ESTIMATES

National Research Council Canada

Performance Report

For the period ending
March 31, 2001

Canada

Improved Reporting to Parliament
Pilot Document

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 of the Government of Canada are structured in several parts. Beginning with an overview of total government spending in Part I, the documents become increasingly more specific. Part II outlines spending according to departments, agencies and programs and contains the proposed wording of the conditions governing spending which Parliament will be asked to approve.

The *Report on Plans and Priorities* provides additional detail on each department and its programs primarily in terms of more strategically oriented planning and results information with a focus on outcomes.

The *Departmental Performance Report* provides a focus on results-based accountability by reporting on accomplishments achieved against the performance expectations and results commitments as set out in the spring *Report on Plans and Priorities*.

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 funds.

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Foreword

In the spring of 2000 the President of the Treasury Board tabled in Parliament the document "Results for Canadians: A Management Framework for the Government of Canada". This document sets a clear agenda for improving and modernising management practices in federal departments and agencies.

Four key management commitments form the basis for this vision of how the Government will deliver their services and benefits to Canadians in the new millennium. In this vision, departments and agencies recognise that they exist to serve Canadians and that a "citizen focus" shapes all activities, programs and services. This vision commits the government of Canada to manage its business by the highest public service values. Responsible spending means spending wisely on the things that matter to Canadians. And finally, this vision sets a clear focus on results – the impact and effects of programs.

Departmental performance reports play a key role in the cycle of planning, monitoring, evaluating, and reporting of results through ministers to Parliament and citizens. Earlier this year, departments and agencies were encouraged to prepare their reports following certain principles. Based on these principles, an effective report provides a coherent and balanced picture of performance that is brief and to the point. It focuses on results – benefits to Canadians – not on activities. It sets the department's performance in context and associates performance with earlier commitments, explaining any changes. Supporting the need for responsible spending, it clearly links resources to results. Finally the report is credible because it substantiates the performance information with appropriate methodologies and relevant data.

In performance reports, departments strive to respond to the ongoing and evolving information needs of parliamentarians and Canadians. The input of parliamentarians and other readers can do much to improve these reports over time. The reader is encouraged to assess the performance of the organization according to the principles outlined above, and provide comments to the department or agency that will help it in the next cycle of planning and reporting.

This report is accessible electronically from the Treasury Board of Canada Secretariat Internet site:
http://www.tbs-sct.gc.ca/rma/dpr/dpre.asp
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National Research Council Canada
Conseil national de recherches Canada

NRC · CNRC

Departmental Performance Report

For the Period ending
31 March 2001

Canada

Acronyms

APEC	Asia-Pacific Economic Cooperation
BRI	Biotechnology Research Institute
CFHT	Canada France Hawaii Telescope
CHC	Canadian Hydraulics Centre
CIHR	Canadian Institutes of Health Research
CISTI	Canada Institute for Scientific and Technical Information
CSTT	Centre for Surface Transportation Technology
CTN	Canadian Technology Network
CS	Corporate Services
FPTT	Federal Partners in Technology Transfer
FTE	Full-Time Equivalent
GAO	General Accounting Office (United States)
HIA	Herzberg Institute of Astrophysics
IAR	Institute for Aerospace Research
IBD	Institute for Biodiagnostics
IBS	Institute for Biological Sciences
IC	Innovation Centre
ICPET	Institute for Chemical Process and Environmental Technologies
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
IRAP	Industrial Research Assistance Program
IRC	Institute for Research in Construction
JCMT	James Clerk Maxwell Telescope
OAG	Office of the Auditor General of Canada
OECD	Organisation for Economic Co-operation and Development
NRC	National Research Council Canada
NSERC	Natural Sciences and Engineering Research Council of Canada
PBI	Plant Biotechnology Institute
R&D	Research and Development
S&T	Science and Technology
SIMS	Steacie Institute for Molecular Sciences
SME	Small and medium–sized enterprises
TPC	Technology Partnerships Canada
TRIUMF	Tri-University Meson Facility
TTC	Thermal Technology Centre

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Executive Summary

The National Research Council Canada (NRC) is Canada's largest public sector research and development agency, with a mandate to undertake, assist or promote scientific and industrial research in fields of importance to Canada. In the early 1990s, NRC predicted that innovation in an international context would be Canada's most significant challenge. In a global economy driven by knowledge and innovation, companies can locate anywhere in the world. They choose to locate wherever local conditions make innovation efficient.

In response to this challenge, NRC launched, in 1995, its vision to be a leader in the development of Canada's knowledge-based economy through science and technology. NRC has focused its strengths on building the innovation infrastructure that Canada needs for the 21st century. In pursuing its *Vision to 2001* over the last five years, NRC has successfully transformed its organization, operations and activities to maximize its contributions across the spectrum, from discovery to innovation. Highlights from this year's performance include:

- NRC contributes to Canada's scientific reputation. This is evidenced by the number of awards and recognition received by staff, over 1,300 articles accepted for publication in refereed scientific journals, 1,800 invited talks, and 780 invitations to serve on international committees.

- The success stories and testimonials from some of NRC's partners provided in this report illustrate the many benefits of working with NRC. The number of organizations coming to work with NRC is continuing to increase. In 2000-2001, NRC participated in over 1,200 formal research and development agreements with external partners from industry, government and academia. An additional 2,300 clients received products or services from NRC research institutes. All of these activities help raise the level of innovation in Canada.

- NRC continues to play a crucial role in linking the creators of knowledge and those who can best use it. In 2000-2001, NRC provided innovation advice, services and support to more than 12,000 Canadian firms through its Industrial Research and Assistance Program (IRAP). The Canadian Technology Network's (CTN) 1,000 members provided advice and pathfinding services to their clients, answered over 2,000 requests for information and organized over 400 workshops for SMEs. The Canada Institute for Scientific and Technical Information (CISTI) broke new ground in the access to and dissemination of scientific, technical and medical information, providing one million documents to its clients.

- NRC contributes to the growth of new technology-based companies. In 2000-2001, NRC created nine new companies to commercialize technologies from institutes and centres, bringing the total number of companies created since 1995-1996 to just under 50. NRC increased technology licensing efforts and undertook co-development and transfer of new technologies to companies, all leading to new products and services. In support of young and emerging Canadian companies, NRC's two Industry Partnership Facilities (IPFs) are filled to capacity and to help with this demand, NRC is building two new IPFs.

- NRC works with communities across Canada to help create an environment for innovation. NRC is proud to be part of the success of the biotechnology technology clusters in Montreal (pharmaceutical) and Saskatoon (agri-food), and is applying its model to new initiatives in Quebec (aerospace, aluminium), Alberta (nanotechnology) and Atlantic Canada (information technology, life sciences, ocean technology). Through a sustained investment in R&D, NRC is helping these communities reach the critical mass necessary for innovation.

- NRC contributes to the generation of scientific knowledge by maintaining major strategic research investments and generating new initiatives in critical fields such as genomics; fuel cells; photonics; aerospace; advanced manufacturing and materials; astronomy; nanotechnology, molecular sciences, biotechnology and environmental technologies. NRC is building on its competencies to create new R&D programs, bringing together multidisciplinary teams to work on bioinformatics, high performance computing, molecular electronics, nanostructures and other leading edge areas.
- NRC contributes to the branding of Canada as a knowledge-based economy through its international activities including R&D cooperation, NRC-led missions abroad to develop technology-based ventures, contributions to international efforts for improving the management of S&T by sharing experiences with international organizations, and outreach to emerging economies to help Canadian companies access distant markets.
- NRC helps Canadian companies to be better positioned to take advantage of globalization. NRC advances Canada's national standards, measurements and codes, signing new international agreements to help reduce technical barriers to trade and increase exports by Canadian-based companies.

- NRC helps produce the highly qualified personnel that are the cornerstone of the knowledge-based economy. Every year, NRC works with Canada's youth through training and development, direct job experience, workshops, seminars and public outreach programs. Over 900 young researchers come to work in NRC laboratories and institutes each year, and through IRAP an additional 640 students gained valuable work experience in Canadian small and medium sized enterprises. Over 1,000 guest workers a year receive advanced training while working in NRC laboratories.

This is the last year that NRC will report on its progress towards the goals set out in its *Vision to 2001*. Over the last five years of this vision, NRC has demonstrated a valued return on the government's investment. 2000-2001 was a year of renewal and recommitment, as NRC moved to chart its course for the next five years. NRC has undertaken extensive consultations, engaging hundreds of stakeholders inside NRC, as well as from government, industry and academia and key interest groups in the development of its new vision. This new strategy sharpens NRC's focus on the needs and opportunities of Canada and all Canadians. It builds on NRC's strategic strengths, its national and international leadership and reputation in research, development and innovation, and most of all, the exceptional dedication, creativity and contributions of its people.

Section 1: Messages

Minister's Portfolio Message

The Industry Portfolio is…

Atlantic Canada Opportunities Agency
Business Development Bank of Canada *
Canada Economic Development for Quebec Regions
Canadian Space Agency
Canadian Tourism Commission *
Competition Tribunal
Copyright Board Canada
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 Performance Reports*

The Government of Canada is committed to making Canada a world leader in the global knowledge-based economy of the 21st century. To meet this goal, the government has set out a very bold vision: to have Canada recognized as one of the most innovative countries in the world.

Why this emphasis on innovation? Innovation is one of the most powerful sources of competitive advantage in modern economies. It fuels productivity and economic growth and that translates into greater prosperity and a better quality of life for all Canadians. Our ability to acquire, adapt, and advance knowledge will determine how well Canadian businesses and Canada as a nation innovate, and in turn, how well Canada competes in the global arena.

Promoting innovation, research and development is a cornerstone of our government's agenda, and we have made progress. Canadian businesses have boosted their research and development (R&D) spending at the second fastest rate among G-7 countries. We have the fastest rate of growth in R&D jobs. And the government is committed to doubling its R&D investments and catapulting Canada into the ranks of the top five countries in the world for research and development performance by 2010.

When it comes to embracing the Internet revolution, or what has come to be known as connectivity, Canada's record is the envy of the world. Our country is one of the most connected countries in the world. We connected all of our schools and libraries to the Internet over two years ago. We have the highest percentage of our population on-line of any country in the world. Furthermore, the National Broadband Task Force has advised the government on how Canadians together can achieve the critical goal of making broadband access widely available to citizens, businesses, public institutions and to all communities in Canada by 2004.

As Minister of Industry, I am responsible for the Industry Portfolio, which consists of fifteen departments and agencies that play a key role in delivering on the government's agenda. With over 40 percent of federal government spending on science and technology, and a wide range of complementary programs to help

businesses both large and small thrive and prosper, the Industry Portfolio has a national reach, regional depth and community presence across the country.

I am pleased to present this Performance Report for the National Research Council Canada (NRC), which shows its contribution, during 2000-2001, to the government's agenda.

2000-2001 was a year of outstanding achievement for NRC. NRC worked across the innovation spectrum, from research discovery to technology commercialization, putting science to work for Canada and all Canadians. NRC worked with partners from all sectors to build and improve the effectiveness of Canada's innovation systems, nurtured national and international networks and collaborations and helped foster the growth of community-based technology clusters in every region. NRC developed new solutions, technologies and innovations that safeguard our environment, improve and protect health, create new sources of wealth, and help Canada compete in the global knowledge economy. NRC created new value for Canada, building national R&D and innovation infrastructure, nurturing the innovative capabilities of SMEs, and increasing its technology transfer, commercialization, and knowledge dissemination activities. NRC encouraged 9 research-based enterprises to spin out of its laboratories, increased its licensing activities and improved its dissemination and diffusion of technical information and advice. In the past year, more than 70 firms were incubating at NRC. In the past six years, NRC has created nearly 50 firms. NRC remains focused on Canada's future and is committed to improving the quality of life for Canadians and delivering what Canada needs to succeed in the global innovative, knowledge economy.

The government's strategy has been to strengthen Canada's capacity for innovation by investing in research and knowledge, and by fostering a nation of highly skilled people. We are assisting all Canadians with life-long access to the tools and skills they need for success. We are laying the foundation of a state-of-the-art research environment in which our best and brightest can make their ground-breaking discoveries right here at home. And we are working with our researchers and entrepreneurs to make sure that Canada is the place where new products and processes get to market first and fastest.

The Honourable Brian Tobin

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

We have confidence in Canada's potential to foster a culture of discovery and innovation. The federal government is taking measures to reinforce Canada's competitiveness, improve the well-being of Canadians and build on Canada's image as a truly innovative society that values the contribution of its talented and skilled people.

New discoveries, knowledge infrastructure, business environment, human capital and marketing of knowledge are all things that we as a country need to strengthen to ensure Canadian leadership in the area of innovation. The National Research Council Canada, the Natural Sciences Engineering Research Council of Canada and the Social Sciences and Humanities Research Council of Canada play essential parts in helping Canadians innovate and understand their world through science, research and development. We call upon experts from the social sciences, natural and physical sciences, humanities, medicine and engineering to inform us of what their disciplines can, and cannot, tell us about the increasingly complex issues that we face every day. This partnership allows us to better comprehend the full scope of the issues we face as a society, and helps us to frame the questions that remain to be answered.

The federal government has important roles as both a performer and a facilitator of science and technology. It fulfills these roles by performing research, using intra-mural capabilities and facilities, by funding extra-mural research, and by fostering partnerships between government, industry and universities. With the recognition that the sciences and technology are moving to the centre of decision-making in all walks of life, this is an opportune moment to pause and reflect on how we as a society keep abreast of the impacts and implications of science and technology.

The Honourable Gilbert Normand

Section 2: Departmental Performance

Societal Context – Challenges and Opportunities

National and International Context

All nations, including Canada, are faced with the constant challenge of keeping up with the ever-increasing pace of technological change and the generation of new knowledge. The introduction of new and sometimes disruptive technologies (such as bioinformatics and genomics, photonics, and nanotechnology) is giving rise to new endeavours and reshaping Canada's traditional industrial base. Intellectual capital and innovation are becoming increasingly important as sources of value for the next generation of wealth creators, and these are mobile assets in today's global marketplace.

Over the last two decades Canada's share of the world's scientific publications has remained at around 4.5 percent, showing Canada's dependence on knowledge produced abroad. A 1996 study of the Organisation for Economic Cooperation and Development (OECD) indicated that, in the mid-1980s, the United States and Japan imported less than 10% of their new technologies, Germany about 25%, France 37%, the United Kingdom 42% and Canada more than 65%. Those figures clearly indicate the necessity of maintaining a global network. Addressing key societal issues such as quality of life, education, health and the environment depends on human ingenuity and the best use of new knowledge, wherever it is available in the world.

Federal Context

In the Speech from the Throne (January 2001), the Government committed to at least doubling current federal expenditures in research and development and helping move Canada to become one of the top five countries for R&D performance by 2010.

NRC, with its national R&D infrastructure and capabilities and its international linkages, is well positioned to assist in improving Canada's R&D performance. NRC has contributed to building networks of researchers and entrepreneurs, provided a training ground for the next generation of highly skilled workers and has translated new knowledge into economic and social benefits for Canadians. NRC has supported the Government's goals by intensifying the leveraged impact of its collaborative R&D projects and its extensive national and international networks,

> "Our objective should be no less than to be recognized as one of the most innovative countries in the world. Achieving this will require a comprehensive approach and the support and participation of all governments, businesses, educational institutions and individual Canadians… An innovative economy is essential to creating opportunity for Canadians… An innovative economy is driven by research and development… To secure our continued success in the 21st century, Canadians must be among the first to integrate new knowledge and put it to use."
>
> **Speech from the Throne**
> **30 January 2001**

achieving results that could not be realized alone. NRC has recognized that innovation occurs at the local level, and the creation and support of technology clusters in communities and regions across the country has been a key element in what NRC has done to further the government agenda.

OPERATING CONTEXT

Excellence in research and innovation at NRC depends heavily on its ability to attract, train and retain highly qualified scientists, engineers, technologists and other professionals. While NRC strives to offer the kind of working environment that attracts and keeps top quality staff, NRC faces stiff national and international competition for the most talented knowledge workers. At present, 56% of NRC's knowledge workers (with continuing status) are over 45 years old. As 31 March 2001, 10% are eligible to retire, with an additional 9% becoming eligible by 2006. Since people are at the core of NRC's success, NRC must ensure that it continues to be a magnet for the most talented and imaginative workers.

NRC's staff and specialized research equipment are located in almost 200 laboratories, test facilities and offices across Canada. The value of these buildings is currently estimated to be $800 million. Sixty percent of NRC's buildings were constructed over 30 years ago, and now require considerable upgrades to maintain the government's infrastructure investment. NRC faces challenges in keeping its facilities and equipment up-to-date to so that it can continue to support Canadian industry in becoming more technology intensive and innovation driven. NRC must consider how it will provide the necessary infrastructure and equipment to meet requirements as well as emerging opportunities of benefit to Canada.

Two additional factors are causing budgetary challenges for NRC: rising utility and fuel costs and changes in the relative value of the Canadian dollar.

- With a large physical asset portfolio to manage, NRC faces budgetary pressures when utility and fuel rates increase, because these rising costs are diverting funds away from research programs. NRC has pursed energy efficiency initiatives such as energy efficient building retrofit and the replacement of old equipment with more energy efficient facilities.
- The relative value of the Canadian dollar impacts significantly on NRC's ability to undertake international R&D collaborations and projects that are essential to opening global markets to Canadian industries and firms.

NRC OBJECTIVES AND PRIORITIES – FROM *VISION TO 2001* TO *VISION TO 2006*

For the past five years, NRC has been guided by a broad vision, *Vision to 2001*, which has emphasized NRC's leadership in developing an innovative, knowledge-based economy through science and technology. NRC's proposed new *Vision to 2006* continues to reflect this commitment. The Vision's strategic pillars will focus on:

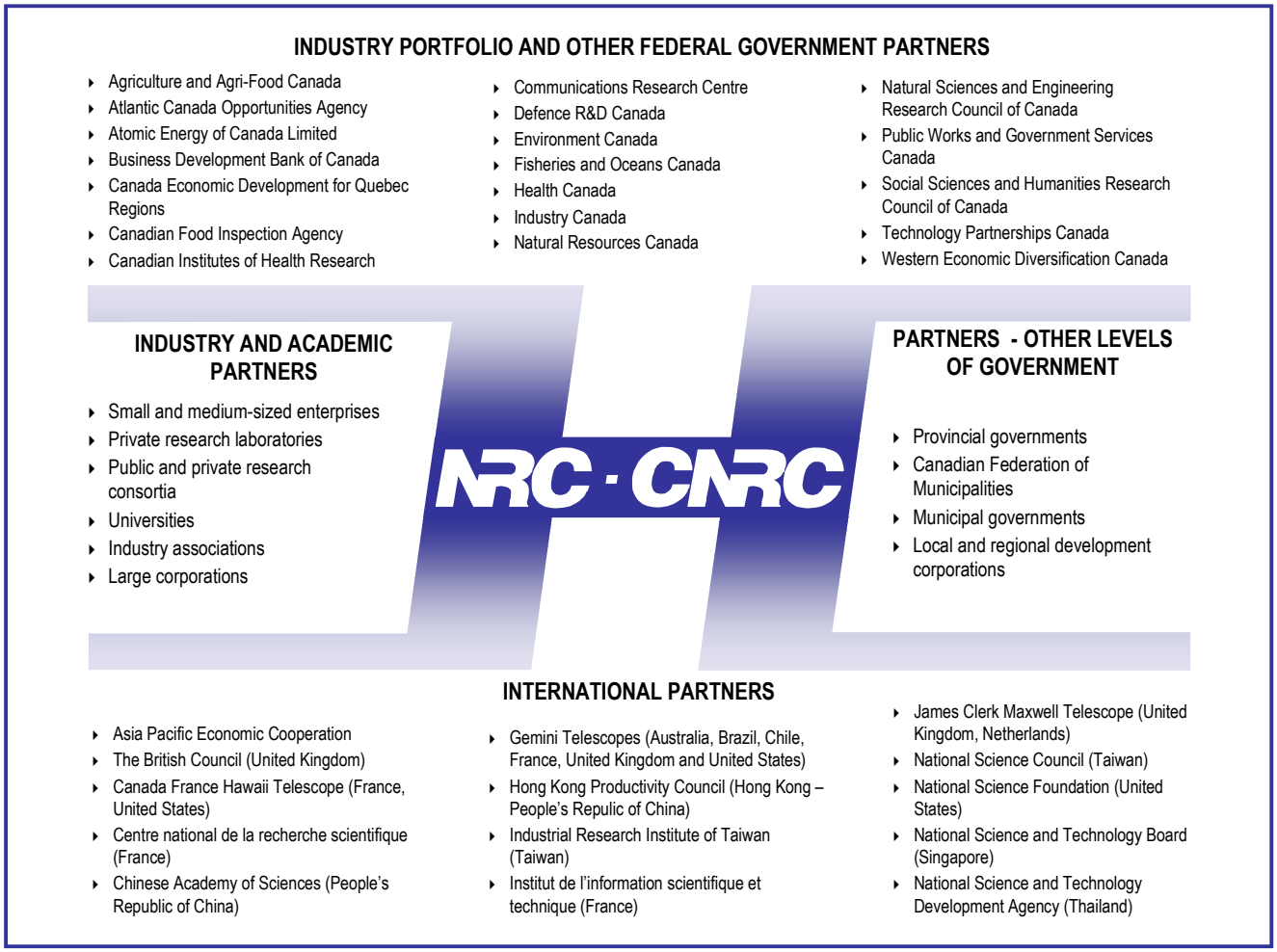
- outstanding people – outstanding employer – recognition as a leading research organization distinguished by creativity and innovation;
- excellence and leadership in research & development – integration of public and private strengths to create new opportunities and meet national challenges for Canada;

- 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.

To realize its new *Vision to 2006*, NRC will develop new strategic directions, goals, outcomes and a related performance framework and measurement strategy.

NRC's Strategic Partners

To fulfill its Vision, NRC works with a variety of partners and networks across a wide spectrum. The diagram below provides examples of NRC's key partners. Specific examples of the accomplishments achieved as a result of these relationships are documented throughout this report.



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
- **Manufacturing Technologies** – Industrial Material Institute, Institute for Chemical Process and Environmental Technologies, Integrated Manufacturing Technologies Institute and Innovation Centre
- **Aerospace Technologies** – Institute for Aerospace Research
- **Ocean Engineering and Marine Industries** – Institute for Marine Dynamics
- **Astronomy and Astrophysics** – Herzberg Institute of Astrophysics
- **Construction** – Institute for Research in Construction
- **Molecular Science** – Steacie Institute for Molecular Sciences
- **Measurement Standards** – Institute for National Measurements Standards

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 and Thermal Technology Centre

BUSINESS LINE 3 - PROGRAM MANAGEMENT

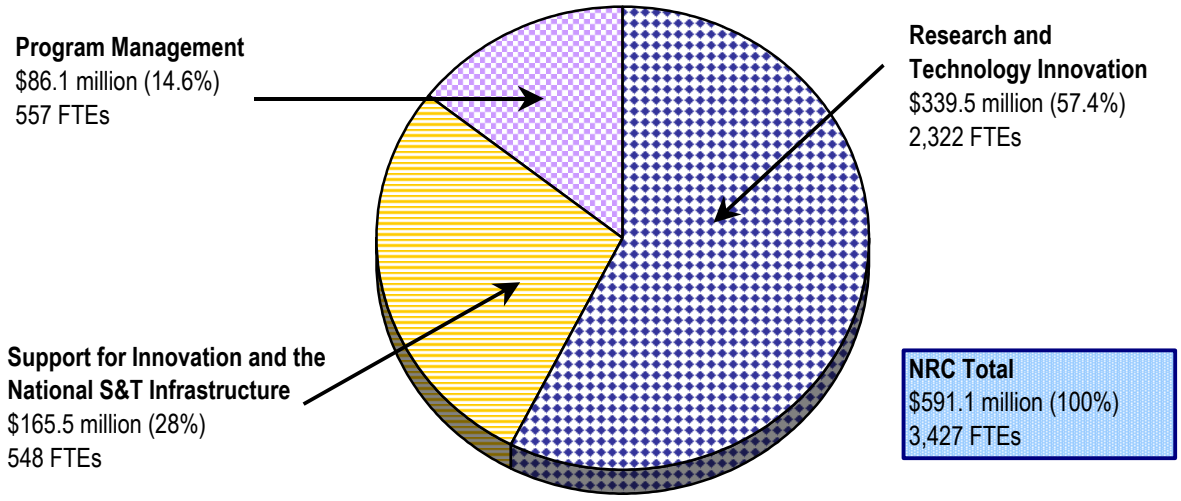
Objective
To provide efficient, client-focused services, which enhance NRC's effectiveness as an integrated, dynamic science and technology organization.

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**

EXPENDITURES PER BUSINESS LINE



Performance Accomplishments

This is the last year that NRC will be reporting its performance against its *Vision to 2001*, a five-year strategy that was aimed at supporting the development of Canada's innovative knowledge economy and a higher quality of life for all Canadians. NRC's work over these past five years responded directly to the needs and priorities of government, industry and all Canadians. NRC can report on a number of successes in R&D, in technology development and commercialization, in opening international doors for industry and in nurturing the growth of Canadian innovation – nationally, regionally and at the community level across Canada. Just as important, however, are the changes that have occurred at NRC. Over the past five years, NRC has become a more agile, adaptive organization through its focus on entrepreneurship. It has improved its ability to disseminate technical information and advice, and has adopted best practices in commercialization and technology transfer. The majority of NRC's research projects are now undertaken in collaboration with partners, and particularly through international linkages, NRC brings the best in the world to Canada. NRC has also recognized the value its institutes can bring to the development of local technology clusters and has devoted resources to these efforts. Each year, illustrating all NRC activities and their impacts and results is a daunting task; this report showcases the best examples of NRC's results in providing benefit and value to Canadians for 2000-2001.

Challenges of Measuring R&D Results

Research and development projects can take several years before their results are known or are ready for application, and each year the progress on most projects is incremental in nature. Therefore, some of the results found in this report could be attributed to investments made two, five, or even ten years ago. However, after several years, it becomes a complex and expensive undertaking to trace all of the impacts and assess a reasonable attribution back to NRC. This is true for internal research projects as well as for R&D projects supported by IRAP. The challenges with measuring results from R&D organizations on an annual basis have been noted by the Office of the Auditor General of Canada (OAG), the United States' General Accounting Office (GAO), OECD, and public and private sector R&D organizations.

In response to the challenges in measuring direct results and identifying the impacts of R&D, leading R&D organizations have developed and implemented performance measurement strategies based on indicators that are both qualitative and quantitative. Some of the indicators used in this report point to or illustrate the process or concept in question, but do not directly measure it. They serve as proxies to assess the results of R&D activity.

Key Result Commitments

The following section highlights how Canadians benefit from the government's long-term investment in NRC. NRC's performance accomplishments are demonstrated by key result commitment and by relevant business line.

Chart of Key Results Commitments (CKRC)

The primary function of the Chart of Key Results Commitments is to communicate to Canadians the results of NRC's commitments.

DEVELOPMENT OF AN INNOVATIVE, KNOWLEDGE-BASED ECONOMY		
To provide Canadians with:	**To be demonstrated by:**	**Reported on pages:**
A research program that focuses on excellence and knowledge, and that is relevant to Canadian needs	▪ Recognition of NRC's research excellence ▪ Acceptance and use of NRC's research advances ▪ Investment in and use of NRC's facilities ▪ Highly qualified personnel ▪ Influence and recognition in international S&T	p. 16 p. 16 p. 18 p. 19 p. 21
Economic growth by helping Canadian firms develop new, marketable technologies	▪ Partner involvement in research projects ▪ Technical and commercial successes NRC partners ▪ NRC's services and support – client and partner satisfaction	p. 22 p. 23 p. 24
Technology-based economic growth in communities across the country	▪ Progress on regional initiatives ▪ Influence of NRC's industry support and information networks ▪ Use and impacts of codes and standards	p. 26 p. 28 p. 30
Transfer of NRC's successes to Canadian firms	▪ Results of patent and licence sales ▪ Technology and information transfers activities ▪ Introduction of improved management tools and systems	p. 30 p. 33 p. 34

VISION TO 2001 – KEY RESULTS COMMITMENTS CROSSWALK

The table below shows the link between NRC's Vision, its key result commitments, performance indicators and relevant business lines.

DEVELOPMENT OF AN INNOVATIVE, KNOWLEDGE-BASED ECONOMY			
***Vision to 2001* Elements:**	**Key Results Commitments:**	**Performance Indicators:**	**Relevant Business Line(s):**
Being dedicated to excellence in advancing the frontiers of scientific and technical knowledge in areas relevant to Canada;	*A research program that focuses on excellence and knowledge, and that is relevant to Canadian needs*	▪ Recognition of NRC's research excellence ▪ Acceptance and use of NRC's research advances ▪ Investment in and use of NRC's facilities ▪ Highly qualified personnel ▪ Influence and recognition in international S&T	▪ BL 1 ▪ BL 1 ▪ BL 1 ▪ BL 1, 2 and 3 ▪ BL 1
Carrying out focused research, in collaboration with industrial, university and government partners, to develop and exploit key technologies;	*Economic growth by helping Canadian firms develop new, marketable technologies*	▪ Partner involvement in research projects ▪ Technical and commercial successes NRC partners ▪ NRC's services and support – client and partner satisfaction	▪ BL 1 ▪ BL 1 and 2 ▪ BL 1, 2 and 3
Providing strategic advice and national leadership to integrate key players in Canada's system of innovation;	*Technology-based economic growth in communities across the country*	▪ Progress on regional initiatives ▪ Influence of NRC's industry support and information networks ▪ Use and impacts of codes and standards	▪ BL 1, 2 and 3 ▪ BL 2 ▪ BL 1
Taking a more aggressive, entrepreneurial approach to ensure the transfer of our knowledge and technological achievements to Canadian-based firms.	*Transfer of NRC's successes to Canadian firms*	▪ Results of patent and licence ▪ Technology and information transfers activities ▪ Introduction of improved management tools and systems	▪ BL 1 ▪ BL 1 ▪ BL 1, 2 and 3

Key Result Commitment

A research program that focuses on excellence and knowledge, and that is relevant to Canadian needs.

Performance Indicator (relevant Business Line):

▪ Recognition of NRC's research excellence	BL 1
▪ Acceptance and use of NRC's research advances	BL 1
▪ Investment in and use of NRC's facilities	BL 1
▪ Highly qualified personnel	BL 1, 2 and 3
▪ Influence and recognition in international S&T	BL 1

Recognition of NRC's Research Excellence

Peer Recognition

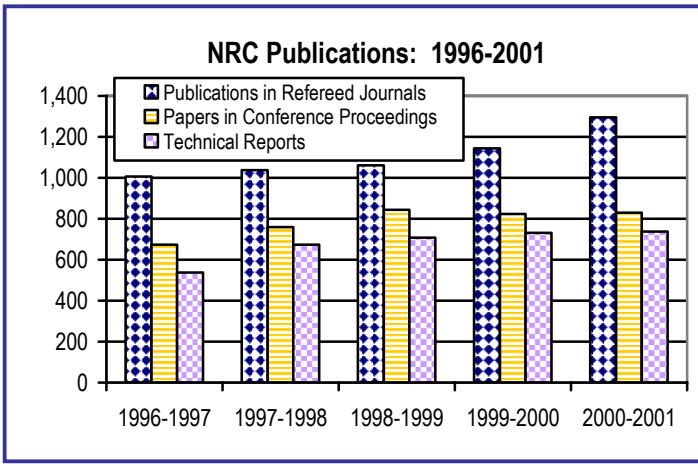
Scientific excellence remains the foundation on which all of NRC's research activities and services are based. A primary indicator of excellence is the formal recognition by peers in Canada and around the world through the awarding of prestigious national and international awards. An "astronomical" award was made to Dr. Donald Morton on the occasion of his retirement from NRC, when the International Astronomical Union named Minor Planet 20106 "Morton" in his honour. David Balam from the University of Victoria discovered this planet in 1995 using NRC's 1.8-m Plaskett Telescope. In February 2001, Arthur J. Carty, NRC President, was appointed an Officer of the Order of Canada for his energetic leadership and clear vision that have made the Council a major player in the development and expansion of new frontiers of scientific exploration. Two NRC researchers, Drs. Robert Wolkow and John Ripmeester were made Fellows of the Royal Society of Canada.

Success in attracting resources, or grants, from external organizations in a peer-reviewed competitive process is another measure of excellence. In 2000-2001, NRC researchers were awarded over $18 million in external grants. Organizations funding NRC researchers include the Manitoba Health Research Council, the Heart and Stroke Foundation, the Kidney Foundation, the National Cancer Institute of Canada, the Children's Hospital of Eastern Ontario Research Fund, the New York Sea Grant Institute, and Imperial College. NRC staff with adjunct professorships, as well as NRC researchers who are members of collaborations or consortia, received funding from PRECARN, NSERC, CIHR, and a number of centres of excellence. A large proportion of this grant money goes towards the hiring of young researchers, who gain experience working in NRC laboratories.

Acceptance and Use of NRC's Research Advances

Publications

Acceptance of scientific papers in leading peer-reviewed publications and conference publications; and invitations to present papers at workshops, meetings and other



events are internationally acknowledged measures of research quality and relevance. They are also one of the main ways that developments in science and technology are communicated. In some fields, conference papers are the preferred method for communicating research breakthroughs, and in others they are the main way of broadening NRC's reach to an industrial audience. NRC researchers wrote almost 1,300 articles in refereed journals and delivered over 1,800 papers to external audiences at conferences around the world. The high quality of these papers is evidenced by:

- A British study concluded that the Canada France Hawaii Telescope (CFHT) and James Clerk Maxwell Telescope (JCMT), two facilities supported by NRC, received twice as many citations as any other telescopes in their respective classes.
- Since 1995, NRC researchers have published 38 articles in two of the highest ranked scientific journals *Science* and *Nature*, gaining international recognition for Canadian research excellence. In 2000-2001, five articles reported NRC breakthroughs in these publications.
- In 2000-2001, a full-scale assessment of the five institutes in NRC's Biotechnology Program, the largest of NRC's three technology groups, was undertaken. The bibliometric analysis prepared by the *Observatoire des sciences et des technologies* as part of this assessment found that papers from NRC's biotechnology institutes had a greater impact factor relative to papers written in other G7 countries. The peer review confirmed that the Biotechnology Group's researchers were of top quality, with international reputations.

Leading edge research

NRC research institutes work primarily in collaboration with industrial partners, but they also devote a percentage of their resources to leading edge basic research. Work in new areas like nanotechnology, biotechnology and genomics, fuel cells and advanced manufacturing and materials helps NRC maintain a strong knowledge base and thus predict future technologies of importance to Canada. NRC institutes have developed a number of mechanisms to ensure adequate resources for this important activity; however, most have reported a declining capacity to meet the future as well as the present needs of their industrial clients. In 2000-2001,

- Researchers in London, Ontario maintained international leadership in laser consolidation and surface modification, a new manufacturing technology that can produce high quality complex shapes faster, cheaper, and with less waste. An article by the editor of *Opto and Laser Europe* for its January/February 2001 issue highlighted NRC's achievements in finishes and tolerances on components produced by the laser consolidation process.
- Researchers in Winnipeg discovered an innovative non-invasive diagnostic test for rheumatoid arthritis (RA) that can detect RA in its very early stages in collaboration with the University of Manitoba. Based on near infrared (NIR) spectroscopy, the test is fast, highly accurate, economical, and if approved, will be easily accessible through a physician's office, clinic, or hospital. Over three million people in North America are affected by RA.
- Obtained a variety of theoretical results that will increase understanding of the optical properties of quantum dots though work under the Canada Europe Research Initiative in Nanostructures (CERION) network, a group of 17 European and 8 Canadian nodes that are participating in similar research on nano-electronics, nano-optics and the technology of advanced nanostructures. These technologies will

be of critical importance to the semiconductor and microelectronics sectors as the physical limits of current technologies are reached. Networking and communication of research advances between Canadian and European partners is achieved through research collaborations and exchanges and an annual meeting. NRC co-manages the CERION program.

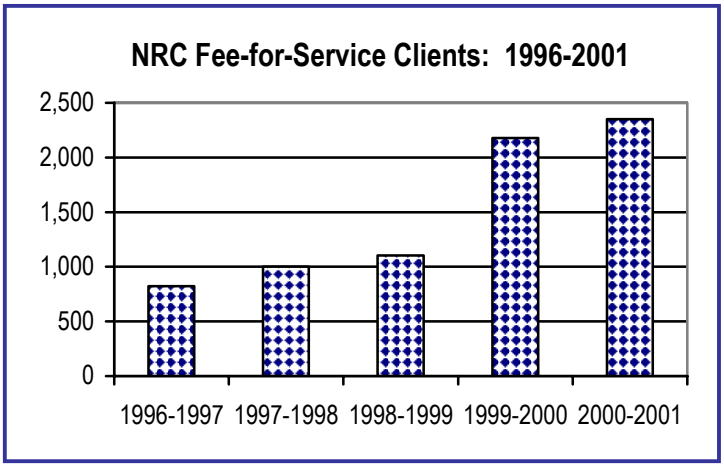
- Used the Internet to provide access to an archive of digital data from the Canadian national observatories and other data sets, including that of the Hubble Space Telescope (HST). NRC's innovative approaches to software and data management allow users to access the data in a scientifically useful way. NRC successfully met the challenge to have data from the new camera at the CFHT publicly available within one year.
- Demonstrated leadership in laser science and photonics, producing the world's shortest pulses (1.8 femtosecond pulses) in collaboration with the Technical University of Vienna. These short pulses may be used to gain insights into atomic processes on a femtosecond time scale.

Increasingly, NRC institutes are collaborating internally on multidisciplinary projects, bringing new methods and providing unique insights into traditional fields of science and technology. For example:

- Biologists and information scientists developed a novel software tool for data mining in large sets of data generated in genetics projects that represents a significant advance over existing commercial packages.
- In the new field of molecular electronics, chemists and physicists obtained very bright, efficient and stable blue polymers for organic light emitting device (OLED) fabrication. Organic devices are a potentially disruptive technology and OLEDs are strong contenders in the flat panel and disposable display market.
- Environmental engineers have taken the lead in applying a key technology from genomics, DNA chips, to environmental problems. Chip technology holds promise in the area of environmental applications and NRC has developed DNA chips to assess drinking water quality and detect common pathogens.

Investment In and Use of NRC Facilities

Investing in equipment and buildings is an essential component of NRC's strategy to stay at the leading edge of Canadian science and technology needs. In 2000-2001, the organization spent about $61 million on equipment, capital acquisitions and building improvements. The majority of NRC's laboratories and facilities are available to Canadian industry and academia through research collaborations and through fee-for-service arrangements. In 2000-2001, NRC provided fee-based services to over 2,300 clients.



Examples of NRC's new and improved facilities include:

- Construction of new astrophysical laboratories and a visitor's facility, the Centre of the Universe, in Victoria. Approximately 40,000 people, including several school groups, visited NRC's facilities in Victoria and Penticton in 2000-2001.
- In Montreal, NRC continued to support the local pharmaceutical-biotechnology cluster with two new facilities, a High Throughput Screening facility and a DNA microarray facility. Funds for the latter were provided by NRC's Genomics and Health Initiative.
- Wind tunnel upgrades at the Institute for Aerospace Research (IAR) in Ottawa, which were funded through a reinvestment of institute's revenues ($2 million).

NRC institutes are also investigating innovative ways to make their own and other research facilities more broadly available and useful to industry and academia. Examples are:

- NRC meets its mandate to maintain access to national astronomical observatories by leveraging its investments in national and international observatories, giving Canadian researchers access to the world's best facilities. Participation in the Atacama Large Millimeter Array (ALMA) project, identified in the Canadian Long Range Plan for Astronomy as Canada's highest priority in ground-based astronomy, provides an excellent example of this strategy. NRC signed two Letters of Intent to formalize Canadian participation. Canadian scientists will gain access to one of the world's most powerful radio telescopes, with a total construction cost of $US 750 million, through a Canadian contribution valued at only $US 30 million. Such leverage is made possible by the quality of Canada's technological capabilities, which makes Canadian participation highly valued by international partners.
- In Montreal, the "Open Lab" concept, which involves on-site training, joint research and product development with the private sector, allows participating scientists to return to their companies with the skills that will give their company an edge in a highly competitive environment.
- NRC and Canadian universities have achieved a stable-operating framework for Canada's national neutron beam laboratory located in Chalk River, Ontario. This partnership effort resulted in an NSERC Major Facilities Access grant of $2.85 million, strengthening Canada's neutron research capabilities and support for testing of CANDU related technologies.
- NRC supported C3.ca, the national organization for advanced high-performance computing (HPC). NRC operates a national co-ordinating office, which co-ordinates access to HPC installations across the country and provides technical support and advice to users. Although primarily of interest to academics today, industry experts have predicted that high performance computing will ultimately have a strong impact on SMEs, particularly in areas such as manufacturing and e-commerce.

Highly Qualified Personnel

Excellence in research and innovation requires highly qualified knowledge workers. Outstanding people are NRC's most valuable asset and it is essential that the organization continues to attract and retain the premier research talent in the country. NRC faces strong competition in finding and keeping the best of the best.

NRC's Employment Philosophy

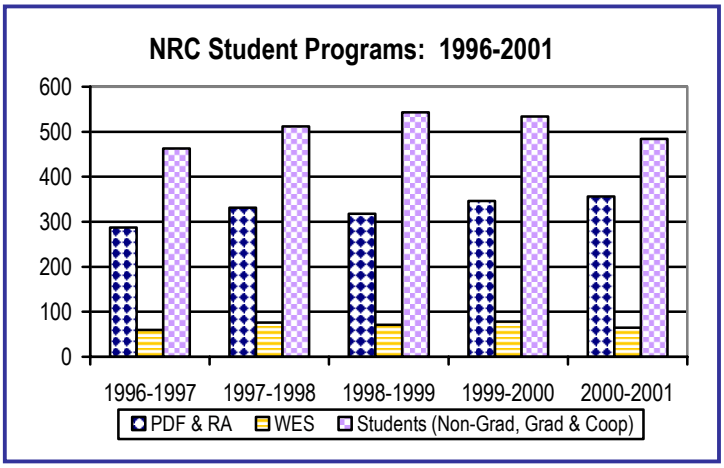
NRC also faces the challenge of building leaders, individuals who possess a full stock of the hard and soft skills required to build the bridge from discovery to innovation. In 2000-2001, NRC launched its new *Employment Philosophy*, a comprehensive roadmap aimed at reshaping Human Resources (HR) to support and enrich the process of innovation, the first pillar of NRC's new *Vision to 2006*. NRC has implemented several initiatives in support of this roadmap:

- **A competency-based human resources management initiative** was completed and launched. Competency profiles exist for all NRC positions and will be linked to staffing and recruitment, learning and employee development, performance management and succession planning. Various innovative tools have been developed in support of implementation, including self-diagnostic tools to identify competency gaps. NRC's Learning Services were redesigned to ensure consistency with the move towards competency-based HR.
- A **Leadership Management Development Program** was launched as a pilot in several institutes and branches. 58 candidates were selected and personalized learning plans are being developed for them. An evaluation of the pilot will be done before expanding the program across NRC.
- To help address recruitment challenges, NRC has established a **University liaison Office** and consulted extensively with universities to compile an inventory of top-flight candidates, and has negotiated access to NSERC postgraduate scholars. A working group has been created to develop innovative approaches to the recruitment challenge.
- To help with **succession planning and training of replacement staff**, NRC has introduced two retirement-related programs (pre-retirement transition leave and post-retirement employment program) that allow staff to ease the transition to retirement and provide time and resources to transfer knowledge to replacement staff.

Talent for Canada

A number of industry sectors have identified the need for highly qualified personnel as a priority, and as a crucial component for economic growth. NRC directly contributes to the development of highly qualified personnel through the training of students and recent graduates. Around 900 students and post-doctoral fellows or research associates work on research teams in NRC laboratories each year, thereby gaining valuable experience and training that is complementary to university and college courses. Other programs and contributions made by NRC in 2000-2001 include:

- Through IRAP's youth internship programs, 631 graduates were placed in 581 SMEs for a total of $4.9 million in contributions to firms.
- 65 students were part of NRC's Women in Engineering and Science (WES) Program;



- NRC signed an agreement with the Canadian Aboriginal Science and Engineering Association to help support the 2001 National Aboriginal Career Symposium;
- 260 NRC researchers were appointed to adjunct professorships in universities and colleges across Canada;
- 253 formal collaborations with universities involving the participation of Canadian university researchers and students and post-doctoral fellows (PDF) in NRC laboratories.

Influence and Recognition of International Science & Technology

This year has seen a significant increase in NRC international activities across the organization. In 2000-2001, NRC staff were invited to participate in almost 600 international committees and organizations, and sponsored or organized some 195 international workshops or conferences. NRC added close to 150 new collaborations with international organizations, bringing the total of ongoing collaborations to almost 450. NRC welcomed a significant number of visits of senior officials from prestigious foreign S&T organizations to its research facilities and laboratories. Although these activities are indicators of scientific excellence and that NRC is viewed by the international community as a valued partner, they are also a primary way to build networks of value to Canada.

Examples of NRC's international activities that have contributed to Canada's reputation as an innovative nation and have provided opportunities to Canadian companies for co-operative partnerships are:

- **APEC R&D Leaders Forum:** NRC organized and hosted this highly successful forum on Creating and Nurturing Technology-based Spin-offs and SMEs in September 2000 in Ottawa. Over 150 delegates from 15 APEC economies participated in plenary sessions and workshops and visited local institutions and firms. Among the many foreign S&T leaders were ministers from Malaysia and Indonesia. A number of Canadian firms participated and had the opportunity to gain a high degree of visibility and to build useful contacts and networks.
- **Mission to Spain:** NRC contributed to the branding of NRC and Canada as a knowledge-based economy on this mission, where potential areas of cooperation were identified. This could lead to better access to the EU Framework Program for Canadian companies.
- **System on a Chip Workshop:** A delegation of NRC researchers, university professors, microelectronics industry association officials and Canadian firms, including Mitel, IBM, Chipworks, Tundra and SiGe Microsystems, participated in a System on a Chip Workshop held in Hsinchu (Taiwan). The Canadian participants received considerable media coverage, leading to new contacts and opportunities for co-operation.
- **National Standards Laboratories:** Arthur J. Carty, NRC President, delivered the keynote address at the National Conference of Standards Laboratories (NCSL) annual conference in Toronto in July 2000, the first time that the conference had been held outside of the United States in 40 years. This international conference attracted 1,200 conference participants from academic, scientific, industrial, commercial and government facilities around the world.
- **International Council for Science (ICSU):** NRC, as Canada's adhering member to the ICSU, and its Canadian partners have been successful in attracting the 2003 International Congress of the

International Union of Biochemistry and Molecular Biology to Toronto and the 2003 International Congress of the International Union of Pure and Applied Chemistry to Ottawa. Each congress is expected to attract some 3,000 delegates.

- **Technology Missions to Asia:** Supporting innovation in the context of the global economy also means ensuring access to foreign technology, expertise and markets. In 2000-2001, IRAP organized three Technology Missions to Asian countries. These resulted in the signing of 20 memoranda of understanding between Canadian and Asian companies.

With this increased level of international activities, NRC has strengthened its international perspective, thereby increasing Canada's visibility as a high technology nation on the international S&T scene. NRC's international initiatives include R&D collaborations, NRC-led missions abroad to develop technology-based ventures, contributions to international efforts for improving the management of S&T by sharing its experiences with international organizations, and outreach to emerging economies to help Canadian companies access distant markets.

Key Result Commitment

Economic growth by helping Canadian firms develop new, marketable technologies.

Performance Indicators (relevant Business Line):

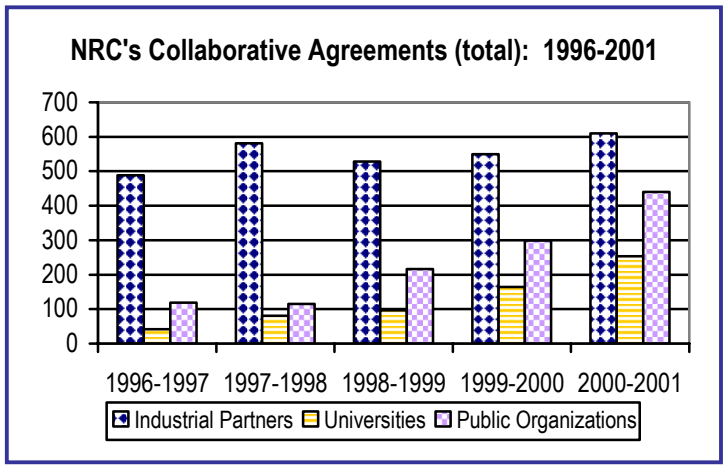
▪ Partner involvement in Research Projects	BL 1
▪ Technical and Commercial Successes of NRC Partners	BL 1 and 2
▪ NRC Services and Support – Client and Partner Satisfaction	BL 1, 2 and 3

Partner involvement in Research Projects

In 2000-2001 alone, NRC signed almost 400 new collaborative agreements with partners, a total value over the lifetime of the agreements of almost $100 million, a strong indication of the value of such activities to NRC's partners. The total number of partnerships active during the year rose to over 1,200. The large increase over previous years is due to a number of factors, including a change in focus on the part of our partners from short-term service contracts to longer term R&D projects, and an increase in participation in multi-year, multi-partner research consortia involving national and international organizations.

NRC institutes have developed several best practices for successful partnerships. The following examples capture some of the highlights of 2000-2001:

- NRC negotiated an agreement with Technology Partnerships Canada to provide $9 million over three years to help launch a pre-competitive research program on novel coatings. This program will involve a number of SMEs.



- As part of the Aerospace Technology Infrastructure Initiative, NRC signed a long-term (10 years plus two five-year options) agreement with Pratt and Whitney Canada to develop and operate a new Altitude Facility as part of the Gas Turbine Environmental Research Centre (GTERC) in Ottawa.
- Another highlight for the year was the very timely collaboration with Foragen, which produced promising results in cattle trials for the vaccine against *E. coli* 0157, the bacterium which caused the water pollution and the tragic disease outbreak in Walkerton, Ontario.
- NRC and McGill University are collaborating to bring Polymeric nanocomposites (PNCs) or "super polymers" to the marketplace with the support of Dupont Canada, Nova Chemicals and ABC group.

Technical and Commercial Successes of NRC Partners

Although NRC research institutes work with companies of all sizes as well as government and academic partners, NRC's Industrial Research Assistance Program has a particular focus on small and medium sized enterprises (SMEs), which are an important part of the Canadian economy. Their ability to succeed in a rapidly changing environment depends on their capacity to innovate. By providing technical advice and financial assistance, NRC, through IRAP supports SMEs' innovation capability in the areas of increased skills, knowledge and technical competencies; improved management practices; enhanced linkages; increased innovation and improved financial performance.

In 2000-2001, IRAP reached more than 12,000 Canadian SMEs with high quality technical advice and/or financial assistance. In total, IRAP spent $93.7 million in direct contributions to firms (including the IRAP-TPC and contributions to firms under the Youth Employment initiative) to help alleviate the risk associated with the development or adoption of new technologies. A total of 3,400 firms received IRAP contributions during the year. Of these 2,700 were new clients.

IRAP joined forces with Technology Partnerships Canada (TPC) a few years ago to support SMEs with projects at the pre-commercialization stage. The IRAP-TPC Program has now reached near full-scale delivery, with 81 new projects funded in 2000-2001 for a total of 188 projects since the program's launch in 1998. This program provides repayable contributions, and six firms have started repaying a total amount of $836,000 in 2000-2001. This money is re-invested in the IRAP-TPC program

IRAP also fosters the integration of sustainable development practices into the innovation processes of Canadian SMEs. Through the Eco-Efficiency Innovation initiative, a joint initiative with the Ontario Centre for Environmental Technology Advancement (OCETA), energy and eco-efficiency audits are provided to Ontario manufacturers resulting in bottom-line cost savings, improved competitiveness and greater environmental performance. To date 51 audits have been undertaken and 25 others are in development. The implementation rate of follow-up actions resulting from the audits is reaching 90

Maritime Mariculture Inc., St. Andrews, NB.

This aquaculture company specializes in the culture of Atlantic Halibut juveniles. After completing four years of research and development at the hatchery level, the company embarked on a pre commercial trial starting in February 2000. The company's goals were to demonstrate its technology, fish husbandry skills and culture system designs to produce large quantities of healthy halibut juveniles ready for transfer to grow out facilities.

The initial target was 50,000 juveniles and the company was able to achieve close to 40,000 well-pigmented fish. This pilot demonstration has also allowed for the collection of data necessary for scale up operations. A commercial facility is being established.

percent compared to 15 percent for previous initiatives of this kind. It is estimated that 25 of these projects are responsible for a reduction in CO_2 emission equivalent to a coal-fired electrical generation system supplying energy for 1,000 houses.

While many of NRC's research projects and collaborations have a strong "public good" component, including health and safety or sustainable development technologies, research collaborations also lead to technical and commercial success for NRC's partners. Examples include:

- NRC and Noranda, a major metals producer of zinc and copper in Canada, are developing leading edge technologies to measure the levels of pollutants in effluents from the company's factory operations. This new technology allows for more accurate, real-time monitoring of harmful liquid wastes produced during operations, while reducing the costs.
- NRC and Jellett Biotek Ltd. of Nova Scotia have developed a rapid field-test kit to detect Paralytic Shellfish Poisoning (PSP) toxins in shellfish, a world-wide problem. The kit is faster and more cost-effective than current methods and can be used in a non-laboratory setting with no specialized training. Shellfish farmers can pre-screen their product before large-scale harvesting. It also has potential in plankton monitoring and as a quality-control tool in processing plants
- NRC and QBiogene Inc. have negotiated a $3.8 million collaborative research project for the development of adenoviral libraries and associated reagents. Adenoviruses can be used as vectors for introducing genes into cells. NRC researchers have shown that the introduction of an adenovirus vector with tetracycline expression into prostate tumors may be a potential tool to help fight prostate cancer. Other potential applications include vaccination, protein production, and large-scale production of other viral vectors.
- NRC recently completed a four-year contract with the Mining Wear Resistant Materials Consortium, a group of nine private firms, to investigate materials that would minimize the costs of wear in extreme environments like the Alberta Oil Sands, a potentially valuable source of energy for North America. The results have allowed firms to significantly reduce their overall production expenses. Research results have also been applied to hard-rock mining conditions.

"QBiogene has developed a strong leadership position with its broad portfolio of adenoviral vector systems. This new collaborative research project will provide the company with the next generation viral vector production platform. BRI has been a valuable partner and I am extremely pleased to have been able to expand our business relationship. The new platform technologies will have applications ranging from the basic research tools to potential new solutions for gene therapy."

Dr. Garth Cumberlidge,
President and Chief Executive Officer
QBiogene.

NRC Services and Support – Client and Partner Satisfaction

NRC ensures that its programs meet the present and future needs of the sectors they serve, and that clients and partners are satisfied with the outcomes of service and research partnership agreements through a number of mechanisms. NRC has an overall advisory policy, each technology group has an advisory board, and most institutes have advisory committees.

In addition, NRC uses both formal and informal surveys to ensure that clients are gaining value from their interactions with NRC, in addition to the formal client surveys performed by external organizations as part of institute and group evaluations. Over the past year, several institutes have concentrated on improving delivery times, a common concern noted by clients in surveys, and as a result, these times are improving.

To ensure that all of NRC's programs meet industry's future needs, NRC has participated in a number of roadmapping exercises, including aerospace, aluminum and aquaculture. NRC is leading a bioresources technology roadmapping exercise with partners in Prince Edward Island and another one in Newfoundland focusing on ocean technology.

One major achievement last year for NRC and the Canadian astronomy community was the release of the Canadian Long Range Plan for Astronomy, *The Origins of Structure in the Universe*. This report, sponsored by NRC and NSERC, was produced by a distinguished panel of astrophysicists after extensive consultations across the country.

Technology Centres

NRC's Technology Centres provide unique engineering facilities to industry and government departments. However, since the mandate of these Centres is not directly related to NRC's core research activities, a plan has been established to bring operations to a full cost recovery model. The Centres include:

- The Thermal Technology Centre which provides objective and valued expertise and technology evaluation in order to help Canadian firms in the development, testing and accreditation of new promising refrigeration and heat transfer technology and equipment.
- The Canadian Hydraulics Centre which provides leading technology and optimization of designs for structures against wave and ice forces, and water environmental disasters such as flooding and pollutant discharges.
- The Centre for Surface Transportation Technology which enhances international opportunities for the Canadian transportation industry by providing vehicle engineering and testing expertise and facilities, particularly in the railway sector.

Key Result Commitment

Technology-based economic growth in communities across the country.

Performance Indicators (relevant Business Line):

- Progress on Regional Initiatives — BL 1, 2 and 3
- Influence of NRC's Industry Support and Information Networks — BL 2
- Use and Impacts of Codes and Standards — BL 1

Progress on NRC Regional Initiatives

The international phenomenon of innovation at the community level is founded on public and private sector teamwork, partnerships and networks. The OECD's National Innovation Systems project has demonstrated the increasing importance of clusters in determining the innovation performance of firms, nations, and regions. NRC is a national organization with a local presence. In addition to IRAP/CTN regional initiatives, NRC has developed a technology cluster strategy which focuses on linking existing local strengths and opportunities in emerging sectors to core NRC R&D capabilities. In the past year, NRC has made considerable progress in the area of regional and community based innovation through its technology clustering approach.

> The comments that I heard in London (Ontario) last month at the Ivey School's annual conference on economic development were quite revealing. In essence several people involved in economic development and the Life Sciences indicated that Halifax has accomplished more in the last year in terms of creating an integrated approach to the Life Sciences than they have been able to achieve in several years. They are looking to Halifax as a model and are astounded that we have been able to convince hospitals, universities and companies to actually put money on the table and work together - they feel they are still in their silos and a long way from real collaboration... NRC must be given a good share of the credit for helping advance our community!"
>
> ***Steve Dempsey, Vice President of the Greater Halifax Partnership***

Atlantic Canada

On 29 June 2000, Prime Minister Jean Chrétien announced a new approach to regional economic development in Atlantic Canada: the Atlantic Investment Partnership (AIP). The $700 million, five-year initiative balances strategic investments and initiatives designed to build new partnerships that will strengthen the region's capacity to innovate and compete in the global knowledge-based economy. In 2000-2001, NRC received $110 million over five years from the AIP to develop technology clusters in Atlantic Canada.

As part of the initial public consultation process, NRC held four successful roundtables in the Atlantic provinces that were attended by over 350 stakeholders from the business, academic and government community. These meetings started the process of building linkages among all of the players needed to create and sustain a strong technology cluster. They spurred the communities involved to develop action plans for the development of research and development based clusters.

NRC will establish a new institute in New Brunswick that will focus on e-business and information technology (IT). NRC received additional funds from the New Brunswick Regional Economic Development Agreement to expand and link the Fredericton-based program to other parts of the

province. These programs will add approximately 60 high technology jobs to the cities involved, and staffing efforts are underway.

The Halifax roundtable resulted in NRC playing a key role in the establishment of the Life Sciences Development Association (LSDA) in Halifax, a community organization created to spearhead cluster development. One component of the LSDA's action plan will be an Industry Partnership Facility (IPF) at NRC's Institute for Marine Biosciences (IMB). Genome Atlantic is expected to locate its DNA sequencing platform at NRC.

An ocean technology cluster is emerging in St. John's around NRC's Institute for Marine Dynamics (IMD), Memorial University of Newfoundland and a number of area firms. NRC's plans to expand its facilities and capacities to meet the future needs of the community and provide the R&D foundation for the cluster were endorsed by roundtable attendees. This initiative also contributes to the government's Shipbuilding policy by providing technology for future generation marine / ocean vehicles and related equipment.

NRC Information Centres (NICs) provide integrated information services for NRC institutes and local firms in regions across the country. Two new NICs (Fredericton and Charlottetown) were funded through the AIP and additional resources were provided to those in Halifax and St. John's. As a result, there are now a total of 17 NICs. IRAP's expertise and network are important in the development of regional initiatives. As a result, IRAP/CTN had an active role in the development of NRC Atlantic initiatives.

Further information on all of NRC's activities in Atlantic Canada can be found at http://www.nrc.ca/atlantic.

Building on the success of the Atlantic Initiative, NRC worked with central agencies, other government departments (OGDs) and stakeholders to further develop proposals for regional cluster initiatives across Canada.

Québec

NRC secured $68 million in funding for its strategic aerospace initiative. Some of this will be used to establish an Advanced Aerospace Manufacturing Technology Centre on the campus of the Université de Montréal. Due for completion in 2003, these facilities will provide testing services and research and development support to Canada's aerospace manufacturers, particularly SMEs. NRC signed an MOU with the university covering the development of the manufacturing technology centre.

In collaboration with Montreal International, BRI took part in developing the strategy for the further development of the biotechnology and biopharmaceuticals cluster in Montréal.

Saskatchewan

In Saskatoon, NRC's impact on the local innovation system has been shown by an Innovation Place survey. Their data indicated that there were 26 agro-biotech firms in Saskatoon, of which 24 had linkages to NRC's Plant Biotechnology Institute (PBI) during their development. PBI plans to expand its support for SMEs and new company creation with the opening of an Industry Partnership Facility in 2002, and is developing a memorandum of understanding with Ag West Biotech Inc. to deliver services to companies.

PBI has also strengthened access to equipment for companies in the region. The Province of Saskatchewan and NRC contributed to new laboratory equipment for proteomics research and NRC and the University of Saskatchewan have entered into agreements to share access to equipment.

Alberta

The organization of a milestone workshop in Banff in January 2001 involving leading scientific and decision-makers has been instrumental in building external support for nanotechnologies, a field that has the potential to revolutionize the production of new devices, machines, materials and systems.

British Columbia

In February 2001, the Okanagan-Shuswap region of British Columbia held its first-ever Regional Innovation Forum, co-sponsored by NRC and the Okanagan University College. The Forum brought together over 100 industry, research, education and government participants to begin charting a plan for the development of an innovative, entrepreneurial culture. Experts from Ottawa's high tech cluster shared their experiences with local players. Discussions at the roundtable focused on innovation in the region's key economic opportunity areas, including agriculture, manufacturing, and high technology.

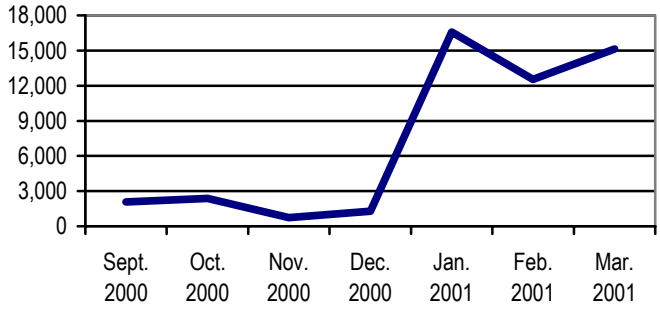
Influence of NRC's Industry Support and Information Networks

NRC helps support Canadian industry through several different avenues, including research and development collaborations, technology transfer, advice, and access to unique equipment and facilities. NRC also supports national and international information networks of value to industry, academia, and other government laboratories. For example:

- NRC provided space in its laboratories and Industry Partnership Facilities (IPFs) to 71 companies, the majority of which were start-ups and SMEs. NRC's two IPFs are now filled to capacity, with waiting lists for additional space or for new companies.
- Genomics researchers at 30 Canadian universities accessed over 220,000 pages a month from NRC's web-based Canadian Bioinformatics Resource (CBR)
- Open source collaborations are informal collaborations that can ensure wider dissemination of technologies and increase innovation, by creating communities of researchers and developers. NRC and 13 independent developers contributed to the design of the Alpha version of NRC's VoiceCode programming-by-voice system, software that allows programmers with Repetitive Strain Injuries to become as productive with speech as with keyboard and mouse. In North America alone, an estimated 34,000 programmers are affected by RSI, a number that is increasing by 10 percent annually. As a result, NRC can now advise Canadian software companies on the use of open source software products.
- In support of the federal Procurement Strategy for Aboriginal Business (PSAB), NRC organized and hosted a Commodity Focus Event to expose the NRC Community to and promote aboriginal firms. NRC Procurement Services issued 66 contracts totalling $272,000 to Aboriginal firms.

- As Canada's largest publisher of scientific and technical journals, the NRC Research Press holds a favourable international position and maintains a leadership position in the area of electronic publishing. This major accomplishment has been made possible through a partnership with the Depository Services Program of Public Works and Government Services Canada. The 14 journals published by the Press are available in both printed and electronic formats. And since January 2001, NRC has provided free electronic access to Canadians. The response from university and government researchers, students, librarians and others has been overwhelmingly positive.

NRC Research Press: articles retrived from electronic journals (Sept. 2000 - March 2001)



- IRAP maintains a network of 260 ITAs and has relationships with over 130 Canadian organizations at the regional level. A number of Industrial Technology Advisors (ITAs) come from these Network Members (NM), and by working together, NRC and the network members increase the regional innovation capacity, the number and type of innovation services available to SMEs and the number of collaborative initiatives between the NM and its clients.
- IRAP provided technical assessments and reviews for 750 projects in 2000-2001 for a number of external organizations and programs. These projects represented almost $4.8 billion in federal government contributions or contracts.

The Technology Visits Program and Innovation Insights Program are organized by the Canadian Manufacturers & Exporters and funded in part by IRAP. Both are designed to promote best manufacturing practices and peer-to-peer exchanges. In 2000-2001, 27 companies from across Canada hosted Technology Visits Program allowing 770 companies to visit their sites. Seventy-four companies hosted *innovation insights* events, a combination of both visits and networking elements, which were attended by close to 1,300 participants. In addition, two international missions were organized under the program.

- CTN is a key facilitator of exchanges and collaborations among the different players of the Canadian innovation system with a membership-base of some 1,000 organizations. In 2000-2001, three new international members were recruited. CTN organized over 400 networking events, an increase of almost 70 percent over the previous year. In addition, CTN served more than 2,300 clients and answered over 2,700 simple queries. More information and success stories about CTN are available at http://ctn.nrc.ca/ctn/hss_e.html
- IRAP develops and facilitates international networks that contribute to enhanced technology-based opportunities for Canadian SMEs. IRAP led 44 events and presentations, which resulted in an increased number of countries showing interest in an IRAP/CTN like program, similar to successful IRAP partnerships in Taiwan and Thailand. Canadian SMEs linked to domestic and international innovation networks have an opportunity to share international relationships, intelligence, resources and foster technology alliances.

Use and Impacts of Codes and Standards

Metrology is a key component in ensuring product quality and the inter-operability and exchangeability of components and is essential for consumer, health and environmental protection. The application of codes and standards enables industrial competitiveness and assures national and international credibility and access for Canadian products. NRC's Institute for National Measurement Standards (INMS) acts as Canada's national metrology institute, providing most of the mandated standards related activities at NRC. In 2000-2001, the institute estimated that it spent $1.6 million to perform this function. The growing number of multilateral measurement agreements means that even more expenditures must be devoted to this activity in the future.

Organizations from around the world come to NRC for standards advice:

- Clients in 75 countries rely on NRC's Certified Reference Materials for environmental safety.
- NRC advised the US Los Alamos National Laboratory's High Magnetic Field Laboratory on how to avoid corona discharges in its superconducting magnet assembly.
- In Canada, a one-time R&D measurement of an aperture plate for JDS Uniphase evolved into adoption of the plates into fibre production lines, with additional plates calibrated by NRC going to overseas factories. The company finds the calibrated plates essential to their production quality control, and plans to expand their use.

Codes and standards are extremely important in the Canadian construction industry. NRC's Institute for Research in Construction (IRC) has been active in 2000-2001 on a number of fronts to strengthen this sector. For example, the institute helped establish guidelines on crack sealant installation for the Municipal Infrastructure Guide, significantly improving the performance of sealants on roadways, extending the life of sealed cracks and roads (1-3 years); reducing costs in rehabilitation, and reducing wear and tear on vehicles for annual savings of up to $300 million in Canada. These saving surpass the relative cost of operating IRC on an annual basis by a ratio of 18 to 1.

Key Result Commitment

Transfer of NRC's research success to Canadian firms.

Performance Indicators (relevant Business Line):

▪ Results of Patent and Licence Sales	BL 1
▪ Technology and Information Transfer Activities	BL 1
▪ Introduction of improved management tools and systems	BL 2 and 3

Results of Patents and Licences Sales

In a knowledge-based economy, progress depends directly upon the ability to generate or acquire knowledge and then manage it effectively. New ideas and discoveries are raw materials with great value.

In the last decade alone, global revenue realized from Intellectual Property (IP) licensing rose from $15 billion to $110 billion.

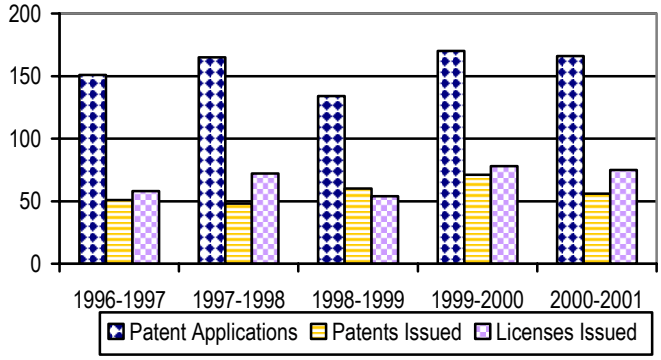
The strategic management of IP to the benefit of Canada is of importance to NRC. One of NRC's institutes has developed a best practice approach to IP management that is getting results, and the institute has tripled its rate of provisional patent filings since implementing the plan in 1999. This success story is being shared with other NRC institutes. NRC's growing IP revenue is not only demonstrating our relevant research, but through reinvestment of these revenues, NRC will be able to generate additional benefits to Canadians.

Canola, a leading Canadian crop, adds $2 billion to our economy. As multi-national biotechnology companies focus their efforts on the four big crops (cotton, soybean, rice and corn), NRC's canola research is of increasing importance to the country. A major objective of NRC's canola research has been to develop lines with an increased oil content, without affecting the growth or development of the plant, or making it more susceptible to insects or disease. Oilseed cultivars with elevated oil content increase value for farmers, and increase oil processing efficiency.

As a result, NRC holds patents on most of the critical points in the Kennedy Pathway, which is significant in the formation of oils and oil content in oilseed plant. By having a family of patents, NRC ensures that Canadians get the full benefit of commercialization, by having the freedom to operate in this highly competitive domain.

A confirmation that the NRC innovation process works is that through working with industry and other partners, research and development work is successfully transformed into new and improved products. By transferring technologies to Canadian businesses, NRC delivers the social benefits of its research, and at the same time plants the seeds for economic growth.

NRC Intellectual Property: 1996-2001



A new patent or patent application is the first step of an innovation on its way to marketability. In 2000-2001, NRC applied for 166 new patents, and secured 56 patents for which applications had been made in previous years. NRC has 585 patents in its portfolio, of which 36 percent are in use.

License agreements show a direct flow of NRC innovation into business application. In 2000-2001, NRC entered into 75 new license agreements. By negotiating a license agreement to use NRC technology, the industrial partner endorses the merit of NRC research. NRC's licensing revenue for 2000-2001 was just under $5 million. This is a ten-fold increase over a six-year period. A few examples of the many ways in which NRC license agreements moved technology to Canadians in 2000-2001 are:

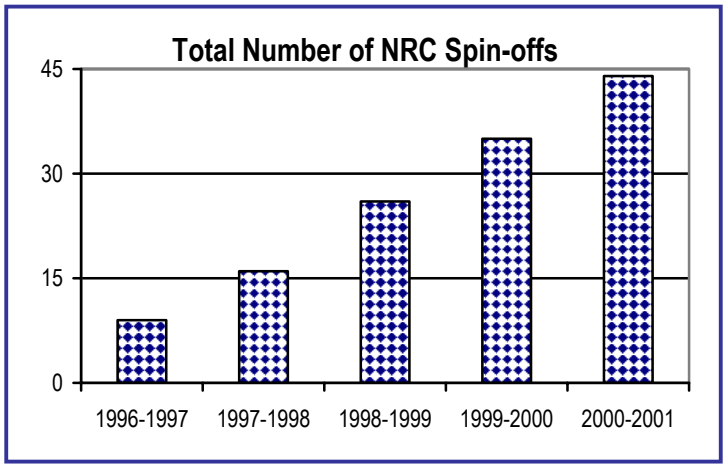
- **Radiation therapy software:** A breakthrough in the long-term investment in radiation therapy research at NRC has resulted in the licensing of new technology to MDS Nordion that will significantly improve the speed and accuracy of radiation therapy treatment for cancer patients. NRC's improvements to this technique have resulted in a software package that is 100 times faster than previous approaches.

- **Fuzzy logic applications:** NRC uses the Internet to distribute FuzzyClips and FuzzyJ, two technologies that allow integration of fuzzy logic into applications. Primarily used by educational institutions, over 12,000 users have downloaded the technologies, obtaining an academic or personal use licence.
- **Laser-induced incandescence:** NRC has licensed its diagnostic instrument based on laser-induced incandescence that performs "real-time" measurements on particulate emission and soot concentrations produced by engines to Artium Technologies Inc. (Sunnyvale, CA).
- **CoQ10 portfolio:** NRC has expanded its patent portfolio for Coenzyme Q10 solubilization technologies and developed techniques for scaled-up production. A start-up company, UbiSol, was incorporated in April 2001 to exploit these technologies, which are suitable for the development of new patentable formulations of drugs and other compounds.
- **Electrically conductive concrete technology:** NRC's unique technology has been transferred to a Canadian subsidiary of a large multinational cement manufacturer. The centrepiece of the transfer was a document detailing recommended procedures and guidelines for manufacturing and using the concrete.
- **Meningitis C vaccine:** Baxter Health Care Corp launched its first product based on NRC's Meningitis C vaccine in the UK. This represents the first product from a series of 10 patents held by NRC. The latest patent in the series incorporates improvements that will extend patent protection to 2015. Group C *Neisseria meningitidis* is a major cause of meningococcal meningitis in Europe and North America. NRC's vaccine was shown to have the highest potency among those used in the UK immunization program. Phase I trials of the Group B meningococcal conjugate vaccine have been launched.

New Company Creation

When NRC develops a technology that shows particularly strong market potential, entirely new companies will sometimes be generated to promote the new product, particularly when there is no existing Canadian receptor capacity. These new companies disseminate technologies and create new jobs for Canadians. In 2000-2001, NRC generated or assisted in the establishment of nine new companies and close to one hundred new jobs for highly qualified Canadians. This brings the total of new companies created by NRC since 1995-1996 to just under 50.

New companies created in 2000-2001:
- MetroPhotonics
- Trillium Photonics
- Optenia
- Image Tree
- Synthesarc
- ParaTecH Therapeutics Inc.
- Novadaq Technologies Inc.
- Group Minutia
- Digital Light and Sound



Technology and Information Transfer Activities

As demonstrated in this report, technology transfer from NRC to firms takes a number of forms. In addition to collaborative research and development projects, guest worker programs, and licensing of technology and know-how, NRC also develops specific materials and programs that are of value to the sectors served by the Council. Examples include:

- NRC organized, sponsored and hosted 19 workshops, seminars and conferences aimed at the construction industry that attracted over 2,500 people, a 40 percent increase over the previous year. For instance, information was disseminated to 375 people from industry on the latest techniques and applications for solving water and sewer-related problems at seminars on the topic "Water & Sewer Infrastructure Systems: Challenges and Solutions" that were held across the country.
- NRC, the Saskatchewan Research Council, and the University of Regina delivered two seminars on Green Chemistry in Saskatoon and Regina that were attended by 75 interested representatives of the Saskatchewan S&T community. The purpose of the seminars was to assist in the development of a Green Chemistry research community in Canada.
- Canadian researchers had an opportunity to hear and interact with world-renowned scientists, CEOs and clinicians from academia, industry and government, from Canada, the United States and Europe when NRC hosted and organized an international conference, "Spectroscopy 2000: Shedding New Light on Disease - Optical Diagnostics for the New Millennium" in Winnipeg that attracted just over 200 people. Workshops on "Financing Biomedical Research" and "Regulatory Affairs" attracted over 100 of the delegates.

Across the country, NRC institutes provided fee-based services to over 2,300 clients. This includes access to facilities and expertise, analytical and testing services, as well as contract research. NRC produced over 700 technical reports for clients as a result of these activities. NRC also provided analysis of data from flight data recorders to 30 different organizations, including 26 SMEs, in the form of "letter reports". Over 300 of these were released, a contribution to improved aircraft flight safety.

To ensure continued access to essential information resources for Canadians, CISTI has used its international presence to develop new resource partnerships (LINK). In 2000-2001, CISTI signed an agreement with the Institut de l'information scientifique et technique (INIST) of France that will provide Canadians with access to the largest French collection of science and technology documents and an additional 10,000 S&T titles. CISTI also signed an agreement with the Korea Institute for Science and Technology Information (KISTI), bringing the total of LINK partners to seven.

Since 1999, CISTI has also introduced significant improvements to its document delivery system (IntelliDoc) to ensure that CISTI could sustain the growth of orders for documents for years to come. Because of the quality of its infrastructure, CISTI was able to fill 89 percent of requests for documents available in its collection within 24 hours, an 8 percent improvement over last year.

In 2000-2001, CISTI delivered over a million documents worldwide, an increase of 16 percent over the previous year. International clients account for 37 percent of documents ordered. Revenues from

international sales are used to support CISTI's collection and to develop new and enhanced products and services

Federal Partners in Technology Transfer (FPTT)

NRC is an active participant to the FPTT initiative, which brings together Canada's federal science-based departments and agencies (SBDAs) to enhance the transfer of knowledge and technology and the management of intellectual property. FPTT provides a forum for collaboration and exchange of expertise on horizontal issues affecting SBDAs and organizes conferences and seminars.

In 2000-01, the conference on Skills Development for Technology Commercialization was attended by 129 participants from academia, industry and NRC and was followed by seminars on the government's IP policy and its new Financial Information System. FPTT website is a unique resource in technology transfer and is constantly updated.

For more information on FPTT achievements, see the FPTT Impact Report on the website (http://www.nrc.ca/fptt/).

Introduction of improved management tools and systems

Corporate-wide Business System

Building on the lessons learned during the installation of NRC's corporate-wide business system (SIGMA) in 1997-1998, NRC ensured that it was production-ready and poised to have a smooth, problem-free implementation of the federal government's Financial Information Strategy on 1 April 2001. An external benchmarking of the cost effectiveness of similar software systems demonstrated that NRC's development and support costs are 50 percent lower than comparable public and private sector organizations.

IRAP's Business Process Improvement Initiative

Responding to the Auditor General's report, in 2000-2001 IRAP dedicated significant efforts to improve its management and delivery system. A new Client Management System will help IRAP ITAs and management monitor contributions, client progress and provide valuable information for the overall assessment of the performance of the program. Other achievements include the revision of the definitions and guidelines regarding Client and Project admissibility criteria and the establishment of contributions and allocations; the alignment of the terms and conditions; the development of an Audit framework and; the integration of the Project Costing Guide and the IRAP performance framework with the new system.

IT Infrastructure

NRC has devoted considerable resources to ensure the security, availability and performance of key elements of its IT infrastructure, with investments being made to provide greater robustness and redundancy in its e-mail system and to strengthen internal IT security operations. Progress was made in developing systems, tools and process to support effective disaster recovery and business resumption planning, an import initiative to protect NRC's investments in technology.

Government-On-Line

In response to the federal Government-On-Line initiative (GOL), NRC has established a working group to plan efforts to meet GOL requirements and to identify strategic opportunities arising from this initiative. NRC is committed to on-line delivery of services both internally and externally as demonstrated by the following projects:

- Employee self-serve pension calculator – based in part on feedback that NRC provided as a member of the pilot project, the pension calculator will be introduced across the public service.
- Development of an e-service capability for NRC conference services, and
- Development of an On-line Technology Database that will allow private sector organizations to view licensable technologies.

Security Audit

NRC began an internal audit of compliance with the Government Security Policy and the effectiveness and efficiency of its implementation. This comprehensive audit encompasses a review of the management of the security function at both the corporate and institute/branch level, including organizational structure and administrative procedures that support the five security subsystems: physical, personnel, IT, security and contracting, and security and contingency management. Results of the audit are expected in the next fiscal year.

Section 3: Consolidated Reporting

Transfer Payments

Tri-University Meson Facility (TRIUMF)

TRIUMF, located on the campus of the University of British Columbia, is Canada's national laboratory for research in particle and nuclear physics. It is managed as a joint venture by a consortium of universities and operated under a contribution from the Government of Canada administered by NRC. An Advisory Committee on TRIUMF (ACOT) monitors TRIUMF's overall scientific program and ensures that all program initiatives are of an appropriate scientific quality, while an Agency Committee on TRIUMF oversees the federal investment in TRIUMF, with a particular focus on financial and commercialization matters.

In 2000-2001, TRIUMF began the first year of a new five-year, $200 million funding commitment by the federal government, which allows TRIUMF to proceed with its two major initiatives: to further develop its Isotope Separator and Accelerator (ISAC) into a unique world-class facility and to participate in the international collaboration to construct the world's highest energy accelerator, the Large Hadron Collider, at the European Organization for Nuclear Research (CERN) in Geneva (Switzerland), thereby assuring Canadian access to this leading edge facility. The number of universities in the TRIUMF Joint Venture has increased, with Carleton University in Ottawa joining the universities of Alberta, British Columbia, Simon Fraser and Victoria as a full member.

A results-based accountability framework incorporating performance indicators and expected results and outcomes has been prepared for TRIUMF for the current 2000-2005 funding period.

For additional information on TRIUMF, refer to http://www.triumf.ca.

Section 4: Financial Performance

Financial Overview

Financial Performance Overview

NRC receives its appropriation budget through Main and Supplementary Estimates voted by Parliament. In 2000-2001, NRC also received $15.6 million from Treasury Board's Contingency Vote 15 for the costs of collective bargaining. In 2000-2001, NRC's Main Estimates budget was approved at $525.3 million. Through Supplementary Estimates, NRC received an additional $53 million for items such as the Regional Innovation Infrastructure in Atlantic Canada, an increase in the contribution to TRIUMF and in support of the Gemini Telescopes, investments in capital assets and Operating Budget carry-forwards.
Pursuant to the NRC Act, the organization is able to spend revenues generated through the provision of goods and services. In 2000-2001, the NRC earned $67.6 million in revenue and used $55 million of these receipts to offset expenditures.

In 2000-2001, NRC's actual expenditures were 7.1 percent, or $41.8 million higher than planned. This increase was largely financed from funding received through Supplementary Estimates and from Treasury Board's Contingency Vote 15.

SUMMARY OF FINANCIAL TABLES

The following tables apply to NRC:

Table 1	Summary of Voted Appropriations
Table 2	Comparison of Total Planned Spending to Actual Spending
Table 3	Historical Comparison of Total Planned Spending to Actual Spending
Table 4	Resource Requirements by Organization and Business Line
Table 5	Respendable Revenues
Table 6	Statutory Payments
Table 7	Transfer Payments
Table 8	Capital Spending by Business Line
Table 9	Capital Projects by Business Line
Table 10	Contingent Liabilities

Table 1 Summary of Voted Appropriations

Financial Requirements by Authority (millions of dollars)				
		2000-2001		
Vote		Planned Spending	Total Authorities	Actual
	National Research Council Program			
75	Operating expenditures	264.1	297.9	**289.9**
80	Capital expenditures	41.8	61.2	**61.1**
85	Grants and contributions	157.3	148.8	**148.4**
(S)	Spending of revenues pursuant of the *National Research Council Act*	53.4	83.6	**55.0**
(S)	Contributions to employee benefit plans	32.7	36.7	**36.7**
	Total Department	**549.3**	**628.2**	**591.1**

Notes:

Figures above exclude the spending of proceeds from the disposal of surplus crown assets.
Total Authorities are Main and Supplementary Estimates plus other authorities.
Due to rounding, figures may not add to totals shown.

Table 2 Comparison of Total Planned Spending to Actual Spending

Departmental Planned versus Actual Spending by Business Line (millions of dollars)

Business Line	FTEs	Operating [1]	Capital	Grants and Contributions	Subtotal Gross Expenditures	Statutory Items [2]	Total Gross Expenditures	Less Respendable Revenues [3]	Total Net Expenditures
Research and Technology Innovation									
Planned spending	2,168	208.1	33.4	45.9	287.4	23.4	310.8	-	310.8
Total authorities	*2,168*	*228.4*	*52.2*	*51.6*	*332.2*	*44.7*	*376.9*	-	*376.9*
Actuals	**2,322**	**208.6**	**54.7**	**51.6**	**314.9**	**24.6**	**339.5**	**-**	**339.5**
Support for Innovation and the National Science and Technology Infrastructure									
Planned spending	362	37.6	-	110.4	148.0	28.6	176.6	-	176.6
Total authorities	*362*	*47.3*	*1.2*	*96.3*	*144.8*	*32.5*	*177.3*	-	*177.3*
Actuals	**548**	**43.8**	**1.6**	**95.9**	**141.3**	**24.2**	**165.5**	**-**	**165.5**
Program Management									
Planned spending	554	51.1	8.4	1.0	60.4	1.5	61.9	-	61.9
Total authorities	*554*	*58.9*	*7.8*	*1.0*	*67.6*	*6.4*	*74.0*	-	*74.0*
Actuals	**557**	**74.2**	**4.8**	**0.9**	**79.9**	**6.2**	**86.1**	**-**	**86.1**
Total									
Planned spending	3,084	296.8	41.8	157.3	495.9	53.4	549.3	-	* 549.3
Total authorities	*3,084*	*334.6*	*61.2*	*148.9*	*544.6*	*83.6*	*628.2*	-	*628.2*
Actuals	**3,427**	**326.6**	**61.1**	**148.4**	**536.1**	**55.0**	**591.1**	**-**	*** 591.1**
Other Revenues and Expenditures									
Non-respendable Revenues [4]									
Planned revenues									-
Total authorities									-
Actuals									**-**
Cost of Services provided by other departments									
Planned spending									10.7
Total authorities									*10.7*
Actuals									**10.7**
Net Cost of the Program									
Planned spending									560.0
Total authorities									*638.9*
Actuals									**601.8**

Notes:

(1) Operating includes contributions to employee benefit plans.
(2) Spending of revenues pursuant to the NRC Act.
(3) Formerly "Revenues Credited to the Vote".
(4) Formerly "Revenues Credited to the General Government Revenues (GGR)".
Planned spending indicates numbers reported in the 2000-2001 Report on Plans and Priorities.

* The difference between 2000-2001 planned and actual spending was $41.8 million. This variance was due to a number of factors: $19.6 million increase in wages and employee benefits for collective bargaining increases; $11.5 million net increase for the Regional Innovation Infrastructure in Atlantic Canada; $16.5 million increase (at year end) to address capital requirements; $4.2 million increase for the additional contribution requirements for the Gemini and CFHT telescopes; and $2.5 million increase for Payments to municipalities in lieu of taxes. In addition, there was a $15 million decrease for IRAP-TPC funding that was transferred to Industry Canada.

Numbers in italic denote Total Authorities for 2000-2001 (Main and Supplementary Estimates and other authorities).

Bolded numbers denote actual expenditures and revenues in 2000-2001.

Numbers exclude the spending of proceeds from the disposal of surplus crown assets.

Due to rounding, figures may not add to totals shown.

Table 3 Historical Comparison of Total Planned Spending to Actual Spending

Historical Comparison of Departmental Planned versus Actual Spending by Business Line (millions of dollars)					
			2000-2001		
Business Line	**Actual 1998-1999**	**Actual 1999-2000**	**Planned Spending**	**Total Authorities**	**Actual**
Research and Technology Innovation	275.8	298.9	310.8	376.9	**339.5**
Support for Innovation and the National Science and Technology Infrastructure	168.6	163.6	176.6	177.3	**165.5**
Program Management	79.5	80.9	61.9	74.0	**86.1**
Total	**524.0**	**543.4**	**549.3**	**628.2**	**591.1**

Notes:

Total Authorities are Main and Supplementary Estimates plus other authorities.
Figures above exclude the spending of proceeds from the disposal of surplus crown assets.
Due to rounding, figures may not add to totals shown.

Table 4 Resource Requirements by Organization and Business Line

Comparison of 2000-2001 RPP Planned Spending and Total Authorities to Actual Expenditures by Organization and Business Line (millions of dollars)

Organization	Business Lines: Research and Technology Innovation	Business Lines: Support for Innovation and the National Science and Technology Infrastructure	Business Lines: Program Management	Total
Research Institutes				
Planned spending	310.8			310.8
Total authorities	*376.9*			*376.9*
Actuals	**339.5**			**339.5**
Industrial Research Assistance Program				
Planned spending		131.3		131.3
Total authorities		*123.8*		*123.8*
Actuals		**117.1**		**117.1**
Scientific and Technical Information				
Planned spending		35.4		35.4
Total authorities		*45.0*		*45.0*
Actuals		**44.1**		**44.1**
Technology Centres				
Planned spending		9.9		9.9
Total authorities		*8.5*		*8.5*
Actuals		**4.3**		**4.3**
Corporate Branches				
Planned spending			51.5	51.5
Total authorities			*62.2*	*62.2*
Actuals			**70.7**	**70.7**
Executive Support				
Planned spending			10.4	10.4
Total authorities			*11.8*	*11.8*
Actuals			**15.4**	**15.4**
Total				
Planned spending	310.8	176.6	61.9	549.3
Total authorities	*376.9*	*177.3*	*74.0*	*628.2*
Actuals	**339.5**	**165.5**	**86.1**	**591.1**
% of Total				
Planned spending	56.6%	32.2%	11.3%	100.0%
Total authorities	*60.0%*	*28.2%*	*11.8%*	*100.0%*
Actuals	**57.4%**	**28.0%**	**14.6%**	**100.0%**

Notes:

Total Authorities are Main and Supplementary Estimates plus other authorities.
Figures above exclude the spending of proceeds from the disposal of surplus crown assets.
Due to rounding, figures may not add to totals shown.

Table 5 Respendable Revenues *

Respendable Revenues by Business Line (millions of dollars)					
			2000-2001		
Business Line	Actual 1998-1999	Actual 1999-2000	Planned Revenue	Total Authorities	Actual
Research and Technology Innovation	21.1	27.0	23.4	23.4	35.0
Support for Innovation and the National Science and Technology Infrastructure	25.4	26.0	28.5	28.5	28.2
Program Management	2.8	5.2	1.5	1.5	4.4
Total Respendable Revenues	**49.3**	**58.2**	**53.4**	**53.4**	**67.6**

Notes:

In accordance with section **5.1(e)** of the **National Research Council Act**, NRC is authorized to spend its operating revenues and therefore does not net-vote.
Total Authorities are Main and Supplementary Estimates plus other authorities.
Due to rounding, figures may not add to totals shown.
Refer to **Table 6** for **statutory payments**.
* Formerly "Revenues credited to the vote".

Table 6 Statutory Payments

Spending of Revenues Pursuant to the NRC Act (millions of dollars)					
			2000-2001		
Business Line	**Actual 1998-1999**	**Actual 1999-2000**	**Planned Spending**	**Total Authorities**	**Actual**
Research and Technology Innovation	21.5	26.4	23.4	44.7	24.6
Support for Innovation and the National Science and Technology Infrastructure	24.8	27.4	28.5	32.5	24.2
Program Management	2.1	3.5	1.5	6.4	6.2
Total Statutory Payments	**48.4**	**57.3**	**53.4**	**83.6**	**55.0**

Notes:

Total Authorities are Main and Supplementary Estimates plus other authorities. The total of **$83.6 M** for **2000-2001** includes an amount of **$16.0M** carried forward from previous years.

Due to rounding, figures may not add to totals shown.

Table 7 Transfer Payments

Transfer Payments by Business Line (millions of dollars)					
			2000-2001		
Business Line	Actual 1998-1999	Actual 1999-2000	Planned Spending	Total Authorities	Actual
GRANTS					
Program Management	5.2	1.0	1.0	1.0	0.9
Total Grants	**5.2**	**1.0**	**1.0**	**1.0**	**0.9**
CONTRIBUTIONS					
Research and Technology Innovation	42.7	42.8	45.9	51.6	51.6
Support for Innovation and the National Science and Technology Infrastructure	104.5	97.2	110.4	96.2	95.9
Total Contributions	**147.2**	**140.0**	**156.3**	**147.8**	**147.5**
Total Transfer Payments	**152.4**	**141.0**	**157.3**	**148.8**	**148.4**

Notes:

Total Authorities are Main and Supplementary Estimates plus other authorities.

Table 8 Capital Spending by Business Line

Capital Spending by Business Line (millions of dollars)					
			2000-2001		
Business Line	Actual 1998-1999	Actual 1999-2000	Planned Spending	Total Authorities	Actual
Research and Technology Innovation	38.3	39.8	33.4	52.2	54.7
Support for Innovation and the National Science and Technology Infrastructure	1.7	0.8	0.0	1.2	1.6
Program Management	11.3	3.4	8.4	7.8	4.8
Total Capital Spending	**51.3**	**44.0**	**41.8**	**61.2**	**61.1**

Notes:

Total Authorities are Main and Supplementary Estimates plus other authorities.
Due to rounding, figures may not add to totals shown.
The above figures exclude revenues used for capital purchases.

Table 9 Capital Projects

Capital Projects by Business Line (millions of dollars)					
				2000-2001	
Business Line	Current Estimated Total Cost	Actual 1998-1999	Actual 1999-2000	Planned Spending	Actual
Research and Technology Innovation					
Montréal Centre of Excellence for Site Rehabilitation	1.4	0.1	0.3	0.2	**0.1**
Micromass Q-TOF Mass Spectrometer	0.6				**0.6**
Upgrade and Expansion of Facilities – Herzberg Institute of Astrophysics	9.6	0.6	3.1	5.6	**5.6**
Scanning Probe Microscopy System	1.2				**1.2**
Molecular Beam Epitaxy System	1.9				**1.0**
Multi-Chamber Deposition and Analysis System	0.8				**0.8**
Dynamic Secondary Ion Mass Spectrometer for Surfaces and Interfaces	1.5				**1.5**
Centre for Research in Cleaner Manufacturing	1.7		0.8	0.9	**0.9**
Addition to Plant Biotechnology Institute Building	9.0		0.5	3.0	**1.3**
M-10 Test Cell Facilities for Combustion Research and Development	1.7		0.9	0.6	**0.8**
Heads-Up Display (HUD) Based Enhancement System	0.5				**0.1**
Advanced Aerospace Manufacturing Technology Centre (AATMC)	34.1				**1.3**
Gallium Nitride Molecular Beam Epitaxy System	0.9				**0.9**
Gas Turbine Environmental Research Centre (GTERC)	19.3				**0.2**
Pilot Scale Downstream Processing Unit	0.5				**0.5**
Virtual Environmental Technology for Material Processing	1.2			1.2	**1.2**
Scanning Electron Microscope	0.6				**0.6**
Aquaculture Addition	1.8				**1.8**
Support for Innovation and the National Science and Technology Infrastructure					
CISTI E-Commerce	1.3				**0.5**
Program Management					
Renovation of Uplands Airport U-61 Building	1.0		0.5		**0.5**
M-6 Boiler Replacement	1.4				**0.5**
M-55 Air Quality Upgrade	0.5				**0.5**
M-23A Renovations	1.2				**0.5**
Sussex Drive Courtyard Renovations	1.0				**0.3**

Table 10 Contingent Liabilities

Contingent Liabilities (millions of dollars)			
List of Contingent Liabilities	**Amount of Contingent Liabilities**		
	March 31, 1999	**March 31, 2000**	**Current as of March 31, 2001**
Claims, Pending and Threatened Litigation			
Litigations	0.0	0.0	0.0
Non-Litigations	0.0	0.0	0.0
Total	**0.0**	**0.0**	**0.0**

Section 5: Departmental Overview

Overview

The National Research Council Canada (NRC), is Canada's principal public sector R&D organization and a leader in the development of an innovative, knowledge-based economy through science and technology. It is a national organization with significant regional and community-based representation with approximately 3,400 employees and 1,100 guest workers, a budget of $545 million and revenue of $68 million for 2000-2001. In addition, it is an integral part of the Industry Portfolio and the S&T community.

NRC creates value to Canadians principally through:

- undertaking research and development in science and technology, technology transfer activities, and advisory services to government;
- leading the development of Canada's national, regional and community-based S&T innovation infrastructure and systems of innovation;
- fostering national and international relationships that support Canada's S&T research, development and innovation efforts, and supporting industry, including SMEs across Canada and globally;
- developing and disseminating S&T information, intelligence and knowledge essential to the development of Canada's new knowledge-based economy; and
- fostering and enhancing a Canadian innovation culture – demonstrating to Canadians the importance, relevance and contributions of government research, development and technology transfer to Canada's prosperity, quality of life and well-being of individual Canadians.

PROGRAM MANDATE

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

Under the *NRC 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 industries.
- operating and administering any astronomical observatories established or maintained by the Government of Canada.
- administering NRC's research and development activities include grants and contributions used to support a number of international activities.

- providing vital scientific and technological services to the research and industrial communities. This mandate is discharged to a great extent through the operation of IRAP, CISTI and the CTN.
- establishing, operating and maintaining a national science library and to publish, sell and otherwise distribute scientific and technical information. NRC fulfils this mandate through CISTI, providing Canadians with access to worldwide scientific, technical, medical and related information and expertise.

Under the *Weights and Measures Act*, NRC is responsible for primary standards of physical measurements as formally established by the *Weights and Measures Act* and the *National Research Council 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.

VISION TO 2001

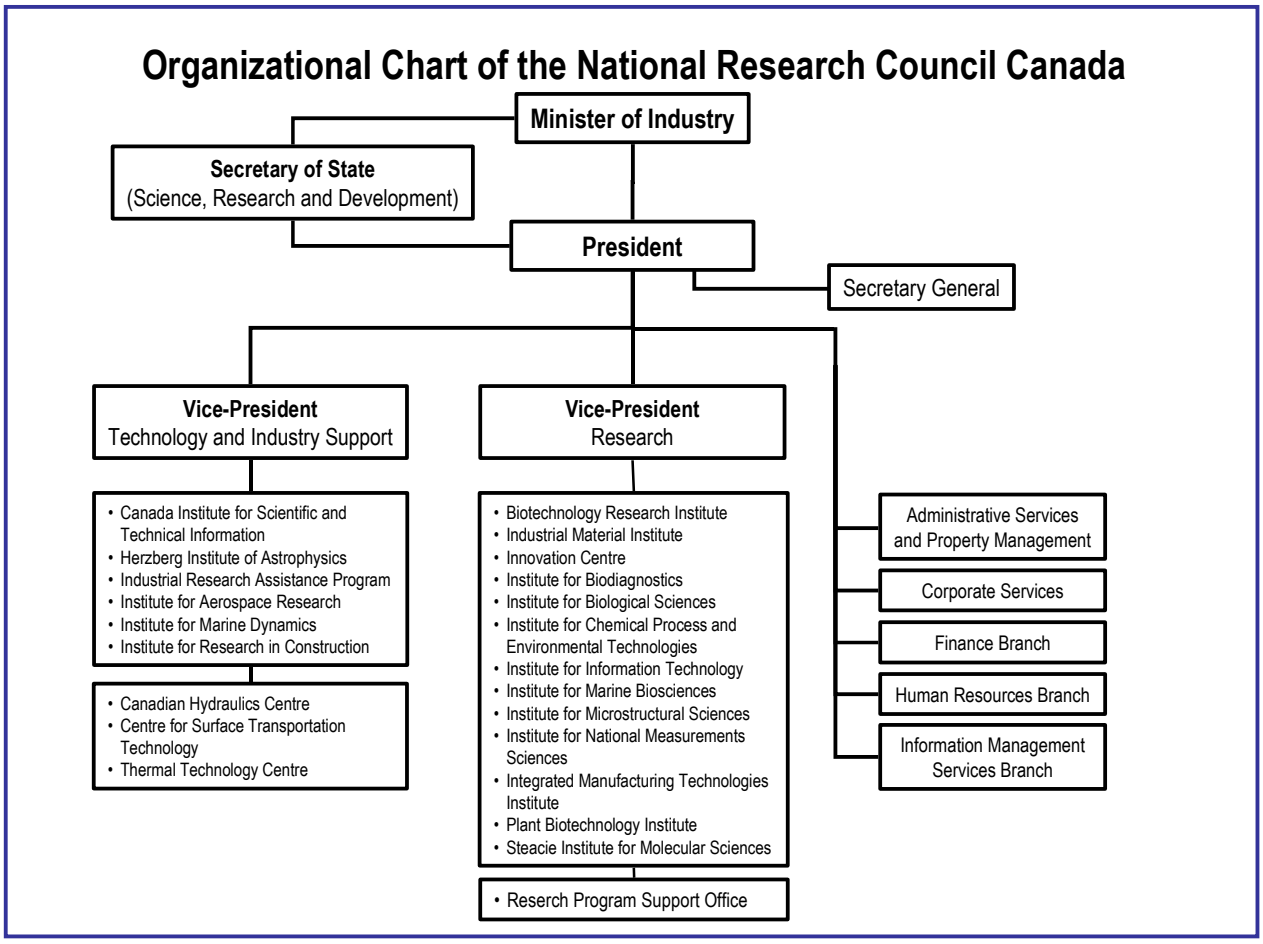
As Canada's foremost research and development agency, NRC will be a leader in the development of an innovative, knowledge-based economy through science and engineering. NRC will accomplish this by:

- being dedicated to excellence in advancing the frontiers of scientific and technical knowledge in areas relevant to Canada;
- carrying out focused research, in collaboration with industrial, university and government partners, to develop and exploit key technologies;
- providing strategic advice and national leadership to integrate key players in Canada's system of innovation; and
- taking a more aggressive, entrepreneurial approach to ensure the transfer of our knowledge and technological achievements to Canadian-based firms.

AGENCY ORGANIZATION

NRC is divided into three business lines that provide a balance between undertaking research and technology development, providing information, technical and financial assistance to industry and the public, and supporting the organization with corporate services. For details on objectives, description and resources refer to the respective business line in Section 2.

The organizational chart of NRC follows on the next page.


Organizational Chart of the National Research Council Canada
Minister of Industry
Secretary of State
(Science, Research and Development)
President
Secretary General
Vice-President
Technology and Industry Support
Vice-President
Research
Canada Institute for Scientific and Technical Information
Herzberg Institute of Astrophysics
Industrial Research Assistance Program
Institute for Aerospace Research
Institute for Marine Dynamics
Institute for Research in Construction
Canadian Hydraulics Centre
Centre for Surface Transportation Technology
Thermal Technology Centre
Biotechnology Research Institute
Industrial Material Institute
Innovation Centre
Institute for Biodiagnostics
Institute for Biological Sciences
Institute for Chemical Process and Environmental Technologies
Institute for Information Technology
Institute for Marine Biosciences
Institute for Microstructural Sciences
Institute for National Measurements Sciences
Integrated Manufacturing Technologies Institute
Plant Biotechnology Institute
Steacie Institute for Molecular Sciences
Reserch Program Support Office
Administrative Services and Property Management
Corporate Services
Finance Branch
Human Resources Branch
Information Management Services Branch

Section 6: Other Information

Contact for Further Information

Corporate Headquarters
1200 Montreal Road
Montreal Rd. 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 & Privacy
(613) 990-6111

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

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

LEGISLATION ADMINISTERED AND ASSOCIATED REGULATIONS

NRC has responsibility for the administration of the:

- *National Research Council Act* R.S.C., 1985, c. N-15, never amended

NRC has responsibility for calibration and certification of standards of measurements under the:

- *Weights and Measures Act* R.S.C., 1970-71-72, c. W-6

NRC provides technical support to the Canadian Commission of Building and Fire Codes.

Appendix A: Awards and Achievements

Awards and Honours

Sue Abrams, PBI	▪ 2000 Burris Distinguished Lecturer, South Dakota State University
James Beaudoin, IRC	▪ Chair of the Gordon Conference on the Chemistry and Physics of Cement 2002 ▪ Appointed to Fellows Nominating Committee – Royal Society of Canada ▪ Appointed to Panel for selection of Fellows, American Ceramic Society
Robert Boyd, IMB	▪ Canadian Society for Chemistry's 2001 Maxxam Award
Keith Brockwell, IAR	▪ Fellow of the Society of Tribologists and Lubrication Engineers
Arthur J. Carty, NRC President	▪ Officer of the Order of Canada ▪ National Merit Award, Ottawa Life Sciences Council, Ottawa, Canada
Shannon Cassidy and team, CS	▪ International Association of Business Communicators Award
Qianfa Chen, IBS	▪ AGCELLENCE Award from Agriculture and Agri-food Canada in the category of innovation for exceptional accomplishments during 1991-1995
Paul Corkum, SIMS	▪ LOESS Distinguished Lecturer Award 2001-2002
Jennifer Decker, INMS	▪ A. von Humboldt Fellowship
Michel J. Desrochers, BRI	▪ Genesis Award, BIOQuebec
Sabry F. El-Hakim, IIT	▪ International Society for Photogrammetry and Remote Sensing (ISPRS) President's Honorary Citation for contribution to the society during the 1996-2000 period
François G. Hamel, IMI	▪ G. MacDonald Young Award of the *Conseil canadien de l'ASM*
Pawel Hawrylak, IMS	▪ Associate, Canadian Institute for Advanced Research Nanoelectronics Program
Marie-Laure Hellin, IMI	▪ First prize, *Agence Québec-Wallonnie-Bruxelles pour la jeunesse, pour sa mission «Aérospatiale: études des cristaux, domaine optique»*
Yaoping Hu, IMTI	▪ Fellowship of the Japan Science and Technology Corporation

Industrial Materials Institute	▪ Partenariat de l'Association de recherche industrielle du Québec (ADRIQ) Prize with Tecnar Automation
Santosh Lall, IMB	▪ Aquaculture Association of Canada Research Award of Excellence
Simon Lilly, HIA	▪ Second Sackler Lecturer at Leiden University, the Netherlands
David J. Lockwood, IMS	▪ D. Sc in Physics from the University of Canterbury
Don MacAuley, IRAP	▪ Citizenship Award from the Association of Professional Engineers of Nova Scotia
Mario Monteiro, IBS	▪ 2000 Young Scientist Award, XIII Helicobacter pylori Conference, Rome, Italy
Don Morton, HIA	▪ Minor Planet 20106 was named "Morton" by the International Astronomical Union in honour of Don Morton upon his retirement as HIA Director General. This Minor Planet was discovered by David Balam, U. Victoria, with the HIA's 1.8-m Plaskett Telescope in 1995.
Joe Mueller, IRAP	▪ BC Biotech Alliance Award for «Community Involvement and Biotechnology Education»
Éric Paquet, IIT	▪ Recognition Award: Digital Human Modelling for Design and Engineering from the Society of Automotive Engineers (SAE) – The Engineering Society for Advancing Mobility Land Sea Air and Space (June 2000)
Chris Ryan, IRAP	▪ John Howard Award for 2000, for excellence in his work as an ITA
John Ripmeester, SIMS	▪ Albright and Wilson Visiting Fellow, University of Warwick, Coventry, UK ▪ Fellow, Royal Society of Canada
Andrew Sachradja, IMS	▪ Associate, Canadian Institute for Advanced Research Nanoelectronics Program
George Salloum, IMTI	▪ Fellowship of the Canadian Academy of Engineering
Micheal Sava, Gopala Gowda, Dee Hopson, Den Wagner, Doug Stone, Christine Machida, Ann Papke and Dick Weytze, IRAP	▪ Ontario Merit Award
Software Engineering Group, IIT	▪ NSERC/Conference Board of Canada Leo Derikx Award for long-term university-industry collaboration with other CSER partners

Peter Stetson, HIA	▪ Astronomical Society of the Pacific Maria and Eric Muhlmann Award for 2000
Albert Stolow, SIMS	▪ Barringer Award of the Spectroscopy Society of Canada, 2001
Paul Thorburn, IMD	▪ Third Millennium Medal of the Institute of Electrical and Electronic Engineers
James F. Whitfield, IBS	▪ Lifetime Achievement Award from the Ottawa Life Sciences Council
George Wong, Innovation Centre	▪ Distinguished International Member of the Institute of Noise Control Engineering
Alf C. Warnock, IRC	▪ ASHRAE Certificate of Appreciation as Chair of Technical Committee 2.6
Robert Wolkow, SIMS	▪ Fellow, Royal Society of Canada

Notable Achievements

John Archer, IRC	▪ Paul Harris Fellow – Rotary Club of Ottawa
Sherif Barakat, IRC	▪ Appointed Jury Chair for the 2000 Canadian Consulting Engineering Awards ▪ Appointed to the Jury of the 2000 Canadian Construction Association Innovation Awards
John Berndt, IRC	▪ Toronto Construction Association Innovative Product/Technology Award – Judge
Martin Bureau, Florence Perrin and Johanne Denault, IMI	▪ Best Paper Award of the Society of Plastics Engineers, Composites Division, presented at ANTEC 2000, Orlando, United States, 7-11 May 2000
Adaire Chown, IRC	▪ Certificate of Appreciation – Canadian Home Builders Association Technical Research Committee ▪ Certificate of Appreciation – Building Officials' Association of British Columbia
Kevin Cooper, IAR	▪ The only non-European invited to join the European Car Aerodynamics Association
Louis E. Daignault and Richard Gendron, IMI	▪ Best Paper Award – Foams from the Thermoplastic Materials and Foams Division of ANTEC 2000

Robert Gaunt, a University of Victoria co-op student working at HIA, now a full-time employee of NRC	▪ Canadian Society for Mechanical Engineering Gold Medal for "Outstanding Academic Achievement in Mechanical Engineering" to a graduating student in the baccalaureate program
Guy Gosselin, IRC	▪ Certificate of Appreciation – Engineering Institute of Canada
John Haysom, IRC	▪ Certificate of Appreciation – Canadian Home Builders' Association Technical Research Committee
Jerzy Komorowski, IAR	▪ Canadian National Delegate to the International Committee on Aeronautical Fatigue
Jean-Gabriel Legoux, Bernard Arsenault, V. Bouyer, Christian Moreau and Luc Leblanc, IMI	▪ Best Paper Award International Thermal Spray Conference ITSC'00 of the ASM Thermal Spray Society
Basil R. Marple and Joël Voyer, IMI	▪ Best Paper Award, International Thermal Spray Conference ITSC'00 of the ASM Thermal Spray Society
Anna Matas, IBD	▪ First prize for a poster in the Research category at the Canadian Association for Wound Care Conference, Montreal, QB, November 2000
Jon Meltzer, IBD	▪ Keith L. Moore Award from the University of Manitoba's Department of Human Anatomy and Cell Science ▪ Third place in the Air Canada Student Entrepreneurship Award competition at the University of Manitoba
Bram Ramjiawan, IBD	▪ Part of business plan team that won a Golden Phone award (ability to keep venture capitalist on the phone) from the San Diego State University's business plan competition ▪ Novartis-Drug Discovery Poster Presentation Award (Joint meeting of Canadian and Swiss Pharmacology and Toxicology Societies -Zermatt Switzerland)
R. Rich, IRC	▪ Director's Award for best student paper (Speech Intelligibility) – CAA 1999
Randy Summers, IBD	▪ Bibliotheca Medica Canadiana, 2000 BMC Research Paper Prize

Appendix B: NRC's Institutes, Branches and Centres

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

BIOTECHNOLOGY GROUP

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

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

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

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

Plant Biotechnology Institute (PBI) - Saskatoon, Saskatchewan
Director General: Dr. 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: Dr. Andrew Woodsworth
General Inquiries: (613) 993-3320
http://www.nrc.ca/iit/

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

MANUFACTURING TECHNOLOGY 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 Technologies (ICPET) - Ottawa, Ontario
Director General: Dr. Don Singleton (*acting*)
General Inquiries: (613) 998-8192
http://www.nrc.ca/icpet/

Industrial Materials Institute (IMI) - Boucherville, Québec
Director General: Dr. 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
Director General: Dr. Simon Lilly
General Inquiries: (250) 363-0040
http://www.nrc.ca/hia/

Industrial Research Assistance Program (IRAP) - Ottawa, Ontario
Director General: Margot Montgomery
General Inquiries: (613) 998-0950
http://www.nrc.ca/irap/

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

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

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

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

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

TECHNOLOGY CENTRES

Canadian Hydraulics Centre (CHC) - Ottawa, Ontario
Director: Dr. 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) 998-9638
http://www.nrc.ca/cstt/

Thermal Technology Centre (TTC) - Ottawa, Ontario
Director: Dr. Jeff Linton
General Inquiries: (613) 998-5338
http://www.nrc.ca/ttc/

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)
Director General: Lucie Lapointe
General Inquiries: (613) 993-4769
Lucie.Lapointe@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