in rural, urban and remote communities across Canada; and
- ***Marketplace*** - ensuring fair, efficient and competitive rules, standards and ways of operating.

Over the planning period, NRC will collaborate with its Portfolio partners in developing strategies and approaches to advance these four priorities.

Collective Initiatives – Technology Clusters Underway

Collective Initiative	Key Result Commitment	List of Partners	Money Allocated by Partners ($millions)	Planned Results
Atlantic Investment Partnership	Fostering technology clusters that develop the innovative capacity and socio-economic potential of Canada's communities.	ACOA & NRC	NRC was allocated $110 million over five years, starting in 2000-2001, from the $700 million Atlantic Investment Partnership for its *Atlantic Canada Innovation Initiative.*	▪ Create a globally competitive research and technology base for cluster development at the community level. ▪ Foster community leadership, champions and knowledge-based strategies. ▪ Leverage funding and new investment in the cluster with stakeholders. ▪ Stimulate the emergence of new firms, jobs, exports and investment growth.
Aerospace Technology Infrastructure Initiative	Provide the technology infrastructure needed to ensure the long-term international competitiveness of the Canadian aerospace industry (including access to national facilities, and leadership and direction in technology transition).	CED & NRC	NRC was allocated $43.4 million over the five-year period 2000-2001 to 2004-2005 for the development of the initiative, which comprises the construction of facilities and establishment of new research programs in Montreal and Ottawa. Additionally, CED is contributing $25 million over the same period toward the capital costs associated with the construction of the Aerospace Manufacturing Technology Centre in Montreal.	▪ Industrial and economic development: increasing and leveraging investments in Canadian aerospace technology, and increasing capacity of Canadian firms. ▪ Regional development: developing and transferring technology within local community. ▪ Advancement of knowledge: development, transfer and growth of knowledge and highly qualified personnel. ▪ Environmental and safety improvements: improve environmental, safety and quality performance of aerospace industry.

5.3 How to Reach Us

Corporate Headquarters
1200 Montreal Road
Montreal Road Campus
Ottawa, Ontario
K1A 0R6

President
Arthur J. Carty
(613) 993-2024
arthur.carty@nrc.ca

Vice-President, Research
Peter Hackett
(613) 993-9244
peter.hackett@nrc.ca

Vice-President, Technology and Industry Support
Jacques Lyrette
(613) 998-3664
jacques.lyrette@nrc.ca

NRC's Internet Web Site
http://www.nrc.ca/

Access to Information and Privacy
(613) 990-6111

General Inquiries
(613) 993-9101
r&d@nrc.ca

RPP Contact
Director, Policy, Planning and Assessment
Rob James
(613) 990-7381
rob.james@nrc.ca

NRC's Institutes, Branches, Programs and Technology Centres

The following is a listing of NRC's Institutes, Branches, Programs and Technology Centres. Where applicable, specific information can be found at the respective web site(s).

Biotechnology Group

Biotechnology Research Institute (BRI)
Montreal, Quebec
Director General: Michel Desrochers
General Inquiries: (514) 496-6100
http://www.nrc.ca/bri/

Institute for Biodiagnostics (IBD)
Winnipeg, Manitoba
Director General: Ian Smith
General Inquiries: (204) 983-7692
http://www.nrc.ca/ibd/

Institute for Biological Sciences (IBS)
Ottawa, Ontario
Director General: Gabrielle Adams
General Inquiries: (613) 993-5975
http://www.nrc.ca/ibs/

Institute for Marine Biosciences (IMB)
Halifax, Nova Scotia
Director General: George Iwama
General Inquiries: (902) 426-6829
http://www.nrc.ca/imb/

Plant Biotechnology Institute (PBI)
Saskatoon, Saskatchewan
Director General: Kutty Kartha
General Inquiries: (306) 975-5568
http://www.nrc.ca/pbi/

Information and Communications Technology Group

Institute for Information Technology (IIT)
Ottawa, Ontario
Director General: Andrew Woodsworth
General Inquiries: (613) 993-3320
http://www.nrc.ca/iit/

Institute for Microstructural Sciences (IMS)
Ottawa, Ontario
Director General: Richard Normandin
General Inquiries: (613) 993-4583
http://www.nrc.ca/ims/

Manufacturing Technologies Group

Innovation Centre
Vancouver, British Columbia
Director General: Maja Veljkovic
General Inquiries: (604) 221-3000
http://www.nrc.ca/icvan/

Institute for Chemical Process and Environmental Technology (ICPET)
Ottawa, Ontario
Acting Director General: Don Singleton
General Inquiries: (613) 998-8192
http://www.nrc.ca/icpet/

Industrial Materials Institute (IMI)
Boucherville, Quebec
Director General: Blaise Champagne
General Inquiries: (450) 641-5100
http://www.nrc.ca/imi/

Integrated Manufacturing Technologies Institute (IMTI) - London, Ontario
Director General: Georges Salloum
General Inquiries: (519) 430-7000
http://www.nrc.ca/imti/

Other Institutes and Programs

Canada Institute for Scientific and Technical Information (CISTI) - Ottawa, Ontario
Director General: Bernard Dumouchel
General Inquiries: (613) 993-2341
http://www.nrc.ca/cisti/

Herzberg Institute of Astrophysics (HIA)
Victoria and Penticton, British Columbia
Acting Director General: Jim Hesser
General Inquiries: (250) 363-8262
http://www.nrc.ca/hia/

Industrial Research Assistance Program (IRAP)
Ottawa, Ontario
Director General: Margot Montgomery
General Inquiries: (613) 993-5326
http://www.nrc.ca/irap/

Institute for Aerospace Research (IAR)
Ottawa, Ontario and Montreal, Quebec
Director General: Bill Wallace
General Inquiries: (613) 993-0141
http://www.nrc.ca/iar/

Institute for Marine Dynamics (IMD)
St. John's, Newfoundland
Director General: Tom LeFeuvre
General Inquiries: (709) 772-2469
http://www.nrc.ca/imd/

National Institute for Nanotechnology (NINT)
Edmonton, Alberta and Ottawa, Ontario
Acting Director General: Danial A. Wayner
General Inquiries: (613) 991-0940
http://www.nrc.ca/nanotech

Institute for National Measurement Standards (INMS) - Ottawa, Ontario
Director General: Janusz Lusztyk
General Inquiries: (613) 990-8750
http://www.nrc.ca/inms/

Institute for Research in Construction (IRC)
Ottawa, Ontario
Director General: Sherif Barakat
General Inquiries: (613) 993-2443
http://www.nrc.ca/irc/

Steacie Institute for Molecular Sciences (SIMS)
Ottawa, Ontario
Director General: Dennis Salahub
General Inquiries: (613) 990-0970
http://www.nrc.ca/sims/

Technology Centres

Canadian Hydraulics Centre (CHC)
Ottawa, Ontario
Director: Etienne Mansard
General Inquiries: (613) 993-2417
http://www.nrc.ca/chc

Centre for Surface Transportation Technology (CSTT)
Ottawa, Ontario and Vancouver, British Columbia
Director: John Coleman
General Inquiries: (613) 998-9639
http://www.nrc.ca/cstt/

Corporate Branches – Ottawa, ON

Administrative Services and Property Management (ASPM)
Director General: Subash Vohra
General Inquiries: (613) 993-2440
Subash.Vohra@nrc.ca

Corporate Services (CS)
Acting Director General: Don Di Salle
General Inquiries: (613) 993-4769
Don.Di_Salle@nrc.ca

Finance Branch (FB)
Director General: Jean-Guy Séguin
General Inquiries: (613) 990-7471
Jean-Guy.Seguin@nrc.ca

Human Resources Branch (HRB)
Director General: Mary McLaren
General Inquiries: (613) 993-9391
Mary.McLaren@nrc.ca

Information Management Services Branch (IMSB)
Director General: Andy Savary
General Inquiries: (613) 991-3773
Andy.Savary@nrc.ca